FINAL

SUPPLEMENT TO THE FINAL ENVIRONMENTAL STATEMENT

STORAGE REALLOCATION: JOHN REDMOND DAM and RESERVOIR, KANSAS

VOLUME I

United States Army Corps of Engineers; Tulsa District
1645 South 101 East Avenue
Tulsa, OK 74128-4609

February 2013

FINAL SUPPLEMENT
TO THE FINAL ENVIRONMENTAL STATEMENT
ABSTRACT

Lead Agency: US Army Corps of Engineers

Title: Final Supplement to the Final Environmental Statement (FSFES)
Storage Reallocation: John Redmond Dam and Reservoir, Kansas

Designation: Final Supplement to the SFES (FSFES)

Proposed Action: Reallocate water storage from the flood control to the conservation pool by raising the conservation pool elevation 2 ft, in a single, permanent pool raise, from elevation 1039 ft NGVD to 1041 ft NGVD. This action provides a more equitable redistribution of remaining storage capacity depleted as a result of greater influx of sediment than originally expected and the uneven sediment accumulation and distribution within the conservation pool.

Affected Jurisdiction: The John Redmond Reservoir project lands covers approximately 29,800 acres and approximately 190 river miles downstream of the dam. Of the total acreage, approximately 18,545 acres are leased to the US Fish and Wildlife Service and managed as the Flint Hills National Wildlife Refuge and 1,472 acres are leased to the State of Kansas and managed by Kansas Department of Wildlife and Parks as the Otter Creek Wildlife Area. All 29,800 acres are situated in Coffey County, Kansas.

Point of Contact: Stephen L. Nolen, Chief, Planning and Environmental Division (CESWT-PE);
1645 South 101st East Avenue, Tulsa, OK 74128-4629; telephone 918-669-7660.

Abstract: This FSFES addresses alternatives and environmental impacts associated with the reallocation of water supply storage from the flood control pool to the conservation pool at John Redmond Reservoir by permanently raising the conservation pool elevation by two feet from 1039 ft NGVD to 1041 ft NGVD. This proposed action provides a more equitable redistribution of remaining storage capacity depleted as a result of greater influx of sediment than originally expected and the uneven sediment accumulation and distribution within the reservoir. Normally, the Corps does not raise the elevation of the conservation pool solely to adjust for the impacts of sedimentation; rather, the storage capacity is redistributed among authorized project purposes. However, this proposed action of raising the conservation pool is expected to ameliorate the adverse impacts of the unanticipated sedimentation on the M&I water supply storage that the State acquired under the two contracts. Water supply storage was to occur within the conservation pool when maintained at the surface elevation of 1039.0 ft NGVD. Studies by the USACE have determined that sediment is accumulating in the conservation pool at a faster rate than originally forecasted and is reducing the amount of available storage capacity. A range of alternatives was developed and screened to determine viable alternatives to carry forward for analysis. The result was four alternatives that are evaluated in this FSFES: no action, raise the conservation pool elevation by 2 ft, raise the conservation pool by 2 ft incrementally, and dredge the sediments from the conservation pool. Assessment topics include impacts to the manmade structures and facilities on land leased to the USFWS and managed as the Flint Hill National Wildlife Refuge that would be submerged as a result of the pool raise and terrestrial habitat at both the Refuge and the Otter Creek Wildlife Management Area. Volumes I and II include the FSFES and supporting information, Volume III is the Storage Reallocation Report.

Review Comments Deadline: Comments must be received by 26 March 2013.

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VOLUME I

Prepared for:

Storage Reallocation: John Redmond Dam and Reservoir, Kansas

U.S. Army Corps of Engineers, Tulsa District
1645 South 101 East Avenue
Tulsa, OK 74128-4609

Prepared by:

engineering-environmental Management, Inc.
9563 South Kingston Court
Englewood, CO 80112

February 2013

EXECUTIVE SUMMARY

John Redmond Dam was initially authorized as the Strawn Dam and Reservoir under the Flood Control Act of 17 May 1950. The intent of design and construction was to provide flood control, water conservation, recreation, and water supply for communities along the Neosho River in southeastern Kansas. The John Redmond Project is also operated for wildlife purposes. Up to the time of construction, the Neosho River had flooded 57 times in 34 years of recorded history. The project was renamed John Redmond Dam and Reservoir by an act of Congress in 1958, to posthumously honor John Redmond, publisher of the *Burlington Daily Republican* newspaper, and one of the first to champion the need for flood control and water conservation along the Neosho River.

Dam construction by the U.S. Army Corps of Engineers (USACE) was undertaken between 1959 and 1964, at a site west of Burlington, Kansas. Water storage began during September 1964, collecting drainage from an approximately 3,015-square mile drainage basin. John Redmond Dam lies below Marion Dam, constructed on the Cottonwood River (a tributary to the Neosho River), and Council Grove Dam, also constructed on the Neosho River and is the integral component of this flood control system. Uncontrolled drainage to the John Redmond Dam includes approximately 2,569-square miles below the upper two dams. Downstream of John Redmond Dam to the Grand Lake O' the Cherokees in Oklahoma, approximately 7,238-square miles of uncontrolled drainage releases water to the Neosho River.

John Redmond Reservoir contains two types of water storage that are separated by zones from the top to the bottom of the lake: flood control pool and conservation pool. Unlike other Corps reservoirs, there is no inactive storage pool at John Redmond. The upper zone provides 524,417 ac-ft of flood control storage and is reserved to contain floodwaters; it otherwise remains empty and is managed for agriculture, wildlife habitat, and recreation under the Otter Creek State Wildlife Area, Flint Hills National Wildlife Refuge, and USACE authorities. The conservation pool provides 50,501 ac-ft of storage for water supply, water quality, and space to contain sediment. The pools, dam structure, agricultural land, wildlife habitat, and recreation sites are contained within approximately 29,800 acres.

The state of Kansas and the federal government entered into a water supply agreement in 1975, for 34,900 ac-ft of water storage and through the design life of the project (calendar year 2014). The water is provided to the Cottonwood and Neosho River Basins Water Assurance District Number 3 and the Wolf Creek Nuclear Generating Station. District Number 3 includes 21 municipal and industrial water users. Water supply storage was to occur within the conservation pool when maintained at the surface elevation of 1039.0 ft. Studies by the USACE have determined that sediment is accumulating in the conservation pool and is reducing the amount of water stored there. Without the pool rise, the amount of conservation storage reduction predicted by calendar year 2014 is approximately 16,946 ac-ft. This is 35.7% short of the contractual agreement. The reallocation report is included in this FSFES in Volume III.

The USACE has been authorized by Congress to conduct a study of reallocation of flood control storage to provide the loss of water supply. This SFES addresses the water supply

storage reallocation in accordance with the National Environmental Policy Act of 1969, as amended (NEPA) (42 USC § 4332 (1994)) and the Council on Environmental Quality Regulations for Implementing the Provisions of the National Environmental Policy Act (40 CFR Parts 1500–1508).

Purpose and Need for the Action

The purpose and need of the proposed federal action is to make an equitable redistribution of the storage remaining between the flood control pool and conservation pools due to uneven sediment distribution. Sediment has been collecting mainly in the conservation pool, thereby reducing the conservation pool faster than was designed while the flood control pool has not received as much sediment and has retained more storage than it was designed to retain. The reallocation does not guarantee the water storage volume contracted to the Kansas Water Office by the 1975 agreement, but makes an equitable redistribution of the remaining storage. The project area is defined as the John Redmond Dam and Reservoir site and the Neosho River to near the Oklahoma border or approximately 190 river miles of the approximately 350-mile-long Neosho River.

The purpose of this SFES is to assess potential environmental impacts of water storage reallocation and the higher conservation pool elevation. As addressed under Council on Environmental Quality regulations, an environmentally preferred alternative is identified in Chapter 2.0. For purposes of National Environmental Policy Act analysis, direct environmental impacts are those associated with the USACE water storage reallocation actions and an alternative to dredge sediments, while cumulative environmental impacts are associated with other activities in the drainage basin. The USACE will consider all environmental impacts identified in the SFES in its decision process before issuing a Record of Decision.

The USACE, acting as the lead agency, will use the SFES in its consideration of water storage reallocation. An agreement between the Kansas and the USFWS to replace man-made structures at the Flint Hills Wildlife Refuge impacted by the pool raise was required for project approval. As of February 2013, said replacement and/or mitigation measures have been completed. This SFES is intended to provide decision makers, responsible agencies, and citizens with enough information on the potential range of environmental impacts to make decisions on the alternatives analyzed in the document.

Other project-related studies have been or are being undertaken, including the preparation of the Flint Hills National Wildlife Refuge Comprehensive Conservation Plan, SUPER modeling performed for the John Redmond Sediment Redistribution Study; U.S. Geological Survey studies of channel widening and low-volume dams; a biological assessment of the proposed action and alternatives to threatened or endangered species identified as present in the project area; annual census for waterfowl and raptor populations; and research performed to study the distribution, abundance, and life history of threatened or rare fish and mussel species.

The SFES process is designed to involve the public in federal decision making. Opportunities to comment on, and participate in, the process were provided during preparation of the draft SFES early in 2001. Comments from citizens and agencies were solicited to help identify the

primary issues associated with the water storage reallocation project. Public meetings and workshops were held as part of the water storage reallocation process to obtain comments on the alternatives under consideration and to identify favorable elements or offer differing opinions. The public input, as well as feedback from the appropriate resource and permitting agencies, will be used to evaluate the alternatives and environmental impacts prior to final decisions.

Since its initiation, the reallocation study has been delayed for a number of years as a direct result of levee safety issues associated with the Hartford levee at John Redmond Reservoir. These issues, which prohibited a conservation pool raise, have been resolved by repairs to the levee.

Scoping Process

The purpose of scoping is to identify potential environmental issues and concerns regarding water storage reallocation. The scoping process for the SFES included public notification via the *Federal Register*, newspaper advertisements, direct mail, and two public meetings and workshops. The USACE considered comments received during the scoping process in determining the range of issues to be evaluated in the SFES.

In accordance with NEPA requirements, a notice of intent to prepare a SFES was published in the *Federal Register* on 7 April 2000. The USACE received 17 comment forms, letters, electronic mail, and a petition during the scoping period in response to the notice of intent and public meetings. These written comments addressed the reallocation agreement, flood control storage loss, dredging, dam safety, wildlife management and wildlife habitat improvement, recreation, and an area of driftwood accumulation in the Neosho River that is locally dubbed the logjam. A more detailed summary of the written scoping comments is included in Chapters 1.0, 7.0, and appendix A.

As part of the SFES scoping process, the USACE held public meetings in Burlington and Chetopa, Kansas (29 March 2001and 5 April 2001, respectively). The public meetings or workshops were designed to inform citizens about the water storage reallocation alternatives and to solicit public participation and comments. In addition to these meetings, another meeting was held with the Neosho Basin Advisory Committee on 16 March 2001. Two written comments were received during the meetings; however, attendees could obtain comment forms to fill out and return at a later date. Because of the scoping meetings and receipt of written comments, an alternative to dredge sediments from the conservation pool was also evaluated by means of the following summary of alternatives.

Proposed Alternatives

Alternatives studied for water storage reallocation included: no action, raise the conservation pool elevation by 2 ft, raise the conservation pool by 2 ft incrementally, and dredge the sediments from the conservation pool.

Under the no action alternative, the dam and reservoir would be operated as they are currently and there would be insufficient water supply storage to meet contractual agreements. This alternative provides the baseline to assess the environmental effects of other alternatives.

Another alternative is to reallocate water storage in the conservation pool by 2 ft in increments of 0.5 ft, 0.5 ft, and 1 ft. Raising the water stored in the conservation pool from 1039.0 ft to 1041.0 ft would achieve the water storage obligation. However, the current water supply agreement with the Kansas Water Office allows for a conservation pool adjustment of 0.5 ft.

A final alternative is to dredge sediments from the conservation pool and forego a raise in the pool elevation. Potential dredging activities could be mechanical or hydraulic, the latter producing much larger quantities of spoil. Dredging requires identification of a disposal site, haul roads and routes, and possible long-term disposal site maintenance. This is rarely a viable alternative due to costs and potential environmental impacts.

The preferred alternative is to reallocate water storage in the conservation pool by 2 ft in a single pool raise. Raising the water stored from elevation 1039.0 ft to 1041.0 ft would achieve the water storage obligation. However, the current water supply agreement with the Kansas Water Office allows for conservation pool adjustments of 0.5 ft. Both alternatives to raise the conservation pool by 2 ft ultimately have the same environmental effect. There is more time involved in the incremental raise, depending on how it is implemented.

Volume I of the SFES provides a description of existing environmental conditions in the Neosho River drainage, including John Redmond Dam and Reservoir. Existing conditions are described for the following resource categories: geology; soils; hydrology; water resources; biological resources; air quality; aesthetics; prime or unique farmland; socioeconomic resources; cultural resources; and hazardous, toxic, or radiological wastes. Volume II includes coordination, correspondence, and reports supporting the analysis in Volume I. Volume III includes the Storage Reallocation Report.

Environmental Impacts

The SFES evaluates potential environmental impacts of the water storage reallocation alternatives. The report compares potential environmental impacts with NEPA and the Council on Environmental Quality impact significance thresholds for each of the environmental resource categories described under Section 3.0 “Description of the Affected Environment.” The environmental impacts of the alternatives described above are summarized in table ES-1.

TABLE ES-1. SUMMARY OF POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental Resource	No Action Alternative	Dredge John Redmond Reservoir Alternative	Phased Pool Storage Reallocation Alternative	Proposed Action: Storage Reallocation
Geology and Soils	No insignificant or significant impacts; no mitigation measures would be required.	Long term, insignificant or significant adverse depending upon mitigation.	Long term insignificant adverse; no mitigation would be required.	Long term insignificant adverse; no mitigation would be required.
Hydrology and Water Resources	Long term significant adverse; mitigation measures would be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Short-term insignificant or significant adverse (depending on the level of sediment contamination); mitigation measures may be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Long term insignificant adverse; no mitigation measures would be required.
Biological Resources	No insignificant or significant impacts; no mitigation measures would be required.	Long term insignificant beneficial; no mitigation measures would be required. Short term insignificant and long-term significant adverse; mitigation measures would be required.	Short and long term insignificant beneficial and adverse, and long term significant beneficial and adverse; replacement measures have been completed	Short and long term insignificant beneficial and adverse, and long term significant beneficial and adverse; replacement measures have been completed
Air Quality	No insignificant or significant impacts; no mitigation measures would be required.	Short-term insignificant adverse impacts; mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.
Aesthetics	No insignificant or significant impacts; no mitigation measures would be required.	Short and long term insignificant adverse; mitigation measures may be required.	Short term insignificant adverse; no mitigation measures would be required.	Short term insignificant adverse; no mitigation measures would be required.
Prime or Unique Farmlands	No insignificant or significant impacts; no mitigation measures would be required.	Long term insignificant adverse; mitigation measures may be required.	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.

TABLE ES-1. SUMMARY OF POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Environmental Resource	No Action Alternative	Dredge John Redmond Reservoir Alternative	Phased Pool Storage Reallocation Alternative	Proposed Action: Storage Reallocation
Socioeconomic Resources	Long term insignificant adverse; no mitigation measures would be required. Short and long term significant adverse; mitigation measures would be required.	Short term significant beneficial and short term insignificant adverse; no mitigation measures would be required.	Short and long term insignificant beneficial and adverse; no mitigation measures would be required. Short and long term significant beneficial and adverse; mitigation measures would be required and have been completed	Short and long term insignificant beneficial and adverse; no mitigation measures would be required. Short and long term significant beneficial and adverse; mitigation measures would be required and have been completed.
Cultural Resources	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.
Hazardous, Toxic, or Radiological Wastes	No insignificant or significant impacts; no mitigation measures would be required.	Short term insignificant adverse; mitigation measures may be required (depending on the level of sediment contamination).	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.
Cumulative Impacts	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.

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1.0 PURPOSE AND NEED FOR THE ACTION

1.1 INTRODUCTION

This Supplement to the Final Environmental Statement (SFES) addresses the Water Supply Storage Reallocation Project for John Redmond Reservoir (JRR), Kansas, and the proposed alternatives. The SFES has been prepared by the U.S. Army Corps of Engineers, Tulsa District (USACE) in accordance with the National Environmental Policy Act of 1969, as amended (NEPA) (42 *United States Code* [USC] 4332 (1994).

The USACE project manager operates the John Redmond Dam and Reservoir under the direction of the Operations Division, Tulsa District. It is a multi-purpose dam project filled in 1964 and authorized for flood control, water supply, water quality, recreation, and fish and wildlife habitat. In addition to site management by the USACE, leases have been signed with other federal (U.S. Fish and Wildlife Service [USFWS]) and state (Kansas Department of Wildlife and Parks [KDWP]) agencies to provide land management for the Flint Hills National Wildlife Refuge (FHNWR) and the Otter Creek Wildlife Area (OCWA) (USACE 1976).

The John Redmond Dam is located on the Neosho River, about 3 miles north and 1 mile west of Burlington, Kansas (figure 1-1). Other communities in the vicinity of the dam and reservoir include New Strawn, Hartford, Neosho Rapids, Jacob's Landing, and Ottumwa, Kansas. Downriver effects on the Neosho River to the vicinity of (Grand Lake) Grand Lake O' the Cherokees are also examined in the SFES. The Neosho and Spring Rivers join near Miami, Oklahoma, to form the Grand River, approximately 10 miles upriver of Grand Lake (GRDA 2001) (figure 1-1).

The state of Kansas and the federal government entered into a water supply agreement at JRR to provide water for the Cottonwood and Neosho River Basins Water Assurance District Number 3 (CNRB) and the Wolf Creek Generating Station (WCGS). The CNRB includes 12 cities and four industrial water users (Lewis, pers. comm., 2001). An estimated 34,900 ac-ft of storage remaining after 50 years of sedimentation (calendar year [CY] 2014) forms the basis of the 1975 agreement (USACE 1976). Water storage was to occur within the conservation pool at the 1039.0-ft elevation; however, recent USACE studies have determined that sediment has been deposited unevenly within JRR, both for the predicted amount and location of sediment deposition. The sediment is accumulating in the conservation pool while the flood control pool has experienced less than predicted sedimentation rates (see figure 1-2 for pool boundaries).

1.2 PURPOSE AND NEED FOR ACTION

The purpose of the proposed federal action is to provide an equitable redistribution (reallocation) of storage between the flood control and conservation pools; and for NEPA compliance to determine the potential environmental impacts of the reallocation. The need for the proposed federal action is because the USACE has been authorized by Congress to provide

the redistribution due to the uneven sediment deposition. Most of the sediment deposition has been below the top of the current conservation pool (elevation 1039.0 ft).

For the purpose of the SFES, the project area is referred to as the JRR project, including all leased lands of FHNWR (18,545 acres) and OCWA (1,472 acres), and the Neosho River to near Grand Lake, Oklahoma. The JRR project, including leased lands, covers approximately 29,800 acres of the reservoir and approximately 190 river miles of the Neosho River downstream of John Redmond Dam (figure 1-1).

For purposes of the NEPA analysis, direct environmental impacts, both positive and negative, are those that occur as a direct result of the action and in the same place and at the same time as the action and would be primarily associated with alternatives to reallocate water storage and the no action alternative. Indirect environmental impacts are those that occur indirectly as a result of the action and may be at a different place or at a different point in time. Indirect impacts would primarily occur as a result of the alternative to dredged sediment from the reservoir. Cumulative impacts are impacts associated with other activities in the drainage basin. Cumulative impacts would be evaluated for each alternative in conjunction with the impacts associated with that alternative.

This document is a supplement to the May 1976 *Final Environmental Statement; Operations and Maintenance Program; John Redmond Dam and Reservoir, Grand (Neosho) River, Kansas; Marion Lake, Cottonwood River, Kansas and Council Grove Lake, Grand (Neosho)River, Kansas*. The CEQ regulations implementing NEPA require preparation of an SFES if there is a substantial change in the proposed action, or if there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action and its impacts. The USACE has determined that this SFES is necessary in response to the disproportionate sediment distribution. In light of this sediment distribution, the USACE has had to consider new alternatives to the management and operation to ensure that available water supply storage in the lake is adequate to meet the demands of water supply storage agreements.

1.3 PUBLIC INFORMATION AND INVOLVEMENT

The NEPA process is designed to involve citizens in federal and local decision making. As required by CEQ regulations for implementing NEPA (40 CFR 1500–1508), the USACE provided for an early and open scoping process to determine issues to be addressed and those considered significant to concerned citizens, organizations, and agencies. Public involvement opportunities associated with the scoping process included the SFES notification process, the notice of intent, and the opportunity to comment on the notice of intent, as well as interagency and public scoping meetings.

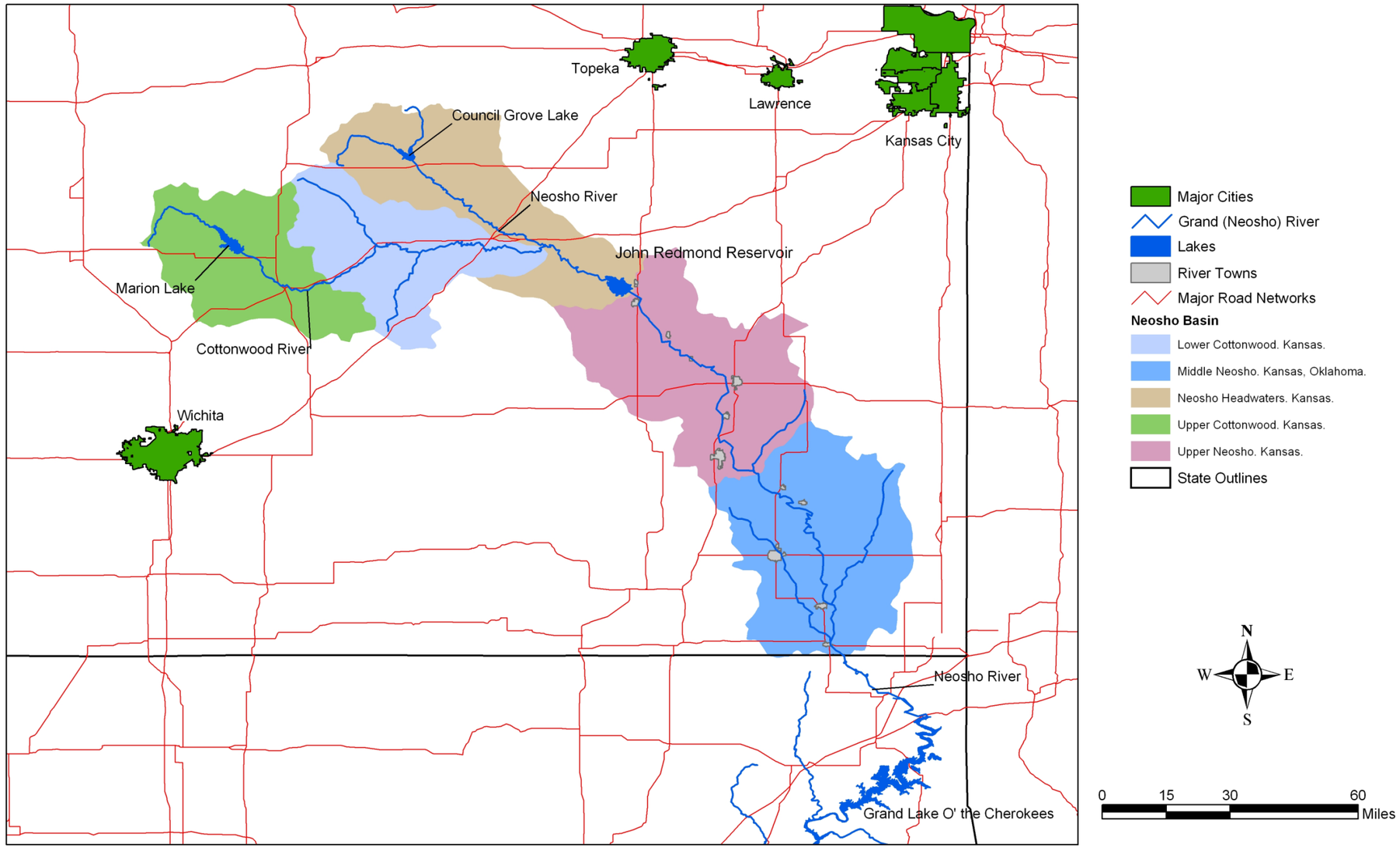

FIGURE 1-1. LOCATION MAP FOR JOHN REDMOND DAM, RESERVOIR, AND THE NEOSHO RIVER TO THE GRAND (LAKE O' THE CHEROKEES) RESERVOIR

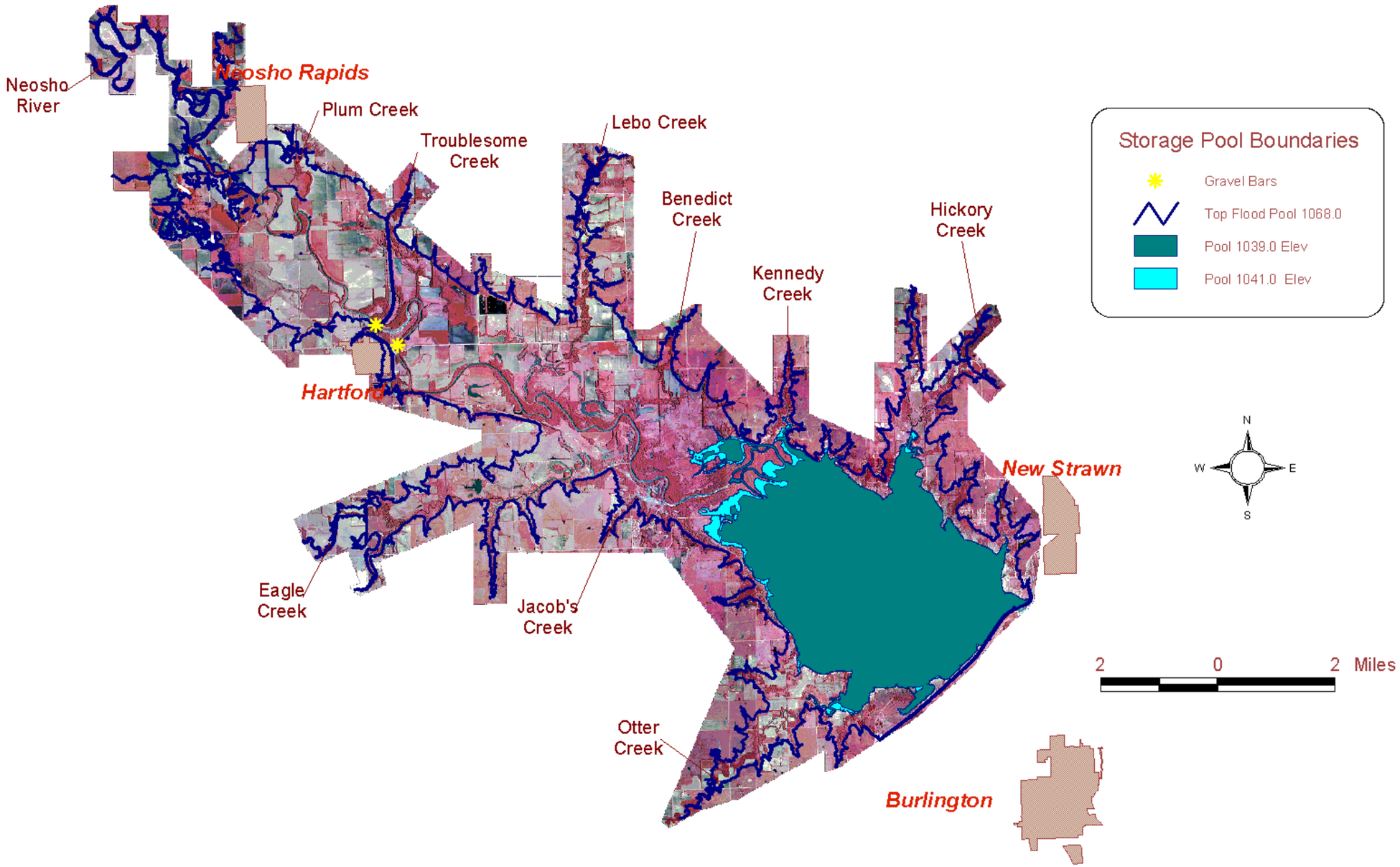

FIGURE 1-2. JOHN REDMOND RESERVOIR SITE CONSERVATION AND FLOOD CONTROL STORAGE POOL BOUNDARIES

Additionally, publication of the draft SFES (DSFES) was announced in the *Federal Register* on 28 June 2002, and the DSFES was circulated to individuals, agencies, and organizations on the mailing list for their comments. Public notices of public meetings on the DSFES were also issued, and public hearings were subsequently held to discuss the study with interested parties. The public input, as well as feedback from resource and permitting agencies, was used to evaluate the alternatives and environmental impacts prior to making final decisions. Sections 1.3.1 and 1.3.2 provide more information on the public coordination process.

1.3.1 Scoping Process

The purpose of scoping is to identify potential environmental issues and concerns regarding the water storage reallocation project. The scoping process for the SFES included public notification via the *Federal Register*, newspaper advertisements, direct mail, and two public meetings. The USACE considered comments received during the scoping process in determining the range of issues to be evaluated in the SFES.

In conformance with the requirements of NEPA (40 CFR 1501.7), a notice of intent to prepare the SFES for the JRR Reallocation Study, Kansas, was published in the *Federal Register* on 7 April 2000 (appendix A). Alternatives to be evaluated were identified in the notice of intent as the no action and two alternatives to raise the lake's conservation pool water level by 2 ft to accommodate for sediment buildup. Significant issues to be addressed in the SFES were identified as potential impacts to:

- Flint Hills National Wildlife Refuge
- recreation and recreational facilities
- structures of the dam
- fish and wildlife resources within, above, and below the reservoir
- downstream flows on the Neosho River
- other impacts identified by the public, agencies, and USACE studies

The scoping period ended on 1 June 2000.

Two public scoping meetings were held in conjunction with the notice of intent. The first meeting was held on 29 March 2001, in Burlington, Kansas, and the second meeting was held on 5 April 2001, in Chetopa, Kansas. In addition to these public scoping meetings, another meeting was held with the Neosho Basin Advisory Committee on 16 March 2000.

The purpose of these meetings was to inform the public of the upcoming water supply reallocation study and to allow citizens an opportunity to comment on the proposed 2-ft raise in the conservation pool water level at JRR. An advertisement for the scoping meetings was placed in the *Coffey County Republican* newspaper on 14 March 2001. Press releases were sent to 47 newspapers and radio and television stations for publication or announcement (appendix A). Copies of the presentation and handout materials are also included in appendix A.

Burlington, Kansas

Thirty individuals representing the public, county agencies, and state agencies attended the scoping meeting held in Burlington, Kansas. Only two written comments were received at the meeting, but attendees could also obtain comment forms to fill out later and return by mail. The following is a synopsis of the concerns expressed by attendees of the Burlington, Kansas meeting:

- Remove the logjam at Jacob's Creek.
- Cut a channel around the logjam.
- Logjam creates a higher pool in the upper reaches of the lake.
- Removal of the logjam would permit water to enter the conservation pool.
- Include seasonal pool management plan in the reallocation study.
- Keep riffles at Hartford clean for madtom habitat.
- Concern for flooding Neosho madtom habitat.
- Operations Division should clean out logjam, as done in early years.
- Logjam is causing increased flooding off USACE property upstream of JRR, around flood pool lands, and upstream to Emporia, Kansas.
- Determine if the increased conservation pool limits Kansas Department of Wildlife and Parks (KDWP) seasonal pool manipulation plans.
- Raising the conservation pool will adversely impact the KDWP OCWA management area (1,600 acres) and make it flood more frequently.
- More damage to crops due to increased flooding because of conservation pool raise.
- Animals are being forced out of their habitat because of higher water levels (i.e., increasing crop damage and increasing car/deer accidents).
- Streambank caving caused from the way the USACE operates JRR, losing cushion of extra flood control storage.
- Should build detention ponds above JRR to trap sediment as was promised before JRR was built.
- Build Cedar Point Lake like the USACE was supposed to.
- Increase in conservation pool will increase the duration and frequency of flooding on easement lands.
- K-130 bridge increases backwater effects.
- High pools isolate non-easement lands preventing farmers from harvesting crops.

The USACE has also received a petition (2001, specific date unknown) signed by 101 individuals from Jacobs Creek, Burlington, Emporia, Hartford, and Neosho Rapids, Kansas. The petition requests the removal of a logjam 0.9 mile east of the Jacobs Creek (Strawn) boat ramp. The petitioners state that the logjam is causing road and property flooding (appendix A).

Chetopa, Kansas

Thirty individuals representing farmers, pecan growers, the city of Chetopa, and a representative from Congressman Coburn's office attended the meeting in Chetopa, Kansas. Most attendees were in opposition to any action that would result in a reduction of flood

control storage, no matter how slight. No written comments were received at the meeting, but attendees could obtain comment forms to fill out later and return by mail. The following is a synopsis of the concerns expressed by attendees of the Chetopa, Kansas meeting:

- There has been an increase in streambank caving on the Neosho River caused by the way the USACE operates JRR for flood control.
- The flood pool is already insufficient.
- A loss of flood control in JRR will increase the duration and frequency, flooding lands downstream on the Neosho River.
- The only real solution to sedimentation in the lake is dredging the reservoir.
- JRR's only purpose is flood control — all other uses are subservient to flood control or are extraneous.
- The only reason the USACE wants to raise the water level is for the duck hunter.

The USACE received 17 comment forms, letters, and electronic mail during the scoping period in response to the notice of intent and/or public meetings. The content of the comments, similar to the concerns expressed at the public meetings, are summarized below and are presented in table 1-1:

- Three generally for the 2-ft raise in water level.
- Nine opposed due to loss of flood control storage.
- Three stated that the lake should be dredged.
- One stated that a raise in the water level would make the dam unsafe.
- Two noted that wildlife management and habitat improvement should be a key part of the project.
- Two noted that habitat would be negatively impacted.
- Two noted that the project would improve recreational opportunities.
- One was opposed to the project because it was being done strictly to benefit recreation.
- Three stated that the logjam needs to be removed.

1.3.2 Public Comment Period on DSFES

Publication of the DSFES was announced in the *Federal Register* on 28 June 2002 (as published in the *Federal Register*, the DSFES was referred to as the DSEIS), and the DSFES was circulated for agency and public review comments from 11 July 2002 to 11 September 2002. Chapter 7.0 contains the list of agencies, organizations, and persons who received copies of the DSFES. The DSFES was also made available through the cities of Burlington, Chanute, Chetopa, and Emporia, Kansas.

Public meetings were held to allow individuals the opportunity to ask questions and submit comments on the DSFES. Two meetings were held on 29 and 30 July 2002, at the Coffee County Courthouse in Burlington, Kansas, and at the Chetopa Public School in Chetopa, Kansas, respectively. Notices for the meetings were published in the *Coffey County Republican* (23 and 26 July 2002), The *Emporia Gazette* (25 and 27 July 2002), The *Iola*

TABLE 1-1. WRITTEN SCOPING COMMENTS

Letter No.	Agency/Organization/ Individuals	Comment	Where Discussed in the SFES – Section	Where Discussed in the SFES – Page
1	Kevin Wellnitz Neosho Rapids, KS	Raising the conservation pool would lead to more frequent flooding of longer duration, which would lower property values.	3.3 3.8.3 3.8.4 4.3	3-3 to 3-16 4-5 to 4-8 3-65 to 3-68 3-68, 69
		Maintenance below the bridge north of Hartford on K-130 is poor. Trees are growing under the bridge obstructing water flow causing water on the west side of K-130.	3.8.4 4.8.6	3-68, 69 4-25
2	Robert Withrow Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage.	3.3 3.8.3 3.8.4	3-3 to 3-16 3-65 to 3-68 3-68, 69
3	Jane Bicker Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage.	3.3 3.8.3 3.8.4	3-3 to 3-16 3-65 to 3-68 3-68, 69
4	Jeff Jackson Columbus, KS	Opposed to raising the conservation pool that would result in loss of flood storage.	3.3 3.8.3 3.8.4	3-3 to 3-16 3-65 to 3-68 3-68, 69
5	Linda Jackson Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage.	3.3 3.8.3 3.8.4	3-3 to 3-16 3-65 to 3-68 3-68, 69
6	Irene & David Elmore Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage.	3.3 3.8.2 3.8.3 3.8.4	3-3 to 3-16 3-60 to 3-65 3-65 to 3-68 3-68, 69
7	Delbert Johnson Oswego, KS	It would be cheaper to dredge the lake than the cost of resulting flood damage.	4.8.1	4-18
		A higher water level would make the dam unsafe.	1.4.3	1-10, 11
8	Henry Bell Chetopa, KS	Release the water from John Redmond when it begins to rain to prevent additional flooding after a flood.	3.3.2 3.3.3	3-6 to 3-9 3-10 to 3-16
		Opposed to raising the pool for hunting and boating.	3.4.6 3.8.2	3-47 to 3-50 3-61 to 3-65
9	Jack Dalrymple Miami, OK	The flood pool is already insufficient. The Corps has had to make releases in excess of channel capacity. Reducing flood storage capacity would further exasperate the situation, resulting in a negative impact downstream.	3.3.2 3.3.3 3.8.2	3-6 to 3-9 3-10 to 3-16 3-61 to 3-65
		Compensating for sedimentation in the conservation pool sets a dangerous precedent. The only solution is dredging.	2.3 3.3 4.8.1	2-2 3-3 to 3-16 4-18

TABLE 1-1. WRITTEN SCOPING COMMENTS

Letter No.	Agency/Organization/ Individuals	Comment	Where Discussed in the SFES – Section	Page
10	W. P. Zimmerman Welch, OK	Any raise in the lake level will decrease flood control. Dredge the sediment.	2.3 3.3 3.8.3 3.8.4 4.8.1	2-2 3-3 to 3-16 3-65 to 3-68 3-68, 69 4-18
11	W.K. Nielsen Emporia, KS	Encourage raising the level of the conservation pool.	Comment Noted.	
12	No name	Neosho madtom habitat will be flooded.	3.4.5	3-43, 44
13	Deborah Wistrom Hartford, KS	Raising the lake level will not stop the existing logjam problem.	3.3.2 3.3.6	3-10, 20, 21 3-25
	Leonard Jirak Hartford, KS	Include pool management for fish and wildlife. Riffles below Hartford need to be periodically flushed to ensure good habitat for madtom.	3.3.3 3.3.6 3.4.4	3-10, 20, 21 3-25, 26 3-39, 40
	Bob Culbertson New Strawn, KS	Manage pool levels with drawdowns for wildlife on a regular basis.	2.5 3.3.2 3.4.4 3.4.5 5.1	2-3 3-9 3-38 to 3-40 3-43, 44 5-2
14	Larry Bess Emporia, KS	Fishing has deteriorated over the past several years due to reduction of riffle areas and silting. Raising the lake level will result in more silt.	3.3.3 4.8.3	3-16 to 3-21 4-21, 22
15	Ron Casey Hartford, KS	The logjam is causing the banks to erode and drop more trees, making the logjam bigger.	3.3.3 3.3.6 3.4.4	3-10, 30, 21 3-25 3-39, 40
		The current lake level is not deep enough to boat on.	3.8.2 3.8.3	3-63 to 3-65 3-67, 68
16	Terry Emmons Hartford, KS	The lake level should be raised 2 to 3 ft.	Comment Noted	
		Clear the logjam to allow easier movement of the fish, and for boating access.	3.3.3 3.3.6 3.4.4	3-10, 20, 21 3-25, 26 3-39, 40
17	Ben Cuadra Waverly, KS	Supports the raising of the pool to increase boating access.	3.8.2 3.8.3	3-63 to 3-65 3-67, 68

Register (25 and 27 July 2002), *Farm Talk* (24 July 2002), the *Chanute Tribune* (25 and 27 July 2002), the *Chetopa Advance* (24 July 2002), and the *Oswego Independent-Observer* (24 July 2002). Appendix H of this Final SFES (FSFES) presents the public notice for the meetings that was published in local newspapers, and any associated correspondence on the availability of the DSFES, including the postcard accompanying the DSFES sent to the mailing list.

The public meetings were conducted as open house and informal question and answer sessions. Three information stations were staffed by knowledgeable representatives of the USACE and the DSFES environmental consultant to assist the public in obtaining details of the proposed action, alternatives evaluated, and potential environmental effects. The DSFES Executive Summary, a Geographic Information System (GIS) presentation, and large-format maps were available to all individuals who attended the meetings. Comment forms and question forms were also available for individuals who wanted to submit written comments.

Burlington, Kansas

All attendees were requested to sign in upon arriving at the meeting. Based on the registration log, 42 individuals representing landowners, the Lyon County Commissioners, Coffee County, the Coffey County Fire Department, Coffey County Emergency Preparedness, the Neosho Basin Advisory Committee, the city of Chanute, the Kansas Water Office (KWO), the KDWP, the USFWS, and the USACE, as well as the mayor of the city of Burlington, were present at the meeting in Burlington, Kansas.

Most attendees asked general questions regarding the NEPA process and the proposed action. Three written comments were received during the meeting, two of which were in support of the proposed action to raise the conservation pool. The last comment was in regard to bank stabilization along the Neosho River and the effect that raising the conservation pool at JRR would have on such efforts. Two individuals requested that they receive hard copies of the DSFES for their review during the public comment period. These individuals were added to the mailing list for the project.

Chetopa, Kansas

All attendees were requested to sign the registration log upon arriving at the meeting. Based on the log, 15 individuals representing landowners, the city of Chetopa, National Farms Feedlots, and the USACE were present at the meeting in Chetopa, Kansas. Most attendees asked general questions regarding the NEPA process and the proposed action. Two written comments were received during the meeting, both of which expressed opposition to the proposed action. Two individuals requested that they receive hard copies of the DSFES for their review during the public comment period. These individuals were added to the mailing list for the project.

1.3.3 Agency and Public Comments on the DSFES

This section summarizes the comments received from federal, state, and local agencies, as well as citizens, during the formal comment period on the DSFES. Copies of agency letters, as well as substantive written comments received from the public, are included in appendix H. Comments considered substantive are those that go beyond casting a vote in support of or in opposition to an action; comments pertaining to information presented in the DSFES; or questions regarding information in the DSFES or the project in general. Letters or forms not containing substantive comment, polls, and petitions are not reproduced in this document. They are on file and available for public inspection at USACE offices in Tulsa, Oklahoma.

Table 1-2 summarizes all written agency and public comments received, as well as responses from the USACE. It is organized into four sections: Federal Agency Comments and Responses; State Agency Comments and Responses; Local Agency Comments and Responses; and Citizens' Comments and Responses. Each section is organized alphabetically by agency / individual name, and are numbered for easy reference. Copies of the written agency and citizen correspondence is provided in appendix H, and are marked in the margin with the corresponding comment number. To distinguish between agency and public comments, agency comment numbers are prefaced with an "A" and public comment numbers are prefaced with a "P."

The USACE response immediately follows each comment summary in table 1-2. Some responses refer the reader to those sections of the SFES where additional information is presented on an issue, while some refer the reader to other comment responses.

1.4 ENVIRONMENTAL SETTING

1.4.1 Climate and Topography

The JRR project area is influenced by a continental climate with average annual precipitation of approximately 35 in in the vicinity of Emporia, Kansas; 40 inches at Chanute, Kansas; and 43 in at Miami, Oklahoma (USACE 1996, NRCS 1982, NOAA 2001). Precipitation is heaviest from late spring through early summer, with about 75% falling during the growing season. Temperatures range from below zero (-30 degrees Fahrenheit (^{o}F) was recorded historically at Chetopa, Kansas) to above 100°F (117°F was recorded historically at Columbus, Kansas) and the winds are predominantly from the south, averaging approximately 12 miles per hour (mph) (FHNWR 2000, NRCS 1990 and 1985). Evaporation rates ranged from approximately 73 in during normal years to approximately 111 in during drought years in the vicinity of Emporia, Kansas (USACE 1996).

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
FEDERAL AGENCY COMMENTS				
U.S. Environmental Protection Agency (EPA), Region VII				
A1	General		The EPA has rated this DEIS as EC-2 (Environmental Concerns – Insufficient Information). A copy of EPA's rating definitions is provided as an enclosure. EPA has assigned this rating on the basis that the DEIS does not provide evidence of analysis with respect to the State of Kansas' plans to address water quality impairments at JRR (siltation and eutrophication) via their Total Maximum Daily Load (TMDL) program.	TMDLs set by the State of Kansas for John Redmond Reservoir were reviewed with respect to potential impacts associated with alternatives. TMDLs exist for both siltation and eutrophication. While the dredging alternative could result in further water quality impairment, the proposed alternative (reallocation and pool level increase) has the potential to improve impaired conditions through dilution and increased water depths (decreasing sediment resuspension). Mr. Tom Stiles of the Kansas Department of Health and Environment (KDHE) was contacted concerning this analysis and concurred with these conclusions. Mr. Stiles stated that the KDHE supports the proposed alternative and sees no adverse impacts on TMDL issues. A short discussion of this issue has been added to the text in Section 4.3.
A2	Table ES-1	ES-5	**Table ES-1. Summary of Potential Significant Environmental Impacts and Mitigation Measures** – In the absence of quality data concerning the chemical composition of lake sediments, EPA cannot agree with the characterization that a dredging alternative would result in *insignificant* consequences to assessed resources. A dredging alternative could resuspend contaminants which include "PCB, atrazine, heavy metals including lead, mercury and arsenic in biota samples, and lead in sediment samples" DEIS, page 3-17, last paragraph. At certain concentrations, these contaminants could not only present a threat to aquatic biota within JRR, but once re-introduced into the water column, these contaminants could also be passed through the spill way to present a health concern, or economic burden (monitoring and removal costs) to water consumers in the lower reaches of Neosho basin. The Corps statement at 4.3 (Dredge Alternative), "The significance of these effects would be dependent upon the contamination level of sediments," corroborates EPA's concern over this alternative absent any further investigation.	The Tulsa District concurs with the comment, and a discussion has been added to the text related to the dredging alternative in Section 4.3. Table ES-1 has also been updated to indicate that the intensity of impacts is dependent on the level of contamination in lake sediments. However, it is important to note that dredging is not part of the preferred alternative.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
A3	ES-1 1.1 2.1 4.11	ES-1 1-1 2-1 4-30	**P.3 and 4.11 Cumulative Impacts –** The DEIS states that the design life of the JRR project is CY 2014 and that Kansas has entered agreement for water supply of 34,900 ac-ft of annual storage. Given that a cumulative impacts analysis should cover, past, present and reasonably expected future actions that have a bearing on this project, EPA believes that the Corps should evaluate the cumulative impact of siltation/sedimentation against the reasonably expected future demand for water supply storage, and Corps plans for meeting these demands beyond the project design life.	The Tulsa District believes that due to the unpredictable nature of flood events and sediment deposition in the watershed, the year 2014 is a reasonable prediction interval for future storage availability in the cumulative effects analysis.
A4	2.3 3.3.3	2-2 3-20	**P.32, Sec. 2.3 Last Paragraph –** EPA agrees that sediments would "be re-deposited over time," however, the rate at which new sediments would be introduced into JRR is dependent upon the efficacy of soil conservation practices and sediment control best management practices that have been implemented within the watershed.	Most sedimentation in reservoirs occurs sporadically during times of flooding conditions. The impact of land use will have an overall effect depending on topography and the percentage of the runoff basin devoted to agriculture or other soil disturbances. Over the past nearly 40 years, no clear sedimentation trend is apparent, other than the heaviest sediment deposition occurs during significant flood events. Except around the lake itself, the USACE has little impact on this process but fully supports soil conservation efforts in the water shed. The text has been updated in Section 3.3.3 ("Surface Water"), page 3-20, first full paragraph to indicate that future sediment deposition is influenced by such practices.
A5	4.3	4-5	**4.3 Hydrology and Water Resources –** Impacts to water quality from any of the presented alternatives should be evaluated in concert with the KDHE TMDL for JRR. EPA recommends that the Corps assess compatibility of alternatives with proposed TMDLs for JRR.	This evaluation has been conducted and coordinated with the KDHE; please see the response to comment number A1
A6	General		The EPA appreciates the quality and clarity of the DEIS.	Comment noted.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
United States Department of the Interior — Fish and Wildlife Service				
A7	5.4	5-5	The Tulsa District of the Corps of Engineers has been actively working with the USFWS in analyzing the impacts of the proposed action on fish and wildlife resources. However, additional analysis is necessary. The USFWS is pleased that the district has agreed to replace the Jacob's Creek boat ramp and will replace the Goose Bend #4 and Strawn dikes and outlet works that will be partially inundated by project implementation. The USFWS will continue to work with the Corps on implementation of those project mitigation features.	Comment noted.
A8	General		The proposed action provides for a permanent 2-ft increase in the conservation pool at John Redmond Reservoir in Kansas. The USFWS maintains the Flint Hills National Wildlife Refuge, a 18,545-acre overlay refuge on the reservoir and the Kansas Department of Wildlife and Parks manages the 1,472 acres Otter Creek Wildlife Management Area on project lands. The proposed pool raise will inundate approximately 500 acres of land managed specifically for wildlife within these two areas. Fish and wildlife refuge and state game area land inundated by the pool raise is an irreversible and irretrievable commitment of resources, and should be so identified in the FEIS.	Comment noted, and the text in Section 4.4 ("Biological Resources Environmental Impacts"), *Phased Pool Storage Reallocation*, has been updated to reflect this loss, as well as direct readers to the mitigation section to show how this loss would be compensated (see response to comment number A9).
A9	4.4 5.4 Appendix F	4-11 5-6 App. F	The USFWS cannot agree that project implementation will not affect the bald eagle due to a lack of provision for riparian woodland replacement within the draft document. The USFWS, however, anticipates favorable acceptance and implementation of riparian/woodland mitigation recommendation. The Corps acceptance of the USFWS recommendation should be incorporated into the EIS.	The Tulsa District and USFWS have agreed upon mitigation to include 243 acres of wetlands/moist soil and 166 acres of riparian woodland that would be replaced on the Flint Hills National Wildlife Refuge at suitable areas to be jointly determined by the USFWS, Kansas Department of Wildlife and Parks, and the USACE. Section 5.4 ("Biological Resources Mitigation") has been updated to include this mitigation. **This work has been completed.**

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
A10	5.4 Appendix F	5-6 App.	The USFWS's final Fish and Wildlife Coordination Act report is included in appendix F and includes specific comments and recommendations of the Department relevant to this project. The draft EIS discusses mitigation of fish and wildlife habitat losses and the USACE analysis, also included in appendix F, concurred with the majority of the USFWS's recommendations. The draft statement did recognize, but did not address, a recommendation to acquire additional land for fish and wildlife management. The USFWS did not specify the number of acres to be acquired and presented several options for bringing lands into federal and/or state management authority. The number of acres to be acquired was dependent upon the option or mix of options that may be utilized. Wetland losses are to be mitigated (Corps response to Recommendation 2) and will not require any acquisition; therefore, the only resource loss not addressed is the loss of riparian/woodland habitat. Approximately 195 acres of riparian and woodland habitat bordering the Neosho River within the Flint Hills National Wildlife Refuge or adjacent to the present conservation pool within the NWR and Otter Creek Wildlife Area will be inundated. Riparian/woodland habitat is considered resource category 2. Any loss of habitat value must be replaced in kind.	As indicated in the response to comment number A9, the USFWS and USACE have agreed upon mitigation that would offset the loss to riparian/woodland habitat. An additional bullet has been added to Section 5.4 ("Biological Resources Mitigation"), page 5-6 to indicate how the USACE will address the recommendation. **Replacement of all affected facilities and habitat on the FHNWR has been funded by the KWO and implemented by the USFWS. In-kind replacement of all facilities and habitat is complete.**
A11	5.4	5-6	Detailed measures to mitigate woodland losses should be addressed in the final EIS. The selection of the mitigation option and the implementation of the option should be closely coordinated with the USFWS and the Kansas Department of Wildlife and Parks.	Comment noted, please see response to comment numbers A9 and A10.
A12	1.0 6.0	1-15 6-1	**Section 6.0 Applicable Environmental Laws and Regulations Page 6.1**: The U.S. Fish and Wildlife Coordination Act of 1958 (16 USC 661 *et seq*.) should be added to the list of applicable laws and regulations. The Act is the principal authority for incorporating fish and wildlife conservation measures in water development projects.	Comment incorporated.
A13	General		The district and their consultant should be commended for preparing a well organized and comprehensive EIS. If it had not been for the lack of specific mitigation for riparian/woodland losses, the document would have been exemplary.	Comment noted.
A14	5.4	TBD	The Final Statement should incorporate specific mitigation measures for riparian/woodland loss.	Comment noted, please see response to comment numbers A9 and A10.
A15	General		As this department has a continuing interest in this project, we are willing to cooperate and coordinate with you on a technical assistance basis in further project evaluation and assessment.	Comment noted.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
STATE AGENCY COMMENTS				
Kansas State Historical Society				
A16	3.9.2	3-75	The Kansas State Historic Preservation Office (SHPO) has received and reviewed the above referenced EIS. We cannot comment on the findings concerning cultural resources since we have not reviewed the Rust 2005 report. Our office requests that we be provided a copy of this report detailing the National Register eligibility evaluations of several archeological sites on the John Redmond Reservoir property.	A copy of the report was provided to the Kansas SHPO. Based on subsequent consultation, the Kansas SHPO has provided documentation indicating that a determination of *no historic properties affected* is warranted for the undertaking. The last paragraph in Section 5.9 ("Cultural Resources Mitigation") has been updated to indicate these circumstances, and the appropriate documentation has been included in appendix G.
Kansas Water Office				
A17	General		The Kansas Water Office is supportive of the USACE's efforts to reallocate storage from the flood control pool to the conservation pool to account for uneven sediment distribution. This reallocation is required as a condition of our contract with the federal government.	Comment noted. The water supply agreement calls for the sediment to be redistributed and Exhibit B to be revised once the user has made the final payment for the storage and terms of Public Law 88-140, Permanent Rights to Storage occur.
A18	3.3.5 3.8.3	3-22 3-68	Water supply storage in John Redmond Reservoir is vital to the citizens and industries of the Neosho basin in Kansas. I believe that the report correctly reflects the demand that is placed upon this storage and the limited alternatives that exist for its users.	Comment noted.
A19	5.0	5-1	I am concerned that the reallocation of storage may be used as a reason for improvement or development of mitigation projects that are not directly related to the reallocation of storage. The need for the reallocation is brought about by an original sediment distribution estimate between the conservation and flood pools that does not match the actual situation. Storage available for water supply has been depleted by sediment deposition to an extent that the State's water supply agreement has been infringed upon.	The reallocation of storage in John Redmond Reservoir is not being used as a reason for improvement or development of mitigation projects that are not directly related to the reallocation for water supply storage. All mitigation IS directly related to the reallocation of the water supply storage. This action would not be occurring otherwise. The Tulsa District does not agree that the need for reallocation was due to an incorrect sediment load estimate. However, large storm events have occurred in the watershed that could not have been predicted at the time the original sediment distribution was made. The sediment load rate was accurate but where it fell in the lake was different from that predicted.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
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			As this incorrect estimation was made by personnel of the federal government, it is not appropriate for citizens of the state of Kansas to pay for mitigation efforts that arise from that miscalculation.	It is the Tulsa District's belief that government personnel correctly estimated the amount of sediment going into the reservoir, but where the sediment fell was different due to large storm events that could not have been predicted at the time the sediment deposition was estimated. Raising the top of the conservation pool by 2 ft would not be occurring if not at the request of the State of Kansas for municipal and water supply purposes. The State is receiving benefits from this action. Public Law 88-140 allows permanent rights to storage but all costs associated with the storage must be paid before obtaining those permanent rights.
LOCAL AGENCY COMMENTS				
Coffey County Fire District				
A20	3.8.2 4.8.2	3-6.3 4-19	This letter is being sent to you regarding the concrete boat ramp in Ottumwa, Kansas, in Coffey County at the John Redmond Reservoir Please be advised the Coffey County Fire District #1 would encourage any and all efforts to maintain a fire suppression water fill point in that area.	Comment noted, however, as stated in Section 4.8.3 (Recreation Environmental Impacts), *phased pool storage reallocation alternative* and *proposed action: Storage Reallocation,* only one boat ramp, the Strawn ramp, in the Flint Hills National Wildlife Refuge would be inundated. Therefore, the water fill point in Ottumwa would be maintained.
Wolf Creek Nuclear Operating Corporation				
A21	General		WCNOC supports the U.S. Corps of Engineers' preferred option to increase the conservation pool at John Redmond Reservoir two ft in a single pool rise. This should help ensure sufficient water storage so that the State of Kansas can fulfill water supply contract obligations.	Comment noted.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
A22	2.1 3.8.3	2-1 3-69	In Section 2.1, reference to the operators of Wolf Creek Generating Station (WCGS) is incorrect. WCGS is operated by WCNOC, both of which are owned by Kansas Gas and Electric Company (KEG, now a subsidiary of Westar [Westar] Energy, Inc.), Kansas City Power & Light Company (KCPL, now a subsidiary of Great Plains Energy, Incorporated) and Kansas Electric Power Cooperative Inc. KGE and KCPL have contracted with the state of Kansas for water supply in John Redmond Reservoir to use for WCGS electricity production purposes.	Comment noted and text has been updated.
A23	3.3.2	3-9	WCNOC agrees that the benefits provided by water level manipulation of John Redmond Reservoir are important for fish, wildlife and water quality. Development of a modified water level management plan with the proposed raise in conservation pool elevation should be considered. However, water level manipulations that unreasonably hamper the ability of the State of Kansas to fulfill its obligations for contracted water supply should be avoided.	Past water manipulation plans that have occurred from time to time have no relationship to this proposed reallocation. Any seasonal manipulation plan proposed by local or state interest for the future will be evaluated on its own merits using the procedure required by the Southwestern Division of the USACE. Any additional encroachment into the flood control pool would affect pool elevation and frequency as well as downstream flow frequency and would require detailed analysis similar to that made for the proposed reallocation.
CITIZEN COMMENTS				
Jack Freund				
P1	3.7 3.8 4.8.4 4.8.5	3-59 3-60 4-22 4-23	I am concerned about the change of the elevation of John Redmond Reservoir. I have approx 101 acres of easement land, about 94A. cropland & 7 acres grass. When the Corps purchased the land the elevation was to be 1033, now they are wanting to raise the level to 1041. The Corps of Engineers paid about $100 per acre for the easement. That amount was gone after the 1st flood. We pay taxes on the land the same rate as anyone else on higher land. With lots of trash to pick up. I think we should have an adjustment. Either buy more land or pay more damages on easement land.	The USACE generally purchased all the land at John Redmond up to elevation 1069' in fee. Flowage easements were purchased beyond that elevation up to 1073'. Current government ownership is more than adequate to accommodate a proposed 2-ft rise in the conservation pool elevation from 1039' to 1041'. The Tulsa District does not have specific information on the tract owned by Mr. Freund. However, the U.S. Government paid just compensation for the lands acquired for John Redmond Reservoir. A current owner acquires only the rights in land a former owner had to convey. If a flowage easement had previously been sold, the land remains subject to that burden, including all of the inherent consequences.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
W.K. Nielsen				
P2	General	—	I am in favor of raising the pool level to 1041.0 in one single raise.	Comment noted.
Gary McCurdy				
P3	General	—	I am in favor of raising the conservation level 2 ft.	Comment noted.
Chauncey Shepard				
P4	3.3 3.8.2 3.8.3 3.8.4 4.3 4.8.2 4.8.3 4.8.4 4.8.5	3-3 3-63 3-68 3-71 4-5 4-19 4-21 4-22 4-23	Bank Stabilization: There needs to be something done (besides just studying and talking) to stabilize the banks of the Neosho River. The method of water release from the John Redmond Dam has caused drastic caving and erosion since its implementation in 1964. The rock weirs are not the answer. Raising the conservation pool, in my opinion, cuts down on the capacity to regulate the flood control, which was why John Redmond was built. Too much concern is given to hunters and recreation instead of the farmers, landowners, and others that work along the river.	Comment noted. As indicated in Section 3.8.4, Lands Within the Floodplain Downriver from JRR (page 3-71), a riverbank reconstruction project is currently planned to stabilize a portion of the Neosho River. The SFES takes into account the impact that raising the conservation pool would have on flood frequency and duration, in Section 4.8.2 (Land Use Environmental Impacts, p. 4-20) and Section 4.8.4 ("Economic Effects of John Redmond Reservoir," p. 4-23). These sections indicate that based on the USACE SUPER model (a hydrologic modeling program), there would be no discernable difference in discharge duration or exceedance frequency between conservation pool elevations at 1039, 1040, 1040.5, and 1041.0 ft (see Section 3.3).
Bob D. Eads				
P5	3.3 3.8.3 3.8.4 4.3 4.8.4 4.8.5	3-3 3-68 3-71 4-5 4-22 4-23	I oppose any increase in the conservation pool at J.R. There is no benefit to flood control in this reallocation of the water level.	Comment noted; however, mitigation for flood flows currently in place reduces the adverse effects of an increase to insignificant (see Section 5.3 "Hydrology and Water Resources Mitigation," p. 5-3).

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	**Location**		**Comment**	**USACE Response**
	Section	**Page**		
Henry Bell				
P6	3.3 3.8.3 3.8.4 4.3 4.8.4 4.8.5	3-3 3-68 3-71 4-5 4-22 4-23	I am not for raising John Redmond to hold more water – I have 700 acres underwater when it floods taking my crops and pasture. I don't want to furnish ground to store water while profit is made by doing so. Water stored on my land 12 to 14 days ruins everything for me. GRDA needs to let water out as it comes from J.R. Neither dam should be full the raining season so they could handle more water.	Comment noted. The SFES takes into account the impact that raising the conservation pool would have on flood frequency and duration, in Section 4.8.2 ("Land Use Environmental Impacts," p. 4-20) and Section 4.8.4 ("Economic Effects of John Redmond Reservoir," p. 4-23). These sections indicate that based on the USACE SUPER model (a hydrologic modeling program), there would be no discernable increase in discharge duration or exceedance frequency between conservation pool elevations at 1039, 1040, 1040.5, and 1041.0 ft (see Section 3.3). As stated in response to Comment P1, the U.S. Government paid just compensation for the lands acquired for John Redmond Reservoir. If a flowage easement had previously been acquired by the USACE, the land remains subject to that burden, including all of the inherent impacts.
The Citizens and Friends of Ottumwa, Coffey County, Kansas				
P7	3.8.2 3.8.3 4.8.2 4.8.3	3-63 3-68 4-19 4-21	The concrete boat ramp in Ottumwa, Kansas in Coffey County has NOT been cleared or maintained for many years. At this time, Coffey County Road and Bridge Dept. maintain the road and circle at the boat ramp. So, at this time, the citizens of Ottumwa and the following towns of Hartford, Lebo, New Strawn, and Jacobs Creek and surrounding friends are requesting permission from the Tulsa Corps of Engineers to clean and open this concrete boat ramp which has 2 or 3 ft of silt on it. We wish to maintain it ourselves and relieve you of having to maintain it. This is how Old Strawn boat ramp at Jacobs Creek is maintained by the citizens of Jacobs Creek. We would like to obtain this permission because we have a lot of fishermen with boats and a lot of hunters in the winter that cannot use this lake which ALL parties do pay taxes, licenses and different fees to use this lake and don't have access to it on the Ottumwa side. Because of the fact that there are NO fire hydrants in the town of Ottumwa, this boat ramp is crucial to the town and surrounding area.	This issue is not related to the reallocation of storage that is being addressed by this study. The Tulsa District Operations and Real Estate Division personnel are working with the citizens of Ottumwa, Kansas on this issue.

TABLE 1-2. WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD ON THE DSFES

COMMENT RESPONSE MATRIX Draft Supplement to the Final Environmental Impact Statement Project: John Redmond Reservoir, Kansas				
Comment No.	Location		Comment	USACE Response
	Section	Page		
			Therefore, by not properly maintaining this boat ramp, you have created a major fire hazard in the Ottumwa are by not allowing the fire trucks access to the ramp and therefore, WATER! So, if this ramp is cleaned and maintained by the citizens of Ottumwa and friends OR the Corps of Engineers, it makes it a much needed availability of water for Coffey County Fire Dept. and allows the trucks to pump water out of the lake to supply the necessary water for any fire. If this request is denied, we would appreciate your coming out to clean it and open it so that we can use the Ottumwa boat ramp on this lake.	

The topography is that of a broad floodplain within low, rounded hills. The hills result from generally westerly to northwesterly dipping strata that create resistant bend and irregular cuesta-like ridges (FHNWR 2000). The broad, shallow Neosho River valley is the most prominent topographical feature on the landscape. The maximum relief is about 225 ft in the dam and reservoir area, with most of the site ranging from the approximately 1,020-ft elevation near the south recreation area below the dam, to the approximately 1,100-ft elevation west of Neosho Rapids, Kansas, within the northwestern-most flood pool boundary. The lowest elevations are downriver near the Lake O' the Cherokees (Grand [Pensacola] Lake) where the Grand (Pensacola) Lake surface elevation lies at approximately 742 ft (GRDA 2001).

The Neosho and Spring Rivers join to form the Grand River, approximately 10 miles southeast of Miami, Oklahoma. The Grand River receives drainage from tributaries on the western slopes of the Ozark Mountains. The river channel varies from 1 to 2 miles in width and flows through rolling hills topography (GRDA 2001).

1.4.2 Land Ownership and Land Management in the Planning Area

Most of the lands of the Neosho River floodplain downstream of JRR are privately owned. Approximately 29,800 acres of land are owned by the USACE; this land is upriver from and includes John Redmond Dam and outlet structures. The USACE project manager operates the dam and reservoir under the direction of the Operations Division, Tulsa District. The principal regulation / management issue identified historically was riverbank erosion that occurs after periods of high flows in the Neosho River below the dam. To minimize any riverbank erosion, releases are decreased as slowly as possible to slow the rate of fall in the river stage, since this erosion has been attributed to the fast rate of fall from natural and regulated flows (USACE 1996). However, recent research determined that aside from localized channel widening, there was little post-dam construction change in bank-full channel width on the Neosho River below John Redmond Dam (Juracek 1999).

The USACE maintains six public-use areas, five of which have recreation parks providing camping, picnic areas, drinking water, and sanitary facilities (USACE 1996). Additional recreation facilities present on USACE-managed lands include five boat ramps, an overlook, and a swimming beach. In addition to site management by the USACE, leases have been signed with the USFWS and KDWP to provide land management for the FHNWR and OCWA.

FHNWR was established in 1966, and consists of approximately 18,545 acres located on the upriver portion of JRR (FHNWR 2000). The refuge is managed primarily for migratory waterfowl and shorebirds. OCWA was established in 1966, and consists of approximately 1,472 acres adjacent to FHNWR and the southeast portion of John Redmond Dam. This wildlife area is managed primarily for big game and upland species: white-tailed deer, wild turkey, mourning dove, bobwhite quail, cottontail rabbit, and squirrel.

Permitted activities on the FHNWR include wildlife observation, hiking and sightseeing, photography, boating, picnicking, camping, fishing, hunting, wild food gathering, and fish bait collection. Interpretive trails are present and include Dove Roost Trail and the Headquarters

Trails. OCWA provides wildlife observation, sightseeing, photography, boating, fishing, and hunting opportunities.

1.4.3 Project Development History

The project was authorized as the Strawn Dam and Reservoir under the Flood Control Act of 17 May 1950 (Public Law 516, 81st Congress, Chapter 188, 2nd Session) (USACE 1976). It was to provide flood control, water conservation, recreation, and water supply. The project was renamed John Redmond Dam and Reservoir by an act of Congress (Public Law 85-327, 85th Congress, HD 3770, 15 February 1958). Construction of John Redmond Dam began in June 1959, and final water storage began during September 1964 (USACE 1976 and 1996).

Construction of John Redmond Dam began in June 1959, and final water storage began during September 1964 (USACE 1976 and 1996). John Redmond Dam is an integral component of a three-dam and reservoir system that includes Council Grove Lake and Marion Reservoir. The three structures provide flood control, water supply, water quality, recreation, and other benefits to the Neosho River basin. The conservation pool of JRR was filled to its initial elevation of 1036.0 ft during November 1964, and was raised to the current 1039.0-ft elevation during April 1976. The Wolf Creek Nuclear Operating Corporation, the operators of WCGS, is owned by Kansas Gas and Electric Company (KG&E), Kansas City Power and Light Company (KCPL), and Kansas Electric Power Cooperative, Inc. KG&E and KCPL have contracted with the state of Kansas for water supply storage in the reservoir for the use of WCGS in producing electricity. WCGS pumps water from the Neosho River below the dam structure to store in the Coffey County Fishing Lake, approximately 3 miles east of JRR. The remaining water users divert flows using low-elevation dams and/or by pumping water from the river.

John Redmond Reservoir (figure 3-12, Section 3.6) is an integral component of a three-dam and reservoir system that includes Council Grove Lake, also on the Neosho River, and Marion Reservoir on the Cottonwood River (USACE 1976). The drainage area occupied by all three dams is 3,015-square miles, of which 2,569-square miles below Council Grove Lake and Marion Reservoir is uncontrolled and drains directly to JRR. The following data and table 1-3 presents the post-construction JRR baseline. Specific physical data describing the dam (USACE 1996), include:

- Earthfill Dam Structure: 20,740 ft long (not including spillway); dam top = 1081.5 ft National Geodetic Vertical Datum (NGVD); maximum height = 86.5 ft above the Neosho River bed; crest width = 35 ft 7 in.

- Spillway: located near left abutment; concrete chute, gated ogee weir; crest elevation = 1033.0 ft NGVD; length = 560 ft; control = 14 (40 ft x 35 in) tainter gates; hoists are individual electric motors.

- Outlet Works: two 24-in circular pipes for low flow; one 30-in circular pipe for water supply; invert elevation = 1015.5 ft NGVD; invert placed through left abutment of spillway; control = motor-operated butterfly valves for low flows and manually-operated gate valves.

- Land Acquisition: taking line is semi-blocked to elevation 1063.0 ft; easement is elevation 1073.0 ft or limits of backwater envelope curve.

1.5 RELEVANT FEDERAL, STATE, AND LOCAL STATUTES, REGULATIONS, AND GUIDELINES

The SFES has been written in compliance with recognized federal and state guidelines, regulations, and statutes presented as table 1-4. A more complete list of applicable environmental laws and regulations are presented in Section 6.0.

TABLE 1-3. PROJECT ELEVATIONS, SURFACE AREAS, AND STORAGE VOLUMES

Project Feature	Elevation in Ft NGVD	Surface Area in Acres	Storage Volume in Ac-ft[1]	Spillway Capacity (cfs)
Top of Dam	1081.5	58,187	1,171,000	732,000
Maximum Pool	1074.5	43,106	807,941	575,000
Surcharge Pool	1073.0	41,111	748,977	542,000
Flood Control Pool	1068.0	34,331	574,918	430,000
Conservation Pool	1039.0	8,084	50,501	25,000
Spillway Crest	1033.0	4,801	9,980	0
Inactive Pool	1020.0	0	0	–
Streambed – Dam	995.0	–	–	–
Flood Control Storage	1039.0 – 1068.0	–	524,417	–
Conservation Storage	1020.0 – 1039.0	–	50,501	–

Source: USACE 1996
(1) Based on runoff from uncontrolled drainage area of 2,569 mi^2 (top of dam = 8.55 in and spillway crest = 0.11 in of precipitation). Based on 2000 resurvey date.

TABLE 1-4. RELEVANT LAWS AND REGULATIONS

Environmental Law or Regulation	General Description
National Environmental Policy Act of 1969, as amended	Requires the disclosure of the environmental impacts of any major federal action.
Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Part 1500 – 1518)	The CEQ, which was established by NEPA, has promulgated regulations for the establishment and implementation of procedures for preparing environmental documentation, including environmental impact statements (40 CFR 1502).
Clean Water Act of 1977, as amended	Provides the principle framework for national, state, and local efforts to protect water quality, including protection of wetlands.

TABLE 1-4. RELEVANT LAWS AND REGULATIONS

Environmental Law or Regulation	General Description
Executive Order 11988 of 1977, *Floodplain Management*	Federal agencies are directed to consider the proximity of their actions to or within floodplains, to (1) reduce the risk of flood damage; (2) minimize the impacts of floods on human safety, health, and welfare; and (3) restore and preserve the natural and beneficial values served by floodplains.
Kansas Administrative Regulations 28-16-28c, *Surface Water Quality Standards*	General provisions state that no degradation of water quality by artificial sources shall be allowed that would have harmful effects on threatened or endangered aquatic life in a critical habitat.
Executive Order 11990 of 1977, *Protection of Wetlands*	Requires federal agencies to minimize or avoid wetlands destruction, loss, or degradation and to preserve and enhance natural and beneficial wetlands values.
U.S. Fish and Wildlife Coordination Act of 1958 (16 USC 661 et seq.)	Provides that wildlife conservation shall receive equal consideration and be coordinated with other features of water resource development programs.
Endangered Species Act of 1973, as amended	Requires federal agencies that fund, authorize, or implement actions to avoid jeopardizing the continued existence of federally listed, threatened, or endangered species, or destroying or adversely affecting their critical habitat. U.S. Fish and Wildlife Coordination Act of 1958 (16 USC 661 *et seq.*) provides that wildlife conservation shall receive equal consideration and be coordinated with other features of water resource development programs.
Clean Air Act of 1970, as amended	Provides the principle framework for national, state, and local efforts to protect air quality.
Kansas Administrative Regulations 28-19-17, *Prevention of Significant Deterioration of Air Quality*	Applies to the construction of major stationary sources and major modifications of stationary sources in areas of the state designated as attainment areas or unclassified areas for any pollutant under the procedures prescribed under the federal Clean Air Act of 1970, as amended.
Antiquities Act of 1906	Authorizes the scientific investigation of antiquities on federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.
National Historic Preservation Act of 1966, as amended	Establishes as policy that federal agencies are to provide preservation of the nation's prehistoric and historic resources, and establishes the National Register of Historic Places.
Archaeological Resources Protection Act of 1979, as amended	Protects materials of archaeological interest from unauthorized removal or destruction and requires federal managers to develop plans and schedules to locate them.

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 INTRODUCTION

The proposed storage reallocation project for JRR and the other alternatives to the proposed action are described in this section. NEPA requires that an EIS objectively evaluate a reasonable range of alternatives that are practical or feasible from a technical and economic perspective, and based on common sense (46 FR 18026, as amended, 51 FR 15618). All of the alternatives evaluated herein meet the basic project goal of providing 34,900 ac-ft of water storage in the conservation pool of JRR.

In 1975, the state of Kansas and the federal government entered into a water supply agreement to provide water for the CNRB and the WCGS. The CNRB includes 21 municipal and industrial water users (Lewis, pers. comm., 2001).

An estimated 34,900 ac-ft of storage remaining after 50 years of sedimentation (CY 2014) forms the basis of the 1975 agreement (USACE 1996). Water storage was to occur within the conservation pool (1020.0 to 1039.0-ft elevation); however, studies have determined that sediment has been deposited unevenly within JRR, both for the predicted amount and location of sediment deposition. The sediment is accumulating in the conservation pool while the flood control pool has experienced less than predicted sedimentation. The uneven sediment distribution has depleted storage available for water supply purposes and is infringing on the water supply agreement obligations.

A recent Tulsa District water supply yield analysis indicated a 25% reduction in the water supply capacity at design life (CY 2014) because of the disproportionate sediment deposition. Most of the sediment deposition has been below the top of the current conservation pool (elevation 1039.0 ft). The USACE has been authorized by Congress to study an equitable redistribution (reallocation) of water storage between the flood control and conservation pools. Therefore, the USACE is evaluating the alternative actions described in this section to resolve the depleted water storage situation. The actions proposed to resolve the water storage issue at JRR are:

- no action
- dredge John Redmond Reservoir
- storage reallocation in a phased pool raise
- proposed (preferred) action: storage reallocation in a single pool raise

2.2 NO ACTION ALTERNATIVE

The no action alternative evaluated in the SFES is in compliance with NEPA (40 CFR 1502.14(d)). No action may be defined as the continuation of an existing plan, policy, or

procedure, or as failure to implement an action. The no action alternative also provides a benchmark to compare the magnitude of the environmental effects of the various alternatives.

Under the no action alternative, the current operating plan for JRR remains in effect with its existing sedimentation and water storage issues. Sediment will continue to accumulate in the conservation pool in greater amounts in the flood control pool, reducing the water supply capacity by approximately 25% when the project reaches its design life (CY 2014). Storage available for water supply purposes in JRR have been depleted by the uneven distribution of sediment such that the water supply agreement with the KWO cannot be met.

With existing conditions, the JRR site will continue to experience wide fluctuations of water levels between flood events and periods of drought. The proposed water level management plan prepared for 1 October 2001 through 30 September 2005 (Le Doux 2000), would remain in effect and would allow an approximately:

- 3-month raise to the 1041.0-ft elevation (mid-October through mid-January)
- 5.5-month lowering to the 1039.0-ft level (mid-January through June)
- 3.5-month lowering to the 1037.0-ft level (July through September)

2.3 DREDGE JOHN REDMOND RESERVOIR

This alternative would remove enough sediment from the conservation pool to provide water supply storage at the existing 1039.0-ft elevation NGVD.

Potential dredging activities are classified as mechanical and hydraulic; mechanical dredging typically uses hoppers to excavate and remove sediments (USEPA 2001). Hydraulic dredging uses a great deal of water to create suction and siphon sediments, generating a much greater volume of dredged material that must be disposed or otherwise used. Dredging activities require transportation of the dredged materials to a site or sites approved for their reuse or disposal or disposing of the material below the dam into the river. Sediments may be used for beneficial purposes or disposed in a landfill. To be used for beneficial purposes, sediments would require an analysis of particle size and sampling for hazardous constituents.

Dredging sediments would achieve the project goal for storage volume in the conservation pool at a lower elevation for the short term; however, sediments would redeposit over time. Most sedimentation in reservoirs occurs sporadically during times of flooding conditions.

2.4 STORAGE REALLOCATION IN A PHASED POOL RAISE

The water supply agreement with the KWO allows for pool adjustment in 0.5-ft increments. This alternative would raise the conservation pool from elevation 1039.0 ft NGVD to elevation 1041.0 ft NGVD using a phased approach. The first phase would raise the conservation pool elevation to 1040.0 ft NGVD, the second to 1040.5 ft NGVD, and the final to elevation 1041.0

ft NGVD. To achieve this raise requires only adjustments of volume control or water elevation at the dam structure.

The phased pool raise alternative would achieve the project goal for storage volume in the conservation pool.

2.5 STORAGE REALLOCATION IN A SINGLE POOL RAISE

The water supply agreement with KWO allows for pool adjustments in 0.5-ft increments. This alternative would raise the conservation pool from elevation 1039.0-ft NGVD, to elevation 1041.0-ft NGVD in a single pool raise. To achieve this raise requires only an adjustment of volume control or water elevation at the dam structure.

The single pool raise (preferred alternative) would achieve the project goal for storage volume in the conservation pool and is preferred by the USACE. The final report for the Water Supply Storage Reallocation may be found in Volume III.

2.6 ALTERNATIVES CONSIDERED BUT ELIMINATED

There were no other alternatives considered for developing this supplement to the FES written in 1976.

2.7 ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is determined by applying the criteria suggested in NEPA and CEQ regulations implementing NEPA. The CEQ regulations state that "[t]he environmentally preferable alternative is the alternative that would promote the national environmental policy as expressed in Section 101 of NEPA, which considers:

1. Fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations.
2. Assuring for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings.
3. Attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.
4. Preserving important historic, cultural, and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice.
5. Achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities.
6. Enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources."

Although the no action alternative would have the least impact on the natural environment, it is not necessarily the environmentally preferred alternative because it does not ensure adequate water supply, as per agreements with the state of Kansas, and therefore, does not accomplish the goals of criteria 2, 3, 4, and 5, noted above, and the purpose and need of the proposed action.

Given that the dredge John Redmond Reservoir alternative would ensure adequate water supply, it does help fulfill the goals of criteria 3, 4, and 5, and the purpose and need for the proposed action. However, the potential for introducing contaminated sediments to both the aquatic environment (during dredging) and the terrestrial environment (during disposal) would not be consistent with the goals of criteria 1 and 2.

Although the proposed action and the storage reallocation in a phased pool raise alternative would have an impact on the natural environment, they do ensure adequate water supply, helping to fulfill criteria 2, 3, 4, and 5. In addition, the mitigation recommended for these alternatives would offset impacts to the natural environment, which would contribute to fulfilling the goal of criterion 1, as well as criteria 2, 3, 4, and 5, and the purpose and need for the proposed action. Therefore, both the proposed action and the storage reallocation in a phased pool raise alternative are considered environmentally preferred.

Table 2-1 lists potential significant impacts and corresponding mitigation measures for each alternative.

TABLE 2-1. SUMMARY OF POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES (PURPOSE AND NEED FOR THE ACTION)

Environmental Resource	No Action Alternative	Dredge John Redmond Reservoir Alternative	Phased Pool Storage Reallocation Alternative	Proposed Action: Storage Reallocation
Geology and Soils	No insignificant or significant impacts; no mitigation measures would be required.	Long term, insignificant or significant adverse depending upon mitigation.	Long term insignificant adverse; no mitigation would be required.	Long term insignificant adverse; no mitigation would be required.
Hydrology and Water Resources	Long term significant adverse; mitigation measures would be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Short term insignificant or significant adverse (depending on the level of sediment contamination); mitigation measures may be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Long term insignificant adverse; no mitigation measures would be required.
Biological Resources	No insignificant or significant impacts; no mitigation measures would be required.	Long term insignificant beneficial; no mitigation measures would required. Short term insignificant and long term significant adverse; mitigation measures would required.	Short and long term insignificant beneficial and adverse, and long term significant beneficial and adverse; mitigation measures would be required.	Short and long term insignificant beneficial and adverse, and long term significant beneficial and adverse; mitigation measures would be required.
Air Quality	No insignificant or significant impacts; no mitigation measures would be required.	Short term insignificant adverse impacts; mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.
Aesthetics	No insignificant or significant impacts; no mitigation measures would be required.	Short and long term insignificant adverse; mitigation measures may be required.	Short term insignificant adverse; no mitigation measures would be required.	Short term insignificant adverse; no mitigation measures would be required.
Prime or Unique Farmland	No insignificant or significant impacts; no mitigation measures would be required.	Long term insignificant adverse; mitigation measures may be required.	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.

TABLE 2-1. SUMMARY OF POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES (PURPOSE AND NEED FOR THE ACTION)

Environmental Resource	No Action Alternative	Dredge John Redmond Reservoir Alternative	Phased Pool Storage Reallocation Alternative	Proposed Action: Storage Reallocation
Socioeconomic Resources	Long term insignificant adverse; no mitigation measures would be required. Short and long term significant adverse; mitigation measures would be required.	Short term significant beneficial and short term insignificant adverse; no mitigation measures would be required.	Short and long term insignificant beneficial and adverse; no mitigation measures would be required. Short and long term significant beneficial and adverse; mitigation measures would be required.	Short and long term insignificant beneficial and adverse; no mitigation measures would be required. Short and long term significant beneficial and adverse; mitigation measures would be required.
Cultural Resources	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.
Hazardous, Toxic, or Radiological Wastes	No insignificant or significant impacts; no mitigation measures would be required.	Short term insignificant adverse; mitigation measures may be required (depending on the level of sediment contamination).	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.
Cumulative Impacts	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter sets forth the affected environment of the proposed action and describes the present physical conditions within the area of the proposed action. The area, or region of influence, is defined for each environmental issue based on the extent of physical resources that may be affected directly or indirectly by the proposed action and appropriate guidelines of regulatory agencies or common professional practice. Table 3-1 summarizes the environmental issues and associated region of influence described in the affected environment sections of the SFES.

TABLE 3-1. ENVIRONMENTAL ISSUES AND REGION OF INFLUENCE

Environmental Issue	Region of Influence
Geology and Soils	Pool raise area and downriver effects
Hydrology and Water Resources	Pool raise area and downriver effects
Biological Resources	Pool raise area, disposal areas, and downriver effects
Air Quality	Pool raise area and disposal areas
Aesthetics	Pool raise area and disposal areas
Prime or Unique Farmlands	Pool raise area, disposal areas, and downriver effects
Socioeconomic Resources	Pool raise area, disposal areas and downriver effects
Cultural Resources	Pool raise area, disposal areas, and downriver effects
Hazardous, Toxic, or Radiological Wastes	Pool raise area, disposal areas, and downriver effects

Section 3.0 of the SFES describes the baseline conditions for each environmental resource against which the potential impacts of the proposed action will be compared. Generally, the baseline used for the analysis of environmental impacts under NEPA reflects the conditions present during the year 2000. The original sediment analysis conducted to determine rates and location of accumulation in JRR was performed during 1963, and resurveys were completed in 1974, 1983, 1991, and 1993 (USACE 1996).

3.2 GEOLOGY AND SOILS

3.2.1 Geology

JRR lies among low, rounded hills. The topography is a result of generally westerly to northwesterly dipping strata that creates resistant bend and irregular cuesta-like ridges (FHNWR 2000). The Neosho River valley and most of the JRR site is composed of Holocene, Post-Kansan alluvium and is bordered by the Pennsylvanian – Virgilian, Waubansee group on the western end and the Shawnee group on the eastern end of the site (O'Connor 1953; Merriam 2000). Both the Waubansee and Shawnee groups are sedimentary exposures, which were deposited in shallow seas and swamps approximately 300 million years ago (FHNWR 2000). Some very small exposures of Tertiary terrace deposits are present at the western end of the conservation pool of the reservoir, above the northern floodplain boundary of the Neosho River (Merriam 2000).

To the west of JRR in the Flint Hills region are formations of the Permian period, deposited approximately 250 million years ago (FHNWR 2000). A portion of the sediments deposited as Holocene alluvium along the Neosho River within the JRR project area were eroded from these Permian formations. The alluvial deposits have been further described as cherty gravel, cobble, and sand with small amounts of boulders and mud present (Obermeyer et al. 1997). Gravel-sized alluvium was most commonly observed along the Neosho River above and below John Redmond Dam and Reservoir.

3.2.2 Soils

Soils formed within the JRR site and the project area (table 3-2) are relatively shallow, silty loam and silty, clay loams that are fertile, but low in organic matter and phosphoric acid (FHNWR 2000). Soils form through the physical and chemical weathering of parent material (SCS 1982), and the characteristics of soil thus formed are determined by the:

- physical and mineral composition of the parent material
- climate under which the soil material has accumulated and existed since accumulation
- plant and animal life on the soil
- relief, or topography
- length of time the soil forces have acted upon the soil material

The soil type and amount has been determined for the zone that occurs between reservoir elevation 1039.0 ft and 1041.0 ft. Approximately 570 acres of the soils and the non-soil cover of surface water are present and are listed in table 3-2.

TABLE 3-2. SOIL DESCRIPTIONS AND AMOUNT PRESENT BETWEEN THE 1039.0 FT AND 1041.0 FT ELEVATION ZONE OF JRR

Soil Type	Acreage	Description
(AeD) Apperson – Dennis Silty Clay Loams, 1%–4% slopes	0.15 a	Apperson formed in material weathered from Pennsylvanian period limestone bedrock; Eram from shale bedrock.
(Db) Dennis Silt Loam, 1%–4% slopes	10.23 a	Formed in material weathered from Pennsylvanian period shale bedrock.
(De) Dennis Silty Clay Loam, 2%–5% slopes	8.87 a	Formed in material weathered from Pennsylvanian period shale bedrock.
(Eb) Eram Silt Loam, 1%–3% slopes	0.03 a	Formed in material weathered from Pennsylvanian period shale bedrock.
(Ec) Eram Silt Loam, 3%–7% slopes	0.59 a	Formed in material weathered from Pennsylvanian period shale bedrock.
(Er) Eram – Collinsville Complex, 4%–15% slopes	4.29 a	Eram formed in material weathered from Pennsylvanian period shale; Collinsville from sandstone bedrock.
(Es) Eram – Schidler Silty Clay Loams, 4–15% slopes	0.93 a	Eram formed in material weathered from Pennsylvanian period shale bedrock; Schidler from limestone bedrock.
INT	31.05 a	Unknown.
(Kb) Kenoma Silt Loam, 1%–3% slopes	10.99 a	Formed in old alluvial sediment deposited in the Tertiary and Quaternary periods, on high terraces and uplands.
(La) Lanton Silty Clay Loam	10.99 a	Formed in recent, loamy alluvial sediment deposited in the Quaternary period, on floodplains and low terraces.
(Oc) Orthents, Clayey	12.75 a	Surface soil and part or all of the subsoil have been removed and used as fill material in roads, etc.
(Os) Osage Silty Clay Loam	21.98 a	Formed in recent, clayey alluvial sediment deposited in the Quaternary period, on floodplains and low terraces.
(Ot) Osage Silty Clay	251.50 a	Formed in recent, clayey alluvial sediment deposited in the Quaternary period, on floodplains and low terraces.
(Sa) Summit Silty Clay Loam, 1%–4% slopes	10.26 a	Formed in material weathered from Pennsylvanian period shale bedrock.
(Vb) Verdigris Silt Loam	62.12 a	Formed in recent, loamy alluvial sediment deposited in the Quaternary period, on floodplains and low terraces.
(W) Water	118.22 a	Standing water.
(Wo) Woodson Silt Loam	14.97 a	Formed in old alluvial sediment deposited in the Tertiary and Quaternary periods, on high terraces and uplands.

Source: SCS 1982; SCS 1981, and USACE 2001

Floodplain soils of the Neosho River below John Redmond Dam are primarily Verdigris silt loam, Verdigris soils—channeled, Osage silty clay loam, Dennis silt loam, Lanton silt loam, and Hepler silt loam to the southern project boundary in Oklahoma (NRCS 1982a, 1972, 1978, 1982b, 1990, 1985, 1973). All of these soils are addressed under Section 3.7 “Prime or Unique Farmland.”

3.3 HYDROLOGY AND WATER RESOURCES

3.3.1 Introduction

The Neosho River is one of the many alluvial rivers draining the semiarid western United States. Approximately 200 tributary streams and creeks deliver water to the Neosho River as it traverses the Neosho basin in Kansas (KSWR 1999). From its source in the Flint Hills region of east-central Kansas, the Neosho River flows southeasterly for 314 miles to the Kansas border with Oklahoma and drains about 5,973-square miles. Approximately 34 miles south of the border, the Neosho and Spring Rivers join at Grand Lake O' the Cherokees, then flow as the Grand River an additional 130 miles to the confluence with the Arkansas River (figure 1-1).

Annual precipitation across the Neosho basin ranges from approximately 30 in in the northwestern portion (Flint Hills) to approximately 43 in in the southeastern portion (Miami, Oklahoma). The average annual precipitation in the region above JRR is approximately 32.5 in per year. A majority, 71.4% of the precipitation falls from April through September, including the major storms of record (table 3-3) (USACE 1996). Major storm duration averages are approximately 6 days in the vicinity of John Redmond Dam.

TABLE 3-3. MAJOR STORMS: JANUARY 1922 THROUGH DECEMBER 1994, JOHN REDMOND RESERVOIR

Inclusive Dates	Average Basin Rainfall (in)	Inclusive Dates	Average Basin Rainfall (in)
09–15 Mar 1922	4.12	12–18 May 1957	5.08
14–24 May 1923	5.37	12–19 Jul 1959	5.35
03–11 Jun 1923	5.77	30 Sep-05 Oct 1959	4.86
11–15 Sep 1926	4.60	25–31 Oct 1960	4.47
30 Sep-04 Oct 1926	4.57	20–24 Jul 1961	4.70
12–19 Apr 1927	4.41	12–14 Sep 1961	4.26
12–20 Jun 1927	5.94	28 May-03 Jun 1962	6.26
12–16 Aug 1927	5.44	19–25 Sep 1962	5.31
01–05 Jun 1928	4.82	15–19 Nov 1964	4.10
15–17 Nov 1928	5.50	03–10 Jun 1965	7.00
09–11 Jul 1929	4.63	17–21 Sep 1965	4.40
11–17 Nov 1931	5.04	16–24 Jun 1967	7.26
04–08 Jul 1932	5.34	23–26 Jul 1968	4.50
04–09 Sep 1937	4.82	08–20 Jun 1970	4.70
02–06 May 1938	4.51	30 Jun-06 Jul 1971	4.53
19–23 May 1938	5.53	23–30 Jul 1971	4.30
15–16 Aug 1938	4.11	07–19 Jul 1972	5.15
31 May-02 Jun 1941	5.05	03–11 Mar 1973	4.99
01–06 Sep 1941	4.26	21–28 Sep 1973	7.52
16–24 Jun 1942	6.12	16–21 May 1977	4.16
03–05 Sep 1942	5.45	16–24 Jun 1977	4.02
25 May-03 Jun 1950	4.24	08–18 Oct 1985	4.29
09–19 Jul 1950	6.60	27 Sep-04 Oct 1986	4.21
27 Apr-01 May 1951	4.17	16–24 Jul 1992	4.49
09–13 Jul 1951	11.25	07–12 May 1993	4.66
01–06 Sep 1951	4.51	18–22 Jul 1993	7.53
21–27 Sep 1955	5.08		

Source: USACE 1996

Prior to 1964, the Neosho River flooded 57 times over a period of 34 years, which prompted many public requests to the USACE for flood protection. The largest of the floods occurred in 1951 and had physical effects on the Neosho River channel that remain observable today (Juracek et al. 2001 and Juracek 2000). The result of petitions for flood protection was the planning of four dams and the design and construction of three dams, e.g., Marion (Cottonwood River), Council Grove, and John Redmond (Neosho River) (figure 1-1). The Cottonwood River is a major tributary to the Neosho River and the fourth dam, at Cedar Point, was authorized on the Cottonwood River, but never constructed (USACE 1976). The project is a part of the authorized seven-reservoir system in the Neosho and Grand Rivers basin in Kansas and Oklahoma. The associated dam projects in Oklahoma include Pensacola (Grand Lake O' the Cherokees), Fort Gibson, and Markham Ferry (USACE 1976).

Marion Lake has a total storage capacity of 145,500 ac-ft; 59,900 ac-ft are available for storage of floodwater from an approximately 200-square mile drainage basin. Council Grove Lake has a total storage capacity of 114,300 ac-ft; 76,000 ac-ft are available for storage of floodwater from an approximately 246-square mile drainage basin. John Redmond Reservoir has a total storage capacity of 807,941 ac-ft; 574,918 ac-ft are available for storage of floodwater from an approximately 3,015-square mile drainage basin, with 2,569-square miles uncontrolled below the Marion and Council Grove dams. Downriver from John Redmond Dam to the Kansas border are 2,958-square miles of uncontrolled drainage, with additional uncontrolled drainage from the border to Pensacola Reservoir (Grand Lake O' the Cherokees). All of the lakes provide flood control, maintenance of downstream water quality, water supply storage, recreation, and fish and wildlife habitat.

John Redmond Dam and Reservoir is the integral component of the upper Neosho River system, lying approximately 180 miles downriver from its source, and located at river mile 343.7. This site is approximately 3 miles northwest of Burlington, Kansas (figure 1-2). The dam structure is 20,740 ft long with an average height above the Neosho Valley floor of 60 ft. The lake at the top of the conservation pool is approximately 3 miles wide at its maximum width. It then extends northwesterly, upriver from the dam, approximately 11 miles for the entire length of the flood control pool.

Water management systems, of which storage and flood control reservoirs form an important part, greatly change the natural flow regime of rivers as well as the properties of the water. The extent of these changes is determined by: (1) the relative size and function of a reservoir, (2) the hydrologic regime of the inflows, (3) the release condition, (4) the geomorphological condition of the reservoir, and (5) the quality of the inflow water.

One management tool used by the USACE to operate the complex hydrology of JRR is the SUPER computer program (SUPER). SUPER simulates the regulation of the multipurpose reservoir system on a daily basis and performs an economic analysis of the simulation. SUPER is capable of modeling specific water scenarios for JRR, but it does so in context of the entire reservoir system. SUPER has been used to model the affect of reallocating flood control storage to water supply storage at John Redmond Dam. The results are used to meet contractual water supply requirements through the year 2014, the end of the original project economic life (USACE 1976). In the various analyses performed using SUPER, the control points were: John

Redmond Dam outflow, river gages at Iola and Parsons, Kansas, and the river gage at Commerce, Oklahoma.

The SUPER model was used to simulate regulation of a multi-purpose reservoir system on a daily basis and to perform an economic analysis of the simulation (Hula 1990). The simulation assumed all reservoirs were in place for the entire period of record and that each reservoir operated based on specific operational criteria. The period of record for the Arkansas River system model used was 56 years (January 1940–December 1995). Reallocation to conservation pool elevation 1041.0 ft accounted for a small amount (3.18%) of the flood pool and resulted in only slight increases in the outflows. For larger flood events there was virtually no difference in pool levels and operations, and only slight differences were observed for smaller flood events. These differences were considered minimal (SUPER 2001).

Floodplain Discussion

Juracek (1999) determined that overall channel response to the altered stream flow regime and sediment load introduced below John Redmond Dam was minor. There was some localized channel widening, but little post-dam change in bank-full channel width. This is likely attributable to a substantial reduction in the magnitude of the post-dam annual peak flows in combination with the resistance to erosion of bed and bank geologic exposures and vegetated shoreline (Juracek 1999). The channel may also have been over-widened historically by a series of large floods prior to dam construction.

Another factor determining the limited downstream effects of John Redmond Dam is a series of 12 diversion / overflow dams from Burlington to Chetopa, Kansas (figure 3-1). The overflow dams were built in the 1930s and 1950s for water supply for downriver towns. The predominant effect of these structures, following construction, was channel widening in the geomorphic response zone that extends about 1,000 ft below the dams (Juracek 1999). With the increased energy from higher velocity water flowing over the dams, a more erosive power is developed. When a resistant channel bottom is present, the riverbanks become the immediate erosion target.

3.3.2 Precipitation Data Collection and Monitoring

As part of the effort to operate John Redmond Dam, the USACE maintains a system of data collection (hydrometeorological stations) and reliable communications networks with the U.S. Geological Survey (USGS) and the National Weather Service. The important river gauging stations on the Cottonwood and Neosho Rivers are equipped with automated gages with Data Collection Platforms (DCP) (USACE 1996). Data recorded at the DCPs are transmitted to the hydrology-hydraulics branch computer through a system of satellites and downlinks. River gages are a source of data used to forecast inflows into JRR and are located near Florence and Plymouth, Kansas, on the Cottonwood River and near Dunlap and Americus, Kansas, on the Neosho River. River gages used to regulate flows downriver from the dam are located near Burlington, Iola, Chanute, and Parsons, Kansas, and Commerce, Oklahoma. All of the automated river gages are maintained by the USGS, who periodically record stream flow measurements to develop accurate rating curves.

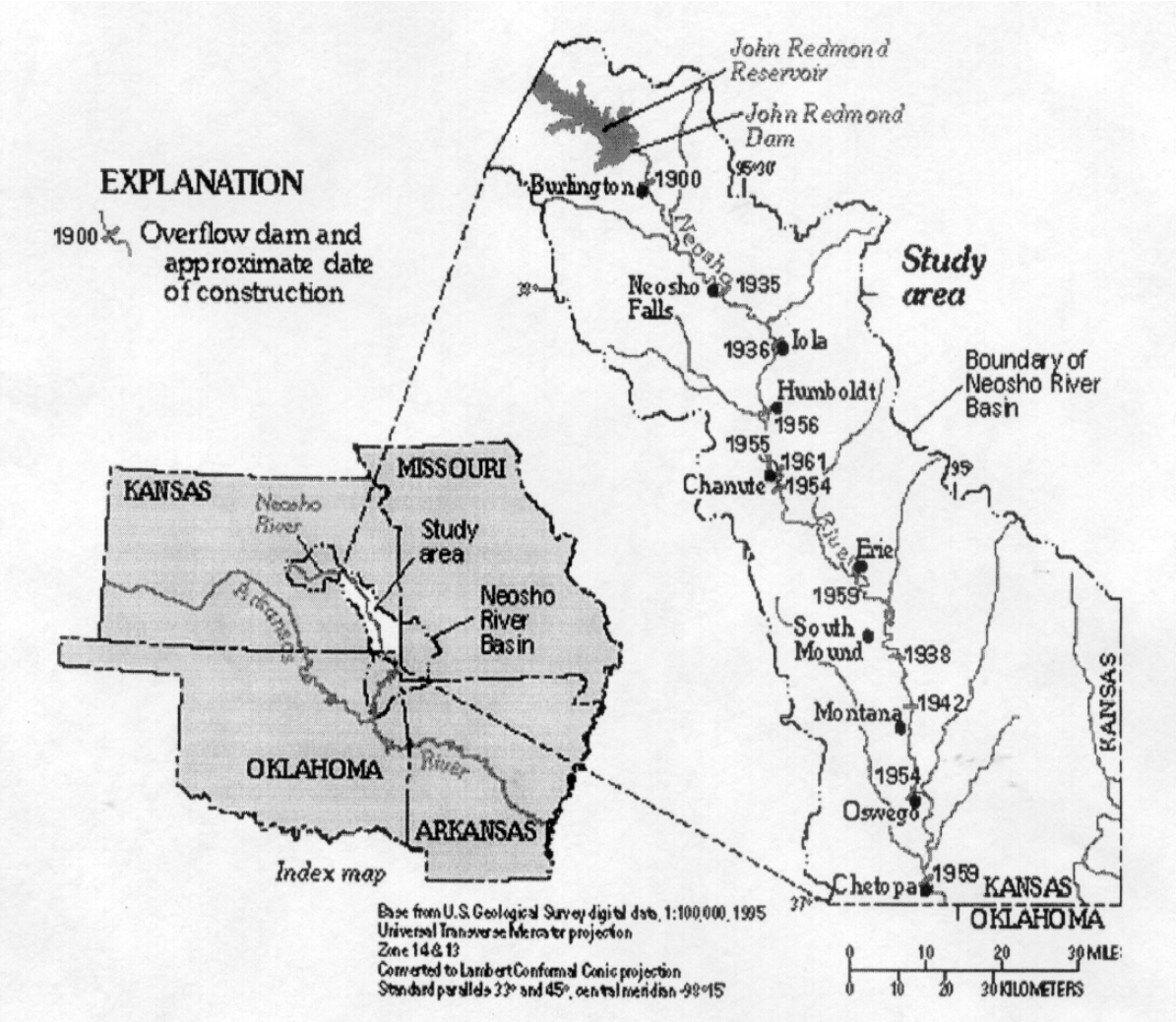


FIGURE 3-1. LOCATION OF NEOSHO RIVER BASIN, STUDY AREA, AND OVERFLOW DAMS (JURACEK 1999)

With the primary objectives of John Redmond Dam, flood releases are made in accordance with the predicted inflow volume, the predicted runoff from the uncontrolled basin drainage area downriver, and the downriver regulating stage / flow restraints at the gauging stations seen in table 3-4. Automated precipitation gages, connected to a DCP that records and transmits the precipitation data along with the stage data, are located at all of the automated river gauging stations along the Cottonwood and Neosho Rivers (USACE 1996). In addition, automated precipitation stations with DCPs are located above JRR near Durham, Diamond Springs, Cassoday, Matfield Green, Cottonwood Falls, and Neosho Rapids; they are also located on the dams at Marion, Council Grove, and John Redmond.

TABLE 3-4. REGULATING STAGES AND DISCHARGES

Station	River	Regulating Lakes	Regulating Stage (ft)	Discharge (cfs)
Burlington	Neosho	John Redmond	23.0	14,000
Iola	Neosho	John Redmond	19.0	18,000
Chanute	Neosho	John Redmond	22.0	18,000
Parsons	Neosho	John Redmond	19.0	17,000
Commerce	Neosho	John Redmond	15.0	22,000

Source: USACE 1996

The National Weather Service maintains a network of local rainfall observers throughout the Neosho River basin who report on a daily basis, and weather stations at the Marion, Council Grove, and John Redmond project offices monitor precipitation, evaporation, wind speed and direction, and temperature (USACE 1996). The local reports are entered into the Automated Field Observing Station computer network by the National Weather Service. JRR pool elevations are monitored by an automated gage and a recording chart located on the dam structure. The DCP connected to the gage transmits precipitation and pool elevations to a satellite receiver; automated pool data are verified using both a wire weight gage and a staff gage located at the dam structure.

The Automated Field Observing Station data (precipitation, river, and pool gage readings) are available for direct access by the USACE District Office, Hydrology-Hydraulics Branch, via the Data Output Message Satellite (DOMSAT) downlink. Reporting criteria for pertinent precipitation and river gauging stations (table 3-5) are used to place these data into the district office database (USACE 1996). Site-specific data from JRR (precipitation, evaporation, wind speed and direction, and sky conditions) are collected, recorded, and reported to the district office daily.

Automation of hydrometeorological data from lake, river, and precipitation gauging stations occurs through using DCPs, in the following steps:

- DCPs transmit hourly and random data to the Geostationary Operational Environmental Satellites (GOES) satellite.
- Data are down-linked from the GOES to the National Oceanic and Atmospheric Administration (NOAA) central computer.
- Data are retransmitted from NOAA to the DOMSAT satellite.
- Data are down-linked from the DOMSAT satellite to USACE Hydrology-Hydraulics Branch computer network in Tulsa.
- DCP data are processed in Tulsa and entered into the database used for regulation of the district reservoir systems.
- Local observer rainfall data are received automatically from the Automated Field Observing Station network using a dedicated line to the Tulsa River Forecast Center.
- Data are automatically encoded into the USACE Tulsa database to be used to forecast river flows and reservoir inflows.

- Weather forecasts, river forecasts, radar depictions, and ancillary weather information is received automatically from the Automated Field Observing Station Network.

TABLE 3-5. REPORTING CRITERIA FOR PERTINENT STATIONS

Station	Report Received By	Report Timing
Rainfall Stations		
▪ Airport Stations	NWS	6-hour rainfall as of 6:00 A.M., 12:00 noon, 6:00 P.M., and 12:00 midnight
▪ USACE Dams	USACE	Rainfall Reports: (1) 8:00 A.M., (2) 1:00 P.M. when 0.50 in or more of precipitation has occurred since 7:00 A.M. or continued rain since the 8:00 A.M. report, (3) 7:00 P.M. when 0.50 in or more of precipitation has occurred since 7:00 A.M. and no 1:00 p.m. report was made, or if it has continued to rain since reporting at 1:00 P.M., (4) report at once the occurrence of 2.00 in` or more of precipitation that occurs during a period of 6 hours or less.
▪ Automated Gages	DCP	Hourly or As Needed
▪ Observer Stations	NWS	7:00 A.M. and every 6 hours, as directed by the National Weather Service
River Gauging Stations		
▪ Cottonwood River, Florence	DCP	Hourly or As Needed
▪ Cottonwood River, Plymouth	DCP	Hourly or As Needed
▪ Neosho River, Dunlap	DCP	Hourly or As Needed
▪ Neosho River, Americus	DCP	Hourly or As Needed
▪ Neosho River, Burlington	DCP	Hourly or As Needed
▪ Neosho River, Iola	DCP	Hourly or As Needed
▪ Neosho River, Chanute	DCP	Hourly or As Needed
▪ Neosho River, Parsons	DCP	Hourly or As Needed
▪ Neosho River, Commerce	DCP	Hourly or As Needed

Source: USACE 1996

Based on the precipitation monitoring and data analyses, hydrologic and flood forecasts are made to determine if and when releases should be made. The hydrology-hydraulics branch of the USACE, Tulsa, Oklahoma, is responsible for this forecasting. The National Weather Service, with assistance from the USACE, forecasts the river stages.

Water Level Management

Major changes to the water control plan have been approved historically (at the request of the state of Kansas) to allocate pool levels for the benefit of fish and wildlife habitat (Le Doux 2000). The USACE currently attempts to manage water levels of the JRR conservation pool (as much as possible on a case-by-case basis) to provide benefits for migrating shorebirds, waterfowl, and the fishery, and also to protect the operational structures. In a typical year, the proposed Water Level Management Plan would: (1) raise the lake level from 1037.0 ft to 1041.0 ft (between 1–15 October); (2) lower the lake level from 1041.0 ft to 1039.0 ft (15 January); lower the lake level from 1039.0 ft to1037.0 ft (15 June –10 July); and maintain the lake level at 1037.0 ft (10 July –1 October). The initial conservation pool elevation provides benefits to fish and waterfowl by flooding shoreline vegetation, the initial decrease serves to protect operational structures and shoreline vegetation from ice damage, and the second decrease provides benefits to migrating shorebirds, allows the growth of shoreline and mudflat vegetation, reduces shoreline erosion, and improves water quality/clarity.

The reallocation and establishment of a new, higher conservation pool elevation would not preclude consideration of seasonal pool plans for fish and wildlife as done currently. Any reasonable seasonal water level manipulation plan would be considered on a case-by-case basis by the USACE. However, further encroachment into the flood pool is unlikely due to excess loss of flood control storage.

3.3.3 Surface Water

Basic Surface Water Inflow

The average yearly runoff or inflow into JRR is 1,054,800 ac-ft, calculated from the period of record from 1922 to 1994, which includes 42 years of pre-operation data and 30 years of post-operation data (USACE 1996). A monthly and annual breakdown of estimated flows (in ac-ft) at John Redmond Dam for the same period of record is shown in table 3-6. Figure B-1 (appendix B) shows the flow duration curve depicting inflows and outflows for JRR (USACE 1996). The upriver dams at Marion and Council Grove regulate slightly less than 15% of the total inflow into JRR.

Prior to 1964, the Neosho River flooded 57 times and subsequent flooding has occurred to the present year. Table 3-7 presents a list of the major Neosho and Cottonwood River floods. Upriver from JRR are the gauging stations along the Cottonwood River, the Neosho River at Council Grove Lake, and the Neosho River at Americus, Kansas. Downriver gauging stations are located on the Neosho River at Burlington, Iola, and Parsons, Kansas, and Commerce, Oklahoma.

Near the upper end of the reservoir, north of Jacob’s Creek Landing, an inflow debris field, dubbed locally as the logjam, has formed in the channel of the Neosho River at a point where the river flow is divided into two channels around an island. River flows slow sufficiently in

TABLE 3-6. ESTIMATED MONTHLY AND ANNUAL FLOWS IN AC-FT—REGULATED BY COUNCIL GROVE DAM SINCE AUGUST 1963 AND MARION DAM SINCE OCTOBER 1967; JOHN REDMOND RESERVOIR (SOURCE: USACE 1996)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1922	1,450	3,900	238,200	446,500	106,200	29,820	112,200	27,830	3,300	1,800	47,800	7,850	1,026,850
1923	5,370	3,510	12,850	8,580	114,100	473,300	141,700	10,540	13,920	48,770	21,470	22,680	876,790
1924	12,980	21,660	77,810	59,360	78,760	29,460	44,190	48,080	22,110	17,000	11,930	6,190	429,530
1925	27,990	16,580	11,960	82,700	22,370	78,770	8,230	1,310	13,180	7,830	41,690	7,300	319,910
1926	9,360	6,890	7,350	85,500	32,060	15,480	2,190	8,580	463,500	326,000	37,170	27,880	1,021,960
1927	28,980	22,530	129,800	565,600	222,500	267,200	34,800	284,400	127,500	112,900	15,140	13,410	1,824,760
1928	15,630	49,710	51,730	105,300	72,890	383,100	108,000	52,190	15,390	19,080	496,700	140,300	1,510,020
1929	143,100	60,550	60,680	180,900	265,900	131,300	240,200	46,400	11,880	10,720	11,210	7,850	1,170,690
1930	4,920	27,500	11,420	26,490	163,500	49,410	6,760	5,610	21,110	4,970	18,130	113,600	453,420
1931	5,550	6,040	21,720	32,630	43,220	32,080	5,840	1,470	5,050	1,450	266,000	54,740	475,790
1932	36,450	28,550	27,270	33,260	30,200	123,900	218,100	14,240	7,730	3,940	3,310	4,400	531,350
1933	3,820	3,040	5,900	64,020	92,970	4,590	7,650	12,570	21,820	4,380	1,340	4,230	226,330
1934	2,020	1,520	3,980	20,530	74,130	14,920	1,280	250	4,490	3,340	38,160	7,080	171,700
1935	14,510	7,250	4,020	5,420	413,200	294,900	18,350	19,430	35,060	97,260	193,900	25,650	1,128,950
1936	23,920	8,970	6,710	3,300	42,430	5,190	700	60	4,950	20,800	2,310	8,620	127,960
1937	38,820	103,100	62,520	41,840	99,250	86,830	14,040	8,500	37,680	1,370	1,340	1,590	496,880
1938	1,460	4,700	28,310	47,460	706,100	300,600	30,750	37,080	16,730	3,660	9,990	4,840	1,191,680
1939	4,370	3,390	8,910	18,740	24,290	27,210	4,660	25,820	1,570	666	282	662	120,570
1940	1,160	2,600	5,340	48,540	46,820	14,210	1,270	5,310	27,010	1,480	27,230	20,650	201,620
1941	184,700	38,470	27,650	80,020	79,520	476,700	50,360	160,100	350,600	915,300	200,900	79,960	2,644,280
1942	39,100	53,170	59,600	210,800	93,440	303,500	52,260	83,760	220,800	114,600	30,340	156,000	1,417,370
1943	76,240	65,540	30,460	23,580	328,700	305,600	49,830	9,930	5,130	22,580	5,480	12,630	935,700
1944	17,820	17,780	307,500	964,300	283,800	101,200	49,890	94,740	33,110	97,150	46,390	435,600	2,449,280
1945	39,880	49,770	221,700	704,200	215,200	183,500	124,700	122,400	169,500	167,000	19,220	14,890	2,031,960
1946	134,000	41,150	81,930	87,750	44,330	127,900	19,160	7,830	43,230	11,950	20,670	36,890	656,790
1947	16,260	7,890	242,300	475,000	107,000	227,800	19,650	7,810	10,680	4,370	3,530	25,600	1,147,890
1948	11,800	28,970	147,500	29,020	79,540	116,700	643,900	37,070	70,790	8,200	9,340	7,910	1,190,740
1949	212,900	292,900	75,640	112,400	217,300	80,530	87,400	18,150	11,550	42,950	9,360	8,680	1,169,760
1950	16,940	8,510	9,690	21,210	64,820	128,300	347,900	403,200	71,410	27,900	12,280	11,340	1,123,500
1951	9,480	18,840	36,650	70,410	468,300	406,300	2,029,000	139,500	445,500	84,930	59,980	31,620	3,800,510
1952	31,540	20,760	184,500	238,300	103,100	37,080	10,140	13,040	4,180	2,450	4,400	5,580	655,070
1953	4,890	4,090	9,120	7,820	29,890	8,390	5,620	1,480	500	320	590	1,420	74,130
1954	1,320	1,450	2,130	1,730	10,490	38,660	800	2,130	40	790	90	80	59,710
1955	350	3,460	1,470	11,550	16,810	16,480	24,020	4,230	21,730	20,960	460	400	121,920
1956	610	1,170	630	10,330	21,230	950	150	5,850	0	0	0	0	40,920
1957	0	0	820	66,460	346,700	176,900	43,690	4,220	20,930	34,350	44,790	15,500	754,360
1958	18,140	31,450	255,900	104,800	85,680	110,600	277,400	48,740	81,000	35,010	34,630	14,360	1,097,710
1959	16,830	27,620	26,320	69,000	280,400	49,820	235,600	26,690	23,330	178,400	26,750	27,010	987,770
1960	65,820	103,700	304,200	120,500	73,470	74,180	18,100	80,480	59,480	167,300	77,020	71,520	1,215,770

TABLE 3-6. ESTIMATED MONTHLY AND ANNUAL FLOWS IN AC-FT—REGULATED BY COUNCIL GROVE DAM SINCE AUGUST 1963 AND MARION DAM SINCE OCTOBER 1967; JOHN REDMOND RESERVOIR (SOURCE: USACE 1996)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
1961	23,860	85,590	240,700	236,950	615,400	102,400	138,200	25,360	186,800	146,900	258,800	56,060	2,117,020
1962	145,300	185,400	125,900	46,470	97,340	266,600	62,180	24,630	365,700	93,330	35,670	29,040	1,477,560
1963	37,290	21,550	71,150	22,380	21,230	42,950	41,770	4,230	8,490	9,360	3,710	3,350	287,460
1964	4,460	4,270	3,880	86,820	46,970	98,220	6,380	6,350	8,590	2,220	93,770	32,300	394,230
1965	21,030	19,750	105,700	80,350	22,770	762,800	91,520	14,710	271,600	10,360	8,990	21,960	1,431,540
1966	25,270	32,470	26,940	71,140	31,050	49,960	7,810	17,320	5,290	940	2,360	3,150	273,700
1967	4,310	2,870	4,330	35,250	10,660	515,970	92,470	31,700	95,310	285,530	55,000	40,670	1,174,070
1968	33,820	20,620	19,470	102,970	98,960	103,640	144,790	32,270	9,560	108,490	104,450	68,390	847,430
1969	56,160	77,420	144,910	326,370	277,200	396,340	262,090	31,190	58,880	122,000	49,890	72,000	1,874,450
1970	34,400	20,780	23,970	290,470	76,800	298,770	24,030	10,410	54,300	87,540	18,300	19,040	958,810
1971	57,760	86,050	78,060	22,260	132,260	495,610	306,400	57,140	14,790	10,100	95,750	67,510	1,423,690
1972	31,690	21,120	15,070	42,920	264,430	20,510	95,640	21,740	24,100	6,890	20,720	48,990	613,820
1973	202,830	265,490	786,570	320,400	230,320	78,140	37,920	19,860	424,440	571,850	137,590	210,630	3,286,040
1974	159,330	64,000	146,840	148,240	171,830	172,820	17,330	28,380	66,350	41,180	142,220	49,130	1,207,650
1975	74,800	152,320	123,100	147,890	64,910	427,950	70,350	25,720	23,690	10,860	10,560	19,140	1,151,290
1976	9,330	7,160	8,780	97,570	148,880	86,100	41,070	5,630	3,860	5,330	4,800	4,190	422,700
1977	4,040	4,070	4,110	7,650	192,380	370,870	191,510	71,100	104,190	42,100	121,480	28,370	1,141,870
1978	12,830	77,190	203,850	32,250	73,500	46,580	31,240	5,510	5,250	80,000	6,320	4,430	578,950
1979	6,490	47,300	208,400	82,100	37,700	183,600	260,400	30,500	8,550	8,880	81,420	15,470	970,810
1980	21,790	65,020	193,780	230,880	31,140	79,640	22,510	8,930	970	8,690	3,620	10,410	677,380
1981	3,920	2,180	5,830	4,920	58,330	151,430	161,840	60,190	57,650	61,700	273,760	86,220	927,970
1982	106,630	162,780	111,890	36,000	378,270	340,750	81,840	18,000	8,190	6,800	6,620	15,930	1,273,700
1983	11,400	46,020	57,390	535,340	322,290	250,820	80,860	8,520	5,980	8,870	36,340	38,900	1,402,730
1984	41,970	37,870	446,650	420,580	180,440	177,860	27,460	7,740	3,520	10,930	31,430	77,280	1,463,730
1985	53,470	250,130	108,540	87,050	203,530	506,610	39,360	242,640	174,470	724,550	200,580	96,310	2,687,240
1986	57,130	97,460	42,290	131,330	169,950	29,300	192,770	60,060	188,190	419,420	39,160	68,330	1,495,390
1987	55,430	119,590	477,230	166,280	98,310	91,120	107,960	78,290	37,070	19,420	40,800	116,490	1,407,990
1988	48,100	23,500	46,190	248,130	43,140	19,930	22,710	4,010	5,260	2,860	4,680	4,470	472,980
1989	5,750	4,740	6,660	4,650	22,850	77,550	36,100	150,210	85,490	33,820	15,270	11,010	454,100
1990	17,950	36,890	174,350	80,330	252,300	246,150	16,660	18,250	8,920	5,060	9,220	6,940	873,020
1991	8,670	5,260	6,050	20,870	59,550	46,810	16,860	1,290	5,480	2,250	5,430	8,830	187,350
1992	8,730	9,560	116,290	47,800	21,280	123,870	454,910	140,130	19,420	16,540	342,510	291,170	1,592,210
1993	143,800	164,930	216,790	259,890	968,530	107,700	953,260	140,730	131,700	35,900	24,200	23,900	3,171,330
1994	17,360	13,790	16,760	133,530	99,070	43,440	25,880	11,760	6,840	4,170	23,400	10,310	406,310
Mean	38,734	47,039	98,228	135,533	152,386	166,386	126,775	45,144	68,169	77,106	56,988	42,422	1,054,910
Max	212,900	292,900	786,570	964,300	706,100	762,800	2,029,000	403,200	463,500	915,300	496,700	435,600	3,800,510
Min	0	0	630	1,730	10,490	950	150	60	0	0	0	0	40,920

TABLE 3-7. MAJOR FLOODS FOR PERIOD OF RECORD, JOHN REDMOND DAM (SOURCE: USACE 1996)

Cottonwood River at Florence	Cottonwood River at Cottonwood Falls (a)	Cottonwood River at Plymouth	Neosho River at Council Grove (c)	Neosho River at Americus (c)	Neosho River at Burlington (d)
Date Stage Flow (ft) (cfs)	Date Stage Flow (ft) (cfs)	Date Stage Flow (ft) (cfs)	Date Stage Flow (ft) (cfs)	Date Stage Flow (ft) (cfs)	Date Stage Flow (ft) (cfs)
05-30-62 21.55 8,600	05-28-35 15.24 10,600	06-05-65 35.70 57,500	07-05-32 30.90 28,500	06-22-67 28.17 10,700	09-13-61 31.53 26,200
06-03-62 23.61 11,100	05-23-38 17.24 12,000	06-09-65 35.43 50,800	06-11-38 35.30 50,000	10-08-67 27.52 9,900	10-11-61 24.50 12,400
09-23-62 23.71 11,400	09-08-41 21.08 21,600	09-22-65 32.86 13,500	07-09-41 24.00 12,100	06-27-69 28.30 10,900	11-03-61 29.04 17,700
09-25-62 22.21 8,900	10-20-41 21.35 35,800	06-22-67 33.74 21,800	10-20-41 37.13 65,900	05-23-71 27.70 10,100	02-01-62 29.48 18,300
07-12-63 21.71 8,400	04-23-44 22.50 61,200	10-07-67 33.23 16,800	06-19-42 25.80 16,100	09-27-73 27.76 10,200	03-23-62 23.65 11,700
06-05-65 25.38 15,300	04-16-45 22.13 54,200	04-27-69 34.26 25,500	06-16-43 28.20 24,400	10-11-73 27.74 10,200	06-01-62 30.00 19,000
06-10-65 27.57 46,400	09-20-45 (b) 12,900	06-27-69 34.48 27,200	04-22-44 24.37 17,600	06-25-77 27.31 9,600	06-03-62 25.42 13,200
09-21-65 22.28 8,800	09-30-45 (b) 20,500	04-19-70 33.05 16,000	05-03-44 30.00 33,800	06-05-85 26.80 12,700	09-28-62 31.36 24,800
06-21-67 26.33 19,400	12-05-45 (b) 40,200	06-20-70 33.15 16,600	08-26-44 23.12 12,300	10-10-85 27.43 17,000	06-08-65 27.49 16,000
10-08-67 24.02 11,000	06-19-46 19.72 15,900	06-03-71 34.03 23,600	12-04-44 25.10 19,500	05-09-93 26.95 13,700	07-14-67 22.70 11,700
04-27-69 24.27 11,500	04-14-47 16.44 11,300	07-05-71 32.99 15,500	04-16-45 26.15 22,600	07-22-93 27.84 17,400	10-12-67 23.18 12,000
05-23-71 24.79 12,600	07-20-48 23.30 78,000	03-11-73 33.59 19,700	05-02-48 23.48 16,500	07-30-93 27.27 15,300	06-22-71 22.78 11,700
03-11-73 24.67 12,300	01-24-49 19.49 11,200	09-27-73 33.54 19,300	07-20-48 28.70 29,900		05-05-72 22.27 12,400
04-21-74 26.61 28,600	07-10-50 (b) 12,500	10-11-73 34.72 34,400	05-01-51 26.55 18,600		05-29-73 25.40 15,300
06-17-75 28.03 56,000	08-01-50 19.73 15,700	06-19-75 33.64 20,100	06-07-51 28.27 23,000		10-11-73 24.29 14,300
04-29-76 23.90 10,800	05-01-51 20.35 18,400	06-25-75 33.16 16,300	07-11-51 36.29 121,000		06-27-75 22.81 12,900
06-20-77 23.20 8,600	06-09-51 19.12 14,700	06-23-77 33.12 16,000	09-04-51 27.00 19,700		07-04-77 23.08 13,400
10-31-79 22.77 10,500	06-30-51 22.68 65,200	06-09-79 33.32 16,800	05-16-57 22.70 12,300		05-17-93 26.41 16,600
11-01-81 21.39 9,100	07-11-51 36.84 196,000	07-05-79 33.07 14,500	05-22-61 33.35 40,400		08-03-93 23.23 13,400
03-19-84 23.69 10,600	09-05-51 17.32 12,000	05-12-82 33.09 14,700	06-29-69 20.34 6,600		
09-22-85 25.37 14,300	05-17-57 19.73 15,600	03-19-84 33.11 15,500	05-22-71 15.53 3,700		
10-10-85 26.92 29,400	05-18-59 20.61 27,200	06-25-85 33.53 17,900	09-30-73 14.64 3,300		
03-18-87 23.24 9,900	05-06-61 30.43 13,400	08-23-85 33.67 19,000	06-30-77 14.27 3,400		
06-12-89 23.39 8,500	05-23-61 31.82 20,200	10-10-85 35.45 58,200	08-04-93 14.25 3,200		
06-08-90 21.98 7,500	06-04-62 29.68 11,700	10-03-86 33.44 17,600			
07-24-92 21.49 7,300	09-24-62 31.63 18,900	03-01-87 33.11 15,500			
11-20-92 23.84 9,300	06-05-65 32.11 24,700	07-24-92 32.75 13,500			
05-09-93 27.85 52,800	06-10-65 33.00 39,600	11-20-92 33.31 19,800			
07-07-93 24.49 10,400	09-21-65 31.20 15,500	05-10-93 35.00 46,900			
07-15-93 26.23 14,000	06-21-67 32.16 28,700	07-06-93 33.21 18,700			
	10-07-67 30.74 13,700	07-22-93 33.75 24,800			
	06-27-69 32.76 40,200				

(a) From 2-12-35 to 6-27-60, datum 13.21 ft lower, discontinued 6-71; (b) No recorded stage; (c) Regulated by Council Grove Dam since 10-1964; (d) Regulated by John Redmond Reservoir since September 1964.

this reach to allow floating driftwood carried from upstream to be captured by other driftwood and debris already deposited in this 1.5-mile-long site. This logjam is an impediment to boaters desiring access from JRR directly up the river to other launching facilities. Under certain conditions, it may also represent an impediment to fish movement between the river and reservoir.

As mentioned previously, the JRR water elevation level is maintained based on the entire reservoir system needs, the immediate upriver and downriver conditions, and the effort to manage the water level for all entities at the reservoir. Using the analyses with the SUPER program model for defining year 2014 conditions by maintaining conservation pool elevation level at 1039.0 ft or changing it to the proposed alternative elevations of 1040.0 ft, 1040.5 ft, and 1041.0 ft NGVD, it can be observed that the percent of time that pool elevations will be equaled or exceeded is indiscernible between the four water elevation levels. Figure B-2 (appendix B) shows the exceedance frequency in percent of years of maximum day (peak) elevations at JRR for each scenario in the year 2014. In this analysis, there is no difference based on the beginning elevations of 1039.0 ft, 1040.0 ft, 1040.5 ft, or 1041.0 ft.

A simulation of a flow year like 1993 was prepared for the conservation pool elevation scenarios (1039.0 ft, 1040.0 ft, 1040.5 ft, and 1041.0 ft) in the year 2014, using the SUPER model. Figure B-3 (appendix B) shows the elevation hydrograph for JRR using the 1039.0-ft and 1041.0-ft conservation pool elevations for clarity in viewing the results. Raising the conservation pool elevation to 1041.0-ft NGVD results in only slight changes for the year 1993 and for 2014. At lower conservation pool elevations, small differences can be observed, however, as the water level rises in the conservation pool, the lake volume increases at a faster rate, thus minimizing the starting elevation differences.

Another simulation with SUPER was to project the conservation storage and flood control storage volumes based on lake area / elevation surveys, including data from the year 2000 (table 3-8). This table illustrates the effects on storage volumes in the year 2014 for the four conservation pool elevation scenarios (1039.0 ft, 1040.0 ft, 1040.5 ft, and 1041.0 ft). From this simulation, it can be deduced that approximately 3.18% of the flood pool will be reallocated.

Basic Surface Water Outflow

Following the construction and operation of John Redmond Dam in 1964, the flow regime of the Neosho River reach downriver from the dam has changed considerably. Controlled releases from the dam have decreased the magnitude of peak discharges and increased the magnitudes of the low discharges (Studley 1996). Studley (1996) used three gauging stations below the dam (Strawn / Burlington, Iola, and Parsons) to prepare research. As seen in figure B-4 (appendix B), the annual peak discharges are considerably less following dam implementation. The effect of uncontrolled drainage upriver from Iola and from Parsons is readily seen.

TABLE 3-8. JOHN REDMOND SEDIMENT REDISTRIBUTION STUDY

	Existing Conditions SUPER Run AX00X02 TOC=1039.0 ft Yr2014 EAC Table	Modified Conditions SUPER Run A00X03 TOC=1040.0 ft Yr2014 EAC Table	Modified Conditions SUPER Run A00X04 TOC=1040.5 ft Yr2014 EAC Table	Modified Conditions SUPER Run A00X05 TOC=1041.0 ft Yr2014 EAC Table
Conservation Storage	40,096 ac-ft	47,838 ac-ft	52,126 ac-ft	56,414 ac-ft
Flood Control Storage	511,729 ac-ft	503,987 ac-ft	499,699 ac-ft	495,410 ac-ft

Source: USACE 1996
TOC=Top of Conservation Pool; ac-ft=ac-ft

One factor considered in JRR releases is the slow recession of downriver flows because of the 1.2-ft/mile slope of the river channel. From the John Redmond Dam, it requires approximately 2 hours of water travel to reach the Burlington gauging station 5.3 miles downriver, 24 hours to reach the Iola gauging station 56.3 miles downriver, 60 hours to reach the Parsons gauging station 139.6 miles downriver, and 84 hours to reach the Commerce, Oklahoma, gauging station 190.2 miles downriver. Figure 3-2 illustrates the location of USGS streamflow gauging stations in the Neosho basin.

Another factor in alluvial basins like the Neosho River basin is that reaches of streams with steep banks are in a continual state of erosion. The USACE mitigates flow-enhanced erosion of the riverbanks by overtly slowing the rate of release after a precipitation event to slow the rate of fall in the river stage.

Discharges are rarely as low as were experienced prior to construction of the dam because of the need to provide adequate water supply and water quality for downriver users. This is accomplished by maintaining an average annual minimum flow of 30-cubic ft per second (cfs) at Chanute, 40 cfs at Iola, and 50 cfs at Parsons, Kansas. Low flow releases are made during dry periods in order to meet minimum flow requirements. The minimum flow requirements range from 21 cfs (November–March) to 48 cfs (July–August), or an average of 30 cfs annually at Chanute, Kansas (USACE 1996).

Outflow duration was analyzed using SUPER to determine the effect of conservation pool elevation raise at the year 2014. Figures B-5, B-6, B-7, and B-8 (appendix B) are semilog plots of the percent of time that discharge durations will be equaled or exceeded for the four conservation pool scenarios of 1039.0 ft, 1040.0 ft, 1040.5 ft, and 1041.0 ft. Differences among the scenarios were indiscernible, even though the amount of discharge increases downriver

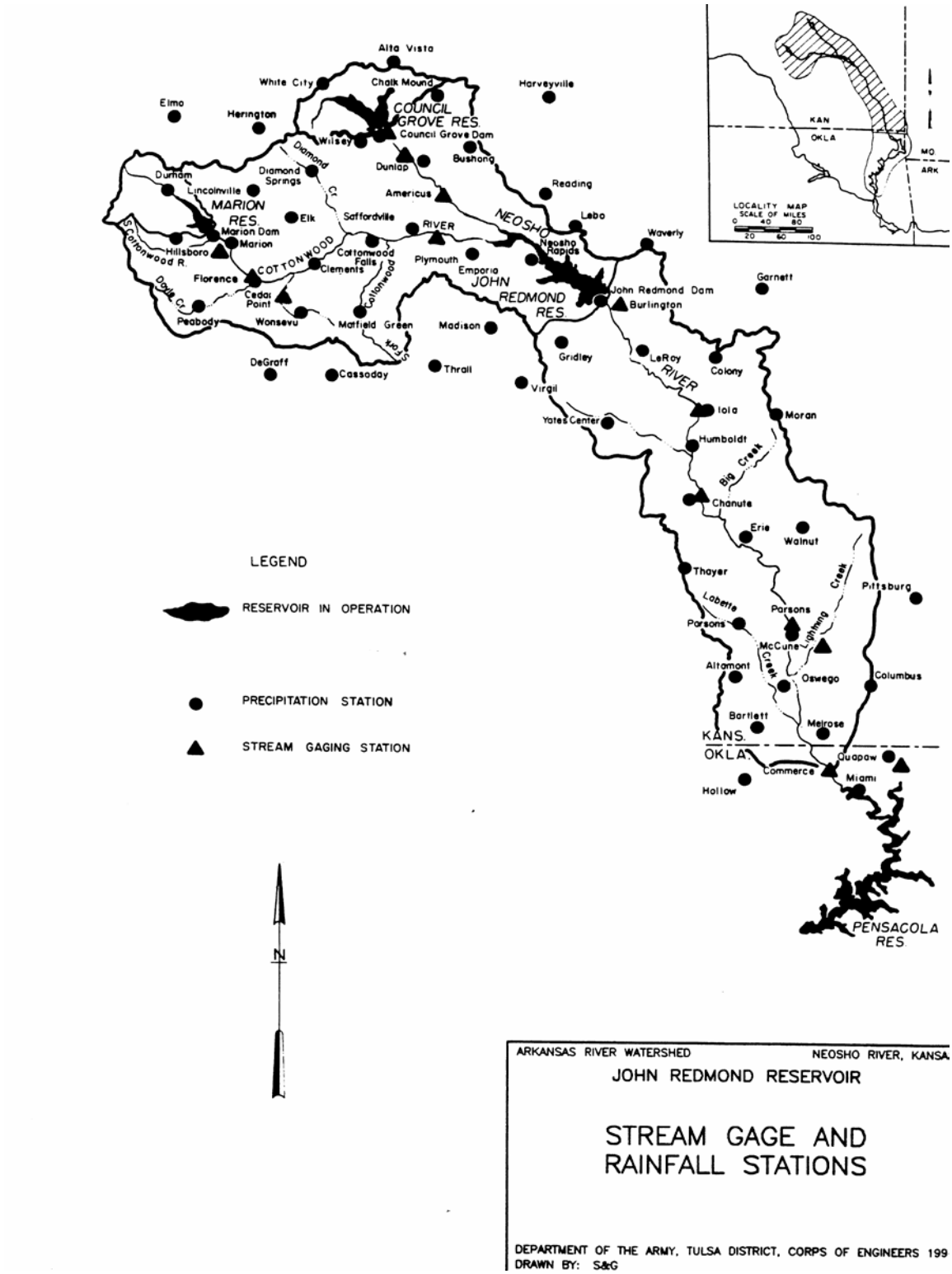


FIGURE 3-2. LOCATIONS FOR U.S. GEOLOGICAL SURVEY STREAMFLOW-GAUGING STATIONS DOWNSTREAM FROM JOHN REDMOND RESERVOIR

because of unregulated inflow. Similarly, there is no discernible difference in the SUPER analysis results of the exceedance frequency of maximum day discharge (peak daily flow) simulation for the year 2014 between the above-listed scenarios (figures B-9, B-10, B-11, and B-12) (appendix B).

Another simulation of a flow year like 1993 was prepared for the JRR outflow and the three downriver gauging stations. Figures B-13, B-14, B-15, and B-16 (appendix B) show the discharge hydrographs at these stations using the 1039.0-ft and 1041.0-ft conservation pool elevations for clarity in viewing the results. For lower discharge rates, slight differences between the two scenarios may be observed.

Surface Water Quality

River / Stream

The state of Kansas established a stream chemistry monitoring program that currently operates 158 permanent / 146 rotational monitoring stations / sites statewide (KDHE 2000). Placement of many sampling stations on smaller order streams in 1990 facilitated a more thorough analysis of rural and agricultural effects to surface water quality. The state of Kansas and the USGS share sampling stations and duties and an example of water quality output is seen in appendix B. The program objectives are to provide timely and scientifically defensible information on the physical, chemical, and bacteriological condition of flowing waters in Kansas; intended uses are:

- Compliance with water quality monitoring and reporting requirements of 40 CFR 130.4 and Sections 106(e)(1), 303(d), and 305(b) of the Federal Clean Water Act.
- Evaluation of water body compliance with the provisions of the Kansas surface water quality standards (*Kansas Administrative Regulations* [K.A.R.] 28-16-28b *et seq.*).
- Identification of point and nonpoint sources of pollution contributing most significantly to documented water use impairments.
- Documentation of spatial and temporal trends in surface water quality resulting from changes in prevailing climatic conditions, land use and land cover, natural resource management practices, wastewater treatment plant operations, and other phenomena.
- Development of scientifically defensible environmental standards, wastewater treatment plant permits, and water body / watershed pollution control plans and TMDL.
- Evaluation of the effectiveness of pollution control efforts and water body remediation / restoration initiatives implemented by the department and other natural resource agencies and organizations.

Sampling frequency currently reflects a bimonthly schedule for permanent monitoring sites and 1 year out of every 4 years for rotational monitoring sites.

In a water quality study of reservoir sediments at Cheney Reservoir (Pope 1999, and Mau 2001), it was theorized that phosphorous concentrations near dam structures, under anoxic conditions, could result in phosphorus releases into the water column and negative effects to

the drinking water supply. Silt and clay particles, which distribute near dams, provide the adsorption mechanism for phosphorus and many trace elements.

Wildhaber et al. (2001) obtained water quality measurements in the Neosho River above JRR and below the dam. They found that water temperature was cooler by approximately 3 degrees Celsius (^{o}C) above the dam (24.74^{o}C) than below (27.58^{o}C). Turbidity was also higher above the dam (57.0 Nephelometric Turbidity Units [NTU]) than downriver of the dam (27.17 NTU), but the pH was nearly the same (8.37 above vs. 8.47 below). Dissolved oxygen increased downriver of the dam (4.66 mg/l vs. 5.62 mg/l); however, conductivity, alkalinity, and hardness were all higher above the dam structure. In addition, species of catfish were more common above JRR than below the dam (45.40/100m^2 vs. 25.66/100m^2).

The Kansas Department of Health and Environment (KDHE) has classified the Neosho River downstream from Council Grove Reservoir and the Cottonwood River as special aquatic life use waters (USFWS 1991). Further defined, these are waters that contain unique habitat types and biota, or species that are listed as threatened or endangered in Kansas. The general provisions of the Kansas surface water quality standards (K.A.R. 28-16-28c) state, in part: "…no degradation of water quality by artificial sources shall be allowed that would result in harmful effects on populations of any threatened or endangered species of aquatic life in a critical habitat…" A variance may be issued by KDHE, however, if "important social and economic development" is impaired (USFWS 1991).

Water quality concerns have been documented for most of the surface water entering JRR, including contaminants (FHNWR 2000). Consumption advisories are issued most years for the Neosho River due to chlordane compound concentrations in fish. During the 1970s, several fish kills were related to runoff from confined livestock feedlots. Investigations by the USFWS, Kansas Field Office, identified polychlorinated biphenyl (PCB), atrazine, and heavy metals, including lead, mercury, and arsenic in biota samples, along with lead in sediment samples (FHNWR 2000). Lead, zinc, and cadmium may lower populations of benthic macroinvertebrates used as food sources by some fish species (Wilhaber et al. 1998). In most aquatic systems, concentrations of trace metals in suspended sediment and the top few centimeters of bottom sediment are far greater than concentrations of trace metals dissolved in the water column (Horowitz 1985).

Reservoir / Lake

Land use and human activities can have considerable effects on water quality in a downstream reservoir (Pope 1998). Constituents such as suspended sediment, nutrients (species of nitrogen and phosphorus), pesticides, and major metals and trace elements may have detrimental effects on reservoir water quality through increased sedimentation, accelerated eutrophication, reduced light penetration, potentially harmful effects to human health and aquatic organisms, and a general decrease in recreational value.

Physicochemical conditions were sampled and recorded for JRR during its initial five summers of impoundment, 1964–1968 (Prophet et al. 1970). In general, the differences between successive years of individual physicochemical factors were not significant, but most factors

exhibited significant changes during 1968, as depicted in table 3-9. JRR was considered unique at the time of this study, because of the periodic enrichment by feedlot wastewater, which resulted in low dissolved oxygen, high ammonia, high fecal coliform bacteria levels, and periodic fish kills. In addition, JRR waters did not become thermally stratified because it was shallow (1.9 meter average depth) and the water was easily mixed by wave action (Prophet et al. 1970).

TABLE 3-9. SUMMER MEANS OF SELECTED PHYSICOCHEMICAL CONDITIONS NEAR OUTLET OF JRR (JUNE – AUGUST) (CONCENTRATIONS IN MG/L)

Year	Specific Conductance	HCO_3	O_2	PO_4	NO_3	Ca	Na	K
1964	467	138.0	5.9	0.28	0.46	40.8	9.1	3.7
1965	456	144.5	6.2	0.35	0.55	40.1	10.4	4.5
1966	448	152.1	6.8	0.08	0.29	53.4	16.5	4.6
1967	378	143.3	6.2	0.46	0.99	42.5	17.7	6.1
1968	348	131.9	7.4	0.33	0.90	29.6	6.7	4.0

Source : Prophet et al. 1970

The state of Kansas established a lake and wetlands water quality monitoring program (KDHE 2000) to provide reliable information on the physicochemical and biological characteristics of publicly owned water bodies; the information is used for:

- Compliance with the water quality monitoring and reporting requirements of 40 CFR 130.4 and Sections 106(e)(1), 303(d), and 305(b) of the Federal Clean Water Act.
- Evaluation of water body compliance with the Kansas surface water quality standards (K.A.R. 28-16-28b *et seq*.).
- Identification of point and nonpoint sources of pollution most significant to water use impairments in publicly owned lakes and wetlands.
- Documentation of spatial and temporal trends in surface water quality resulting from changes in land-use patterns, resource management practices, and climatic conditions.
- Development of scientifically defensible environmental standards, wastewater treatment plant permits, and water body / watershed pollution control plans.
- Evaluation of the efficacy of pollution control efforts and water body remediation / restoration initiatives implemented by the department and other agencies and organizations.

A total of 119 water bodies were included in the lake and wetlands water quality monitoring network during 2000. This number will change over time as new reservoirs are constructed and older reservoirs are dewatered or replaced by more accessible and/or suitable candidate sites (KDHE 2000).

Water quality samples are taken from selected sites at JRR, analyzed on a periodic basis, and published (USACE 1996). The USGS maintains a national stream quality accounting network station on the Neosho River near Parsons, Kansas, where specific conductance, pH, and temperature are recorded bimonthly. Samples are also taken at this site for chemical, biological,

and sediment analysis. The USGS also collects and analyzes periodic samples for specific conductance, pH, and temperature on the Neosho River at Americus, Burlington, and Iola, Kansas. These data are published in the *Water Resources Data, Kansas Annual Report*. Neosho River water quality is considered good, requiring only basic treatment for industrial or municipal use (USACE 1996).

Surface water is also sampled monthly below John Redmond Dam near the WCGS make up screen house (KDHE 2000). These samples are taken as controls to compare water quality with that of the Coffey County Fishing Lake, discharge cove, and the spillway. Radiological analyses of samples included gross alpha, gross beta, tritium (H^3), and gamma isotopes.

Sediment Transport

Dams are known to affect river systems, generally decreasing the distribution of sediments and altering the hydrologic regime, physical habitat, and water quality downriver (various authors in Wildhaber et al. 2000). The rate of loss of storage for a given reservoir is dependent on the rate of erosion of the drainage basin. According to de Noyelles (pers. comm. 2001), JRR is one of the most rapidly silting Kansas reservoirs. Pope (1999) and Mau (2001) described the results of analyzing 13 bottom-sediment cores from Cheney Reservoir (south-central Kansas). The cores were analyzed for percent moisture, bulk density, percent sand and silt/clay, and total phosphorus. For selected sites, cores were also analyzed for pesticides, PCBs, and major metals and trace elements.

Sedimentation patterns and sediment particle sizes were not uniformly distributed in Cheney Reservoir (Pope 1999 and Mau 2001). Most sedimentation occurred in or near the original river channel, most sand-size sediment particles were deposited in the upstream part of the reservoir, and silt- and/or clay-size particles were more widely distributed across the reservoir. Some results from this sampling effort were:

- Mean annual sediment deposition occurred at 209 ac-ft/year (0.22 ac-ft / year / square mile of drainage area), resulting in 27% filling of the conservation pool versus the 34% design estimate.
- Silt/clay sediment fraction is deposited in larger quantities closer to the dam than further upstream in the reservoir, resulting in larger phosphorus concentrations near the dam (94 mg/kg upstream vs. 710 mg/kg near the dam).
- Total phosphorus, which ranged from 94–674 mg/kg, was statistically related to silt- and/or clay-size particles. Mitigation would require reducing the annual distribution of phosphorus in the watershed or control the movement of silt- and/or clay-sized particles from the watershed.
- There was an increasing trend in total phosphorus concentrations, probably related to an increase in fertilizer sales, which doubled between 1965–1996, and to livestock production.
- DDT, DDD, DDE, and dieldrin were present in detectable concentrations; DDE was detected in all samples, ranging from 0.31–1.30 mg/kg. Some possibility of bioaccumulation (insecticides becoming concentrated in the food chain) exists.

- The acetanilide herbicide metochlor was detected in 22% of samples; herbicides may have little long-term water quality implications for aquatic organisms.
- Arsenic, chromium, copper, and nickel were present in concentrations where adverse effects to aquatic organisms occasionally occur.

The water entering JRR is turbid, carrying silt and sediments from tributary drainages and from agricultural land upriver. A large amount of sediment is delivered to JRR as a result of erosion from riverbanks, construction sites, and farmland within the watershed. Over 25% of the original conservation storage has been filled with sediment, although little change has resulted in flood storage (USACE 1996). Land use impacts sedimentation rates based on topography and the percentage of the runoff basin devoted to agriculture or other soil-disturbing activities. Over the past nearly 40 years, no clear sedimentation trend is apparent other than that the heaviest sediment deposition occurs during significant flood events. Except around the lake itself, the USACE has little impact on this process, but fully supports soil conservation efforts in the watershed.

Thirty sedimentation ranges established upriver from the dam are measured periodically. Both endpoints of each range are identified with permanent markers of known vertical and horizontal positions and all are surveyed periodically to compute sediment deposition. The last measurement occurred during 1993 (USACE 1996).

Sediment particle sizes in the Neosho River, above and below the dam, were calculated using the Fredle Index (geometric mean adjusted for distribution of particle sizes). It was determined that this index was lower above the dam than downriver from the dam (5.52 vs. 7.82). Although not significantly different, this index indicates that more evenly distributed substrate sizes occur upriver from the lake, and a shift to the predominance of larger gravel below the dam may be occurring. This increased coarseness of the substrate is considered a common effect of dams (Wildhaber et al. 2000).

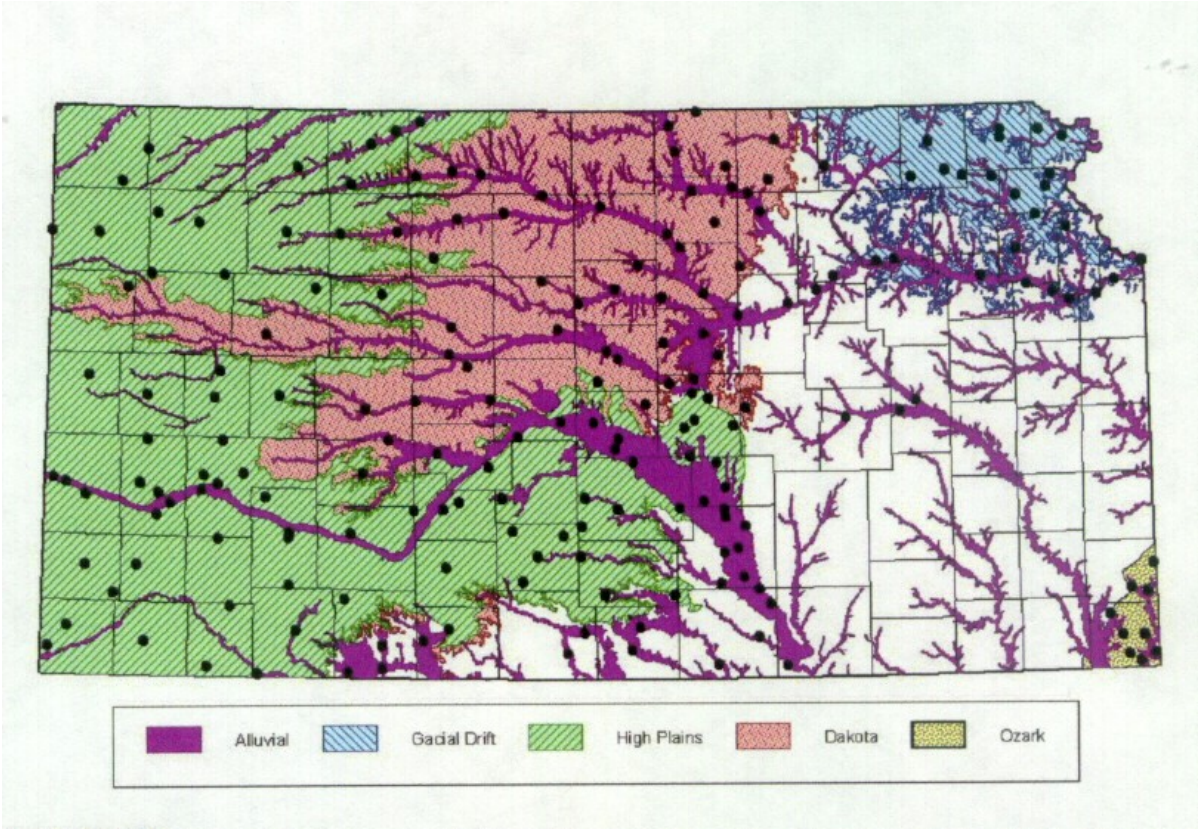
Removal of the logjam, described in Section 3.3.6, would likely result in a navigable channel from JRR to the upriver portions of the Neosho River. This action could also result in the downcutting and transport of sediments currently stored around and among the debris in the channel, as described by Beschta (1979). Following logjam removal on an Oregon stream, Beschta (1979) calculated that more than 5,000 m^3 of sediment along a 250 meters (m) reach was eroded downstream by streamflow during the first winter following debris removal. Debris dam removal within a second order stream in New Hampshire resulted in increased downstream export of dissolved matter by approximately 6% and particulate matter (both fine and coarse) of approximately 500% (Bilby 1981).

In low-gradient, meandering streams, large organic debris enters the channel through bank erosion, mass wasting (landslides), blowdown, and collapse of trees due to ice loading (Keller and Swanson 1979). Under natural conditions, woody debris is removed from stream channels by leaching, microbial decomposition, fragmentation by invertebrates, physical fragmentation, and downstream transport (Bilby and Bisson 1998). The relative importance of each of these processes varies with the size and flow volume of the stream. The presence of large woody debris in a stream facilitates deposition of sediment and accumulation of finer organic matter.

Dramatic increases in sediment and organic matter export occur immediately following removal or disturbance of the debris (Bilby and Bisson 1998). For the Neosho River, removal of the logjam would result in a large quantity of the sediment residing there to be exported or transported into the conservation pool of JRR, further affecting water supply storage. A thorough analysis of this river reach would be warranted to determine sediment quantity and possible fate prior to logjam removal attempts.

3.3.4 Groundwater

Groundwater is a minimal resource along the Neosho River. One reason is the abundance of surface water and another is because the alluvium is shallow and lies on shale and limestone bedrock, which are not good aquifer materials (figure 3-3). Floodplain alluvium near JRR averages approximately 26 ft in thickness and the water table is typically 10–15 ft below the land surface (USACE 1991). Although a few wells have been drilled in the northwest area, most groundwater use in the Neosho basin occurs in Crawford and Cherokee Counties, east of the Neosho River (figure 3-3) where the western extremity of the Ozark aquifer pinches out in the state.



Source: BEFS Groundwater Quality Monitoring Network

FIGURE 3-3. MAP OF MAJOR AQUIFERS AND LOCATION OF ALL WELLS

Groundwater Quality

The state of Kansas established a cooperative groundwater monitoring program between the USGS and the KDHE in 1976 (KDHE 2000). The program objectives are to provide reliable information on groundwater quality for use in the identification of temporal and spatial trends in aquifer chemistry associated with: (1) alterations in land-use patterns, (2) advances in land treatment methods and other resource management practices, (3) changes in groundwater availability or withdrawal rates, and (4) variations in regional climatic conditions. Initially the USGS performed sample collection and data interpretation while sample analyses were performed by KDHE. In 1990, KDHE assumed all operational and managerial aspects of the Kansas groundwater quality monitoring program. The basic sampling network was left intact, but several improvements were made, as follows:

- legal descriptions were reviewed for all network sites
- wells were tagged with a unique site identification number
- the Kansas Water Database (electronic repository for groundwater quality data) was updated to reflect changes and corrections to the list of monitoring well locations

Sampling frequency currently reflects a 2-year rotational sampling schedule in which half of the network was sampled each year. The sampling network now includes a maximum of 200 wells used for public water supply, rural / domestic water supply, irrigation, livestock watering, industrial water supply, groundwater monitoring, or a combination of these uses (KDHE 2000). Data are reported on an aquifer basis; the aquifers were delineated in a digital format by the Kansas Geological Survey (KGS) and the USGS. Only three groundwater monitor wells are located in the upper Neosho River basin (figure 3-3).

A maximum, annual total of samples collected and analyzed includes: (1) inorganic chemistry – 100; and (2) pesticide – 100; volatile organic compounds (VOC) – 25; radionuclide – 25, and radon – 10. The VOC and radiological samples are collected on an eight-year rotational schedule. Groundwater quality data are periodically reviewed and analyzed, then entered into the Kansas Water Database and the U.S. Environmental Protection Agency (USEPA) Storage and Retrieval (STORET) database (KDHE 2000).

3.3.5 Water Rights

The state of Kansas has established a Water Marketing Program to contract with water supply customers (KWO 1996). Several significant events converged during the 1950s leading to the creation of the Water Marketing Program:

- floods of 1951, followed by the 1952–1957 drought
- creation of the Kansas Water Resources Board (now Kansas Water Office) (1955), with responsibility for water resources planning, water policy development, and coordination of water-related activities at all levels of government
- Federal Water Supply Act (1958) passage with provisions allowing non-federal entities to add water supply storage space to planned flood control structures

- Kansas voter approval (1958) of a constitutional amendment allowing Kansas to financially participate in the development of flood control works or works for the conservation or development of the state's water resources

Under the Kansas Water Resources Board, the 1961 Kansas legislature passed a Concurrent Resolution (H.C.R. 5) allowing the state to provide assurances to the federal government for repayment of costs for add-on water supply storage in Council Grove (18,200 ac-ft), Marion (31,930 ac-ft), and JRR (27,450 ac-ft), among others (KWO 1996). The estimated yield capability of this storage space during periods of prolonged drought for these three reservoirs is 29.66 million gallons per day (MGD), with 19.9 MGD assigned to JRR (KWO 1996).

The quantity of water obligated to purchasers is based on an estimate of the quantity of water that can be expected to be withdrawn from storage with a 2% chance of shortage during a drought, having a statistical chance of occurrence once every 50 years (KWO 1996). A yield analysis was conducted on JRR and the recalculation results were as follows:

- Sediment deposition differs significantly from that expected during project design.
- Flood control pool has excess capacity and the conservation pool has diminished capacity.
- The diminished storage capacity of the conservation pool can be recovered—a lower yield results until corrective measures are taken.
- The 2% chance yield has been recalculated to be 19.9 MGD (formerly calculated to be 26.5 MGD) for the original water supply pool purchased from the USACE to serve the Water Marketing Program.
- The portion of the water supply pool purchased in 1985 (Memorandum of Understanding [MOU] with the USACE) was calculated to yield 7.3 MGD.
- The USACE has been authorized by Congress to conduct a study to determine the feasibility of a pool raise to restore storage lost to sedimentation.

To date, withdrawals for water supply storage have not had a major effect on the operation of JRR (USACE 1996). All of the water supply storage is contracted by the state of Kansas. The WCGS has contracted from the state all of the water in the storage to use for cooling and other uses. The state has also formed water assurance districts with downriver communities in anticipation of purchasing additional water supply storage in the reservoir to release for downriver water supply during drought periods.

Within the JRR flood pool, above John Redmond Dam, the USFWS holds rights to 4,574 ac-ft of water under Approved Certificates of Appropriation (FHNWR 2000). These rights are of two types, e.g., natural flow diversion (3,102 ac-ft) and pumping (1,472 ac-ft) for recreational purposes, which include fish and wildlife. These water rights are used to provide water to constructed and naturally occurring wetlands within the refuge. Water rights for flows in the Neosho River, downriver from John Redmond Dam, are issued by the Division of Water Resources, Kansas State Board of Agriculture (USACE 1996). Currently, irrigation and recreation use comprise 10% of the water rights (5% each), municipalities have rights to 14%, and industrial use is 76% of the water rights held at JRR (USACE 1996). The active water right holders downriver from John Redmond Dam, as of 1996, are listed in table 3-10.

TABLE 3-10. ACTIVE WATER RIGHT HOLDERS

Water User – Location	Use	Amount (cfs)	Amount (ac-ft/year)
City of Chetopa – Chetopa, Kansas	Municipal	1.12	233
City of Oswego – Oswego, Kansas	Municipal	1.79	636
Dickinson Farms – Labette County	Irrigation	3.12	230
Joe Sprague – Labette County	Irrigation	3.34	285
Carroll Sprague – Labette County	Irrigation	2.69	119
Larry Sprague – Labette, County	Irrigation	3.34	98
KS Gas & Electric Co. – Labette County	Industrial	61.3	2,027
KS Ord. Plant – Labette County	Industrial	1.54	868
RWD #6 Crawford, Co. – Labette County	Municipal	0.51	92
June Carson – Labette County	Irrigation	5.79	192
Wayne Brunenn – Labette County	Irrigation	1.48	107
National Farms Feedlot – Labette County	Industrial	16.22	313
City of Parsons – Parsons, Kansas	Municipal	14.04	2,305
Big Islands Farms – Neosho County	Recreation	20.05	80
Gertrude J. Richards – Neosho County	Irrigation	1.78	35
KS D of Wildlife & Parks – Neosho County	Recreation	15.60	200
P & S Land Company – Neosho County	Irrigation	2.23	100
Beachner Brothers – Neosho County	Irrigation	6.68	551
James Chappell – Neosho County	Irrigation	6.68	92
Charles Gouvion – Neosho County	Recreation	0.67	4
KS D Wildlife & Parks – Neosho County	Recreation	28.74	3,000
City of St. Paul – St. Paul, Kansas	Municipal	0.67	156
Patrick A. Johnson – Neosho County	Irrigation	2.23	100
City of Erie – Erie, Kansas	Municipal	2.63	424
Thayer Insurance Agency – Neosho County	Irrigation	5.35	400
R. W. Hudson – Neosho County	Irrigation	3.34	128
Taylor Brothers – Neosho County	Irrigation	2.23	127
Kenneth Casper – Neosho County	Irrigation	3.99	180
City of Chanute – Chanute, Kansas	Municipal	9.36	2,718
Ash Grove Cement Co. – Allen County	Industrial	8.91	850
Monarch Cement Co. – Allen County	Industrial	1.11	0
City of Humboldt – Humboldt, Kansas	Municipal	2.56	676
John Works – Allen County	Irrigation	11.83	689
Jack McFadden – Allen County	Irrigation	5.35	286
Charles Sutherland – Allen County	Irrigation	1.54	82
City of Iola – Iola, Kansas	Municipal	6.13	1,718
PWWSD #5 Iola – Iola, Kansas	Municipal	1.84	615
RWD #6 Woodson Co. – Woodson County	Municipal	1.03	215

TABLE 3-10. ACTIVE WATER RIGHT HOLDERS

Water User – Location	Use	Amount (cfs)	Amount (ac-ft/year)
City of Leroy – Leroy, Kansas	Municipal	0.52	75
Clarence Parmely – Coffey County	Irrigation	4.81	79
Kenneth Crofts – Coffey County	Irrigation	2.51	39
Forrest Robrahn – Coffey County	Irrigation	0.88	27
City of Burlington – Burlington, Kansas	Municipal	3.34	911
KS Gas & Electric Co. – Coffey County	Industrial	170.00	53,916
KSD Wildlife & Parks – Coffey County	Recreation	26.74	150
Total Irrigation	21 Users		3,946
Total Industrial	6 Users		57,974
Total Municipal	13 Users		10,774
Total Recreation	5 Users		3,434
Grand Total	**45 Users**		**76,128**

The KG&E holds the only water contract through KWO to support operation of WCGS (53,916 ac-ft); the remainder of water rights holders are members of the CNRB (3,500 ac-ft) (KWO 1996).

Water Assurance Districts were formed under the Water Assurance Program Act of 1986 (K.S.A. 82A. 82a-1330 *et seq*.), which gives the KWO authority to enter into contracts with the federal government for storage space to be used for water assurance. It was under this act that the CNRB was formed (KWO 1996). Ten thousand ac-ft of water were purchased under this act, 3,500 ac-ft were from JRR.

3.3.6 Logjam

A drift logjam up to 1.5 miles in length occurs in the Neosho River, near the Jacob's Landing site above JRR. The logjam has formed above an island in the Neosho River, which causes the river to fork into two channels (figure 3-4). This logjam has attracted local attention in favor of removal, and was the topic of comments obtained during public meetings held in Burlington, Kansas. Although the logjam does not contribute to downriver flooding, it is quite large and was considered cost prohibitive to remove (FHNWR 2000).

Local citizens attempted removal of the logjam by burning during the summer of 1999, but the wet wood would not carry the fire (FHNWR 2000). The accumulated debris at the site is considered economically unfeasible to remove by demolition or mechanical means. The Neosho River may eventually form a new channel around this location, south of the existing channel (Jirak, pers. comm., 2001).

FIGURE 3-4. LOGJAM AREA UPRIVER OF JOHN REDMOND RESERVOIR

Some effects of the logjam, or large woody debris accumulation in the Neosho River north of Jacob's Creek Landing and west of the reservoir, have been identified and include:

- an impediment to navigation by boat between the lake and upriver sites
- slowing or dissipation of Neosho River flows resulting in some backwater formation
- diversion of water over the access road to the Jacob's Creek Landing boat ramp during high-flow events for the Neosho River
- aggradation (raising) of the riverbed due to accumulation of sediment; the sediments also serve to anchor the logjam into the riverbed
- dropping of sediments within the John Redmond flood control pool rather than the conservation pool
- formation of a structure resistant to erosion, much like a geologic feature might be
- future island formation or formation of a cut-off oxbow when sediment deposition is sufficient
- a source for driftwood to accumulate and possibly float into the reservoir and against the dam structure during flood events

In addition to the observed effects listed above, the following research would benefit any potential logjam removal analysis: (1) determination of other, similar examples of large woody debris accumulation for other reaches of the Neosho River and the effect; (2) study the effects of raising the reservoir water level to 1041.0 ft on debris accumulation and navigation at the logjam site; (3) an economic analysis of logjam removal, hauling, storage, and disposal versus other alternatives such as opening a new, more direct channel into the reservoir; and (4) examination of different forms of large woody debris management, including upriver prevention measures.

An initial appraisal of the logjam was developed and finalized in December 2004, which recommends constructing and maintaining public access and a boat ramp in the vicinity of Neosho Rapids. Construction of this access point will provide long-term access to the Neosho River, with a relatively low risk of impact from logjams. A budget for this task will be prepared and submitted in Fiscal Years 2007 through 2012.

3.4 BIOLOGICAL RESOURCES

Biological resources include the vegetation, wetlands, wildlife, fisheries and aquatic resources, and the endangered, threatened, and candidate species present in the vicinity of JRR. In addition, a national wildlife refuge and a Kansas wildlife management area are present within JRR project lands and are summarized under this report section.

Several biological surveys have been completed at JRR and in the project region. A countywide plant species list and description of plant communities was prepared for FHNWR during 1999 and published in 2000. Additionally, lists of avifauna, mammals, and herptiles have been prepared by the refuge or by the Kansas Natural Heritage Inventory (KNHI), and were published for FHNWR during 2000. Waterfowl and raptor census data are taken at JRR annually / bimonthly between the months of October and March by the KDWP (appendix C). Fishery data for the Neosho madtom and other catfish were collected during the late 1990s for the Neosho River upstream and downstream of the dam and reservoir during a number of years and published during 2000. Similarly, data for freshwater mussels was collected during the mid-1990s for the Neosho River upstream and downstream of the dam and reservoir and published during 1997.

3.4.1 Vegetation Resources

Plant species have been inventoried for Coffey and Lyon Counties, and number 776 (KNHI in FHNWR 2000). Many of these species grow in the variety of vegetation types that also serve as wildlife habitat within the JRR project area, including woodland, shrubland, and herbaceous (terrestrial and aquatic) plant communities (figure 1-2). The terrestrial herbaceous communities are comprised of native and introduced grasslands, in addition to agricultural crops and fallow cropland that supports weedy annual forbs and grasses. Forested, shrub-scrub, and emergent wetlands and aquatic plant communities are discussed in Section 3.4.2.

The JRR project area lies within the Prairie Division–Forest-steppes and prairies ecoregion province (formerly the Prairie Parkland Province), Osage Plains section (Bailey 1997). The lowest elevations support riparian woodlands along the Neosho River and its tributaries and the JRR shoreline, upland woodlands on adjacent slopes and hills, and tall- and mid-grasses on open sites of the higher elevations. Shrubs are invading some grasslands where land management practices are not sufficient to prevent their establishment. These sites will eventually support predominantly shrub and woodland species, unless stewardship practices such as hand grubbing, mowing, controlled burning, or herbicide application are employed.

Woodlands

Riparian woodlands are characterized as a bottomland hardwood type (Elm-Ash-Cottonwood Woodland). These stands are dominated by American elm, green ash, eastern cottonwood, black willow, black walnut, sycamore, silver maple, burr oak, box-elder, and hackberry. They are lowland sites, typically have heavy soils with poor surface drainage, and are located along the Neosho River (both upstream and downstream of the dam and reservoir), on the shoreline

of JRR, and along Otter, Buffalo, Jacobs, Eagle, Plum, Troublesome, Lebo, Benedict, Kennedy, and Hickory Creeks (figure 1-2). The aerial photo signature for riparian woodlands in figure 1-2 consists of a closed canopy that is reddish to reddish-brown to dull orange color, with a pebbly texture.

Downriver from JRR, most of the floodplain vegetation that has become established along the Neosho River and its major tributaries can be described as the riparian woodland type. When observed during a site field visit and on black and white aerial photography of the countywide soil surveys (NRCS 1982a, 1972, 1978, 1982b, 1990, 1985, and 1973), it is a closed-canopy forest type extending the length of the Neosho River (figure 3-5). The type occupies islands and point bars and first and second terraces along the river. Islands, point bars, and first terraces are dominated by eastern cottonwood, silver maple, box-elder, and black willow, while slightly higher elevation second terraces support eastern cottonwood, green ash, American elm, black walnut, hackberry, and burr oak. It is common to observe seedlings and saplings of these trees in the forest understory, in addition to the eastern red cedar.

FIGURE 3-5. NEOSHO RIVER, CHANUTE, KANSAS

In Cherokee and Neosho Counties, and nearer the Oklahoma border, farmers have selected pecan trees to grow on the second and upper first terraces of the Neosho River. Growth of pecan trees is encouraged, while other tree and shrub species are regularly removed to allow for the maximum production of nuts and effective gathering when they mature. Mature pecans are shaken from trees mechanically and recovered from the ground surface with mechanical pickers, or from materials such as tarpaulins laid over the ground surface to catch the nuts.

Upland woodlands occupy drier sites adjacent to riparian woodlands including slopes and hillsides. They are typically characterized as Oak-Hickory Woodland. Upland woodlands are dominated by burr oak, northern red oak, pin oak, shagbark hickory, and shellbark hickory. On

the driest sites, bitternut hickory, chinquapin oak, Osage orange, redbud, and eastern red cedar are the common tree species. Wooded upland sites typically have good surface and internal drainage because of their topographic location on slopes. Some north-facing slopes are dominated by red oak and are considered a unique Ozarkian Woodland (Minnerath, pers. comm., 2001). Perhaps the best example of this type occupies a portion of the Eagle Creek drainage (figure 1-2). The aerial photo signature for upland woodlands (figure 1-2) consists of a closed canopy that is dull brownish-red in color with a pebbly texture. It is also likely that the Ozarkian Woodland type is present along some drainages downriver and tributary to the Neosho River, including the Spring River and Lightning Creek drainages.

As an adjunct to a raccoon denning survey in the FHNWR, Gehrt et al. (1990) collected riparian tree data. Using a point-quarter sampling methodology for trees greater than 30 centimeters (cm) diameter at breast height (dbh), the tree species distance from the point, and dbh were recorded. The relative dominance, relative density, basal area, and number of trees per hectare (ha) were calculated. Hackberry was the dominant tree species over 30 cm dbh, along with silver maple, green ash, white oak, American elm, sycamore, and mulberry. Riparian woodlands at the FHNWR supported 159 trees per hectare with a basal area of 28.2 m^2/ha. The dbh for eastern cottonwood averaged 50.2 cm, sycamore 115 cm, and silver maple 57.0 cm.

Shrublands

Shrublands occur as patches and stands along drainages, the reservoir shoreline, upper margins of wetlands, and as invasive species of grasslands. Floodplain shrublands growing along the riverbanks are dominated by buckbrush, greenbriar, dogwood, American plum, and the liana, wild grape. The reservoir shoreline and upper wetlands margins are characterized by button-brush and seedling black willow and eastern cottonwood. A few stands of seedling silver maple were also observed, having become established on upper wetlands margins. Invasive shrub species of upland grasslands include species of sumac and sapling trees, particularly eastern red cedar.

Downriver of the JRR, shrublands occupy recently scoured islands, point bars, and riverbanks (figure 3-6). On these sites that are disturbed during flood events, sandbar willow, rough dogwood, and buttonbrush invade rapidly and form stands of shrubs up to 15 ft tall. On some sites, silver maple, eastern cottonwood, and black willow seedlings make up a significant portion of the shrub canopy cover. As the shrubs mature, the stands are gradually replaced by black willow, silver maple, and eastern cottonwood trees. The aerial photo signature for shrublands (figure 1-2) is a dull orange to reddish-brown color and a brushy texture containing individual pebbles where small black willow or eastern cottonwood trees are present.

Grasslands

Grasslands of the project area are predominantly introduced and exotic within the project site mid- and lowland areas and are dominated by smooth brome, Kentucky bluegrass, and meadow fescue. A few stands of mostly native grass species occupy approximately 225 acres along the

FIGURE 3-6. NEOSHO RIVER ISLAND, CHANUTE, KANSAS

northern and southern boundary fencelines (FHNWR 2000). These grasslands are composed of tall- and mid-grass species and are considered tallgrass prairies as described by McGregor et al. (1986). Grass species commonly associated with dry, upper slopes, hills, and ridges are mostly mid-grasses, including little bluestem, sideoats grama, purple top, and Indiangrass. Lower, more mesic slopes and swales support the tall grasses—big bluestem, broomsedge bluestem, Kentucky bluegrass, silver bluestem, switchgrass, and witchgrass.

Only small patches of grassland were observed along the Neosho River downriver of JRR. These occurred on steep, southerly exposed banks and in canopy breaks where disturbances for road and power line maintenance activities had occurred (figure 1-2). Some pasture grasses had been planted to support grazing livestock on a few sites above the primary floodplain.

The aerial photo signature for grasslands (figure 1-2) is predominantly pink to pinkish-red and smooth textured. A few pebbly-roughened areas may be present where shrubs and small trees have begun to invade the grasslands. Where grasslands have been recently mown, the color signature becomes white to light pink and is smooth-textured, depending on the amount of regrowth that has occurred.

The KDWP attempted planting approximately 100 acres of native grasses in the OCWA (Barlow, pers. comm., 2001). To date, approximately half of this acreage remains; the rest of the plantings failed due to flooding because of the flood control function of the dam. Figure 3-7 shows a herbaceous association dominated by weedy forbs at OCWA.

FIGURE 3-7. JOHN REDMOND OPEN AREA AND WOODLAND

Several large areas of landscaping also support introduced grasslands within the JRR project area. These are irrigated plantings and are used for recreation sites and as aesthetic plantings around buildings. Typically, landscaped grasslands are planted to Kentucky bluegrass and Bermuda grass. Along the Neosho River, below John Redmond Dam, landscaped grasslands and gardens have been introduced in some local parks such as the one shown for the city of Burlington in figure 3-8.

FIGURE 3-8. NEOSHO RIVER, BURLINGTON, KANSAS

The aerial photo signatures for introduced and maintained grasslands range from dull pink to light red and the texture is very smooth due to regular mowing. Individual pebbles and groups of pebbles appear where trees and shrubs have been introduced as landscape plantings and as

shade trees. These grassland signatures are often interrupted with the white signatures of roads, trails, and campsites.

Agricultural Land

Approximately 4,298 acres of croplands are available for lease on the FHNWR, 400 acres on the OCWA, and 400 acres on USACE land. The typical crops planted on leased agricultural lands are corn, wheat, and soybeans. Currently, the USACE acreage is not leased because the land is too often flooded and the costs associated with driftwood removal are too high (Fry, pers. comm., 2001). Similarly, the lease for the OCWA acreage will soon expire and a crop has been harvested only about 2 of every 5 years (Barlow, pers. comm., 2001). Currently, 14 farmers lease approximately 3,700 acres of the available land within the FHNWR (Gamble, pers. comm., 2001).

Downriver from JRR, agricultural fields occupy the upland along nearly the entire 190-mile corridor. For much of the corridor, riparian forests form a narrow to broad belt along the river, intercepting runoff from adjacent agricultural land, but at a few sites fields are farmed to nearly the river's edge (figure 3-9). The aerial photo signatures for agricultural lands range from pink to deep red and a smooth texture for fields planted to crops such as soybeans and wheat (figure 1-2), while cornfields and fallow lands with tall, annual weeds appear reddish to orange and slightly roughened.

FIGURE 3-9. AGRICULTURAL FIELD NEXT TO THE NEOSHO RIVER

In addition to agricultural leases, mudflats are sometimes aerially seeded with millet to provide forage for fish and wildlife. During 2000, approximately 700 acres of mudflats were aerially seeded (Gamble, pers. comm., 2001).

Downriver from JRR, pecan plantings and orchards have been established in the floodplain of the Neosho River and other floodplain and upland sites in southeastern Kansas (Reid 1995).

The scoping meeting held in Chetopa, Kansas (USACE 2001), resulted in several comments from pecan growers concerning effects of floodwater on pecan production in the area. Generally, pecan trees will grow without irrigation when an average of 30 inches of precipitation is available, but ample water throughout the growing season is necessary for good tree growth and regular nut production (Reid 1995). Good soils for pecan production are characterized by a clay loam to sandy loam texture, good internal drainage, and a static water table that ranges from 10–25 ft below the soil surface (Reid 1995). Nut production can be negatively affected by: (1) mild drought conditions, resulting in smaller nuts (spring drought) or poor kernel filling (summer drought); (2) severe drought conditions, resulting in nut abortion, premature defoliation, and a decrease in the following year's nut crop; and (3) extended periods of seasonal flooding, resulting in early leaf-fall from stressed trees.

Pecan orchards and groves consist of the tree canopy and an understory of cool-season grasses that are regularly mowed. Pecan nuts ripen in late September to early October, dry on the tree during October, and fall or are shaken from the trees and collected mechanically from the mowed ground cover (Reid 1995).

Exotic Plant Species

Several non-native plant species are present in the project area; two targeted for control and occurring within JRR lands are Johnson grass and Sericea lespedeza (FHNWR 2000; Jirak, pers. comm., 2001). State and county law mandates control of exotic plant species (FHNWR 2000). Typically, control efforts incorporate mowing and farming, although biological controls are being investigated. Pesticide and herbicide use are restricted in the Neosho River floodplain within the refuge and an integrated pest management approach is taken, using farm management practices, prescribed burning, and chemical application where appropriate (FHNWR 2000).

3.4.2 Wetlands Resources

Wetlands of JRR consist of natural wetlands (approximately 123 acres) that have become established upriver from the reservoir in abandoned oxbows of the Neosho River and deeper floodplain depressions (that are now known as lakes) (FHNWR 2000). Wetlands also persist along the shoreline of the reservoir and at the base of John Redmond Dam, where shallow water supports emergent and aquatic types, which have been introduced into FHNWR. Wetlands occupying the area between the 1039-ft and 1041-ft contours are shown on figure 3-10 and have been classified under the USFWS-National Wetlands Inventory, as follows:

- L1UBHh – Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked / Impounded
- L2USAh – Lacustrine, Littoral, Unconsolidated Shore, Temporarily Flooded, Diked / Impounded
- PEMAh – Palustrine, Emergent, Temporarily Flooded, Diked / Impounded
- PFOAh – Palustrine, Forested, Temporarily Flooded, Diked / Impounded
- PSSA – Palustrine. Scrub-Shrub, Temporarily Flooded
- PSSAh – Palustrine, Scrub-Shrub, Temporarily Flooded, Diked / Impounded

- R2UBHx – Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded, Excavated

FIGURE 3-10. REPRESENTATIVE WETLANDS AT JRR

Forty-three wetlands units totaling approximately 1,934 acres have been created on the FHNWR using a dike and levee system and pumping or natural flow diversion water rights that equal 4,574 ac-ft. Two wetlands units, Strawn and Goose Bend #4, lie in relatively close proximity to the upper shores of JRR (FHNWR 2000). The hydrology supporting wetlands within JRR and along the Neosho River is predominantly surface water that inundates sites during high water periods or is pumped into constructed, shallow impoundments. Figure 3-12 illustrates the location of the Strawn and Goose Bend #4 wetlands units as well as the other wetlands units at FHNWR.

Natural wetlands communities support species of sedge, flatsedge, spike-rush, bulrush, rush, and grasses such as prairie cordgrass, switchgrass, and rice cutgrass (FHNWR 2000). An aquatic component is typically present in wetlands of the JRR project area and includes swamp smartweed, pondweed species, duckweed, bladderwort, arrowhead, water plantain, and hornwort. A fringe of willow and buttonbush shrubs is typically present on upper wetland margins.

Wetlands established in the wetlands units and in shallow coves of the reservoir are dominated by swamp smartweed, in addition to other smartweed species, bulrush, cattail, spike-rush, and sedge (figure 3-11). Some stands of seedling silver maple, eastern cottonwood, and black willow were also present. On the reservoir drawdown zones, weedy annuals such as cocklebur, foxtail grass, and barnyard grass are common species. Reservoir drawdown zones are sometimes aerially seeded with millet to provide waterfowl and fisheries forage (Gamble, pers. comm., 2001).

Downriver from the dam, wetlands on the Neosho River banks and on islands in the river are predominantly shrub-scrub and dominated by species of willow and buttonbush shrubs, and sapling black willow, silver maple, and eastern cottonwood trees. Herbaceous species, including bulrush, cattail, and spikerush, are commonly observed. In areas of ponded water such as oxbows, aquatic species including smartweed and duckweed are common.

FIGURE 3-11. SMARTWEED IN WETLAND UNIT

3.4.3 Wildlife Resources

The JRR project area supports a wide variety of bird, herpetile, and mammal species. FHNWR (2000) lists 294 species of birds, including 90 species that are known to nest on the refuge. Species lists prepared for Coffey and Lyon Counties included 47 mammals and 58 herptiles that likely occur within the JRR site.

The project site and region provides habitat for a variety of avifauna that use the upland, grassland, agricultural land, hardwood riparian stands, marshes, and flooded sloughs and ponds present. The peak of migration is April to May for passerine species, July to August for shorebirds, and November to December for waterfowl species. The JRR area avifauna provides a destination for conduct of both naturalist activities such as bird watching and for hunting waterfowl, turkey, northern bobwhite quail, and mourning dove.

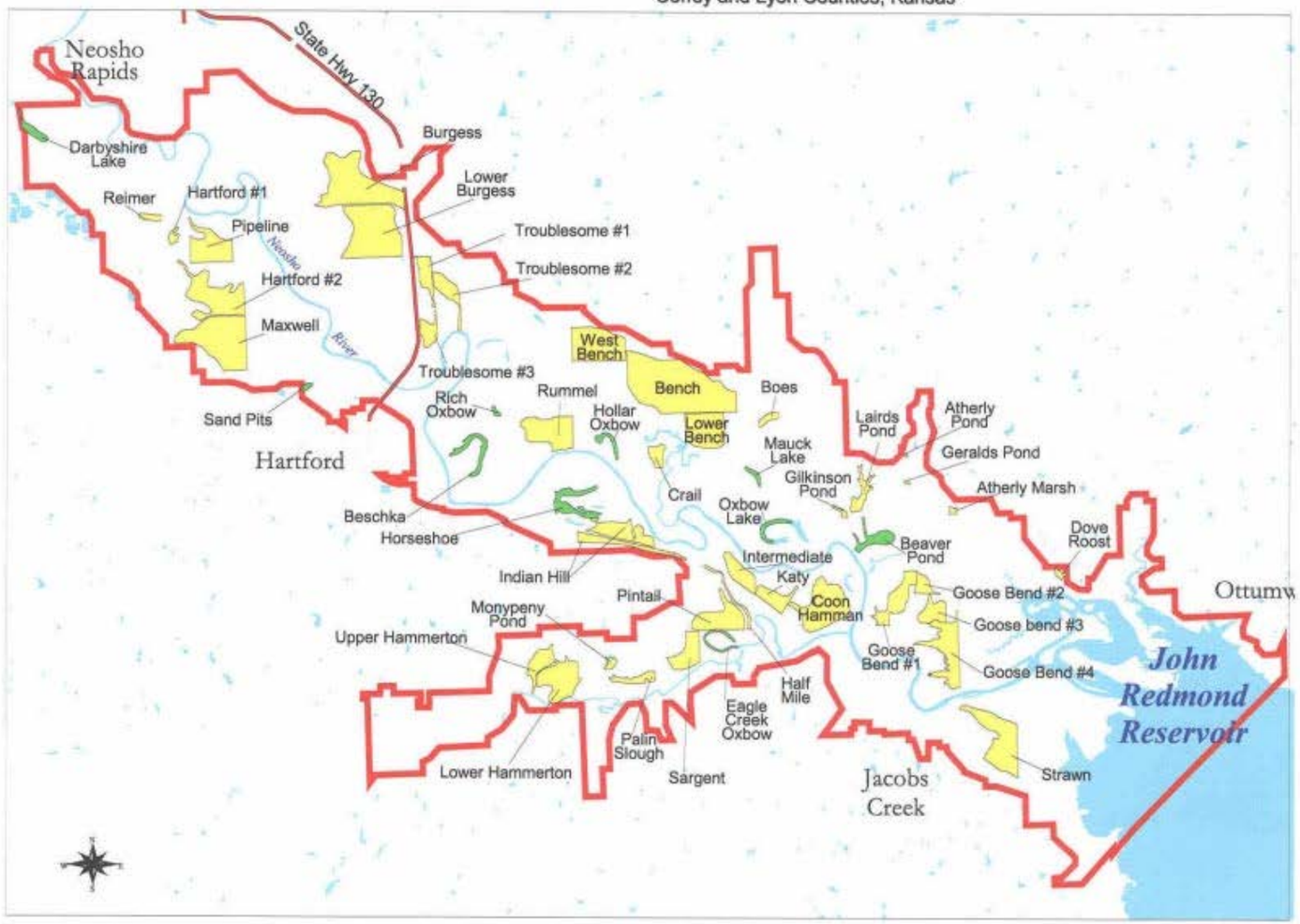
One roost used by turkeys is known within the FHNWR adjacent to the Neosho River near Mauck Lake (Applegate, pers. comm., 2001). This site is approximately 2 miles upriver from the 1041.0-ft elevation, near the Lebo Creek confluence. There are likely to be additional turkey roosts within riparian habitats in the vicinity (Applegate, pers. comm., 2001).

Northern bobwhite quail have been studied relative to their behavioral response or fate during flooding events in eastern Kansas (Applegate et al. in press). The effects of flooding to northern bobwhite quail populations was evaluated within the Cottonwood and Neosho River flood-plains from 31 October to 2 November 1998 (a period of 21 cm of rain in Lyon County, Kansas) during the third incident of overbank flooding in the decade. Overbank flooding along these rivers occurred in 1993, 1995, and 1998. The results of the study (Applegate et al., in press) were:

- The mortality rate for marked northern bobwhite quail occupying floodplains; following flooding events, was estimated to be about 10 times higher than for quail located on upland sites (0.22 vs. 0.02).

Wetland Units of Flint Hills NWR

Coffey and Lyon Counties, Kansas



Frequency	Wetland_typ	Acreage
8	CREATED	122.933
43	NATURAL	1933.972

Legend

Wetland Units

- Created Wetland
- Natural Wetland

Map # 5 Wetland Units Map

Source: USFWS 2000

FIGURE 3-12. WETLANDS UNITS OF THE FLINT HILLS NATIONAL WILDLIFE REFUGE

- Individual quail, located by radio-collars, were found dead beneath flood debris and silt following the overbank flooding events (some marked birds were never relocated following the flood event and possibly were swept away by floodwaters).
- Natural mortality was also higher (approximately 3x) for floodplain dwelling quail (0.36 vs. 0.10) possibly the result of displaced coveys being more susceptible to predation.
- Coveys that did not go extinct following floods moved their range to avoid floodwaters (one covey as far as 0.4 km).
- Approximately 50 coveys of northern bobwhite quail could have been lost in Lyon County over the 130 km^2 area of flooded land and an unknown number of coveys were likely displaced.

Raptors common to the area include the American kestrel, prairie falcon, northern harrier, red-tailed hawk, great horned owl, barred owl, and wintering bald eagles. Although not strictly raptors, the turkey vulture and American crow are also common (FHNWR 2000). Passerine birds common to and nesting within JRR include the American goldfinch, eastern meadowlark, red-winged blackbird, northern cardinal, common yellowthroat, brown thrasher, northern thrasher, northern mockingbird, American robin, house wren, black-capped chickadee, barn swallow, horned lark, eastern kingbird, and red-bellied woodpecker among many other species (FHNWR 2000). The introduced European starling and house sparrow are also considered abundant passerine birds for the area.

Shorebirds common to JRR and vicinity include the killdeer, American avocet, herons, plovers, sandpipers, yellowlegs, dowitchers, gulls, and terns (FHNWR 2000). Common waterfowl species present during the fall migration include the mallard, teal (green-winged, cinnamon, and blue-winged), northern shoveler, common merganser, lesser scaup, redhead, wood duck, and American coot (KDWP 2001). Commonly observed goose species include the Canada, Ross, snow, and white-fronted.

The numbers of waterfowl present through the season are variable, depending on habitat availability and quality. During the year 2000 migration, a total of approximately 48,600 geese and 48,000 ducks were counted on JRR (KDWP 2001). During the year 1996 migration, approximately 103,000 geese and 236,000 ducks were counted (KDWP 2001). Tabular summaries of additional waterfowl counts by year are presented in appendix C. The primary use of JRR and the FHNWR by waterfowl is for resting and foraging during migration; little waterfowl nesting activity occurs in the area (Gamble, pers. comm., 2001).

Herptiles common to JRR and vicinity uplands include species such as Woodhouse's toad, box turtle, common garter snake, and species of skink (FHNWR 2000).

A variety of game and non-game mammals are present in the JRR site vicinity. The principal game mammals include the eastern cottontail, eastern fox squirrel, and white-tailed deer. Common furbearers present include the muskrat, raccoon, a few beaver, and the carnivores coyote, red and gray fox, mink, and species of weasel. The river otter has been reintroduced to the region and a few have been observed using the Neosho River (Gamble, pers. comm., 2001).

Raccoon denning behavior and response to flooding has been studied along the Neosho River within the FHNWR (Gehrt et al. 1990 and 1993). Eighty-three percent of dens used by raccoons in the FHNWR were tree cavities (Gehrt et al. 1990). Cavities in silver maple and sycamore trees were the most commonly used by raccoons for den sites, and suitable trees occurred at a density of 5.5 trees/ha in the FHNWR. Extensive flooding (69 and 78 days) of the Neosho River valley above JRR did not force raccoons out of the floodplain or contribute to raccoon mortality (Gehrt et al. 1993). Rather, the partly arboreal raccoons remained within floodwaters and swam from tree top to tree top during these two flooding events at JRR.

White-tailed deer tended to remain within wooded habitat adjacent to flooded areas above JRR, including using areas covered with shallow water (Fox, pers. comm., 2001). Floods tend to concentrate deer in smaller areas of habitat, making them more vulnerable to hunters during the hunting season and to vehicle traffic (Jirak, pers. comm., 2001). Fox (pers. comm., 2001) stated that landowner complaints adjacent to FHNWR are minor, and recalled only one on record for a landowner on the northern boundary of the refuge. In this case, the deer were feeding in agricultural fields adjacent to a portion of FHNWR closed to hunting (Fox, pers. comm., 2001).

The Kansas Department of Transportation (KDOT) maintains records of total deer-related vehicle accidents (DVA) by county and has calculated the DVA per billion miles traveled for each county (KDOT 2000a and b). The John Redmond Dam and Reservoir lies in the western half of Coffey County and the eastern half of Lyon County. Data for these counties show a 15-year total of 1,317 and 1,759 DVAs for Coffey and Lyon Counties, respectively. It is unknown how many of these accidents occurred in the vicinity of JRR or to what extent flood events played a role. Fox (pers. comm., 2001) stated that many of the DVAs occur on paved highways with higher rates of speed and larger traffic volumes—most roads adjacent to JRR are earth-surfaced. KDOT (2000b) translates the data to approximately 600 and 337 DVAs per billion miles traveled for Coffey and Lyon Counties, respectively.

There is a trend in the data toward more DVAs for the 15-year period represented, 1985 to 1999 (KDOT 2000a). For the first 11 years, DVAs averaged 100 and 66 per year in Coffey and Lyon Counties, respectively. In the last 4 years, DVAs averaged 165 and 149 per year in Coffey and Lyon Counties, respectively; the cause of this increase in DVAs is unknown.

The JRR site lies in deer management unit 14 of the KDWP statewide management plan (Fox, pers. comm., 2001). White-tailed deer occupy the habitats of the JRR site and are affected by flood storage behind the dam. However, the deer tend to move to the edge of the flood pool when it is formed, even occupying some areas with shallow standing water (Fox, pers. comm., 2001).

3.4.4 Fisheries and Aquatic Resources

Fish species have been listed for Coffey and Lyon Counties and number 68 (FHNWR 2000). Those common to JRR include the channel and flathead catfish, common carp, white bass, walleye, white crappie, and several species of sunfish (USACE 2001). Amphibians present in the aquatic system include the plains leopard frog, bullfrog, and tiger salamander. Common

aquatic reptiles include the snapping turtle, map turtles, softshell turtles, and northern water snake.

The lake environment supports both sport and rough fish species, with gizzard shad as the predominant forage base for the sport fish. The population of walleye is considered to be in fair condition and spawn among the rocks on the face of the dam. Typically, walleye spawn in 1 to 4 ft of water among riprap on the dam face (USFWS 2001). White crappie may spawn throughout the shallow portions of JRR, but their preferred location is in coves protected from wave action. White bass and channel catfish populations tend to be insensitive to moderately fluctuating water levels in the reservoir. Wipers, or hybrid striped bass (cross between white and striped bass) are primarily an open water fish species. Bigmouth and smallmouth buffalo, common carp, and the river carpsucker are rough fish present throughout JRR (USFWS 2001).

The JRR was recently studied to determine its effect within the Neosho River on the associated ictalurid (catfish) populations (Wildhaber et al. 2000). Comparative studies were conducted to determine differences in the Neosho River fishery above the reservoir and below the dam structure. Generally, more catfish were present above JRR than occurred below the dam (table 3-11).

TABLE 3-11. MEAN DENSITY OF ICTALURID FISH SPECIES CAPTURED ABOVE JRR AND BELOW JOHN REDMOND DAM, KANSAS

Fish Species	Mean Density Above JRR	Mean Density Below Dam
Neosho madtom	19.82/100 m^2	5.64/100 m^2
Channel catfish	34.31/100 m^2	18.73/100 m^2
Stonecat	4.61/100 m^2	2.83/100 m^2
All catfish excluding Neosho madtom	45.40/100 m^2	25.66/100 m^2

Source: Wildhaber et al. 2000
[Note: research was conducted at an average water depth - velocity of 0.33 m - 0.34 m/s above JRR and 0.38 m - 0.35 m/s below the dam.]

Several attributes of the Neosho River were compared above and below the reservoir and dam (Wildhaber et al. 2000), including:

- water temperature was cooler by approximately 3°C above the dam (24.74°C) than below (27.58°C)
- turbidity was higher above the dam (57.0 NTU) than downriver of the dam (27.17 NTU)
- the pH was nearly the same (8.37 above and 8.47 below)
- dissolved oxygen increased downriver of the dam (4.66 mg/l above and 5.62 mg/l below)
- conductivity, alkalinity, and hardness were all higher above the dam structure, but it was unknown if these factors limit ictalurid populations

An analysis of sediments indicated the Fredle Index (geometric mean adjusted for distribution of particle sizes) was lower above the dam than downriver from the dam (5.52 vs. 7.82). Although not significantly different, this index indicates that more evenly distributed substrate sizes occur upriver from the reservoir, and a shift to the predominance of larger gravel below the dam may be occurring. This increased coarseness of the substrate is considered a common effect of reservoirs and could be a limiting factor for some fish populations (Wildhaber et al. 2000).

The logjam (Section 3.3.6) has been identified as an impediment to navigation from JRR up the Neosho River to upriver boat launching facilities. However, large woody debris has been beneficial in restoration efforts for fisheries such as those along the Au Sable River in Michigan (ASRWRC 1996). Tillma et al. (1998) determined that woody debris habitat and undercut banks were a positive influence on spotted bass density and biomass in Kansas streams. Gurnell et al. (1995) suggest avoiding the indiscriminant removal of coarse woody debris in favor of active management because accumulations have an effect on hydrology, hydraulic properties, sediments, morphology, and biology of river channels. In particular, they stabilize and increase the biological productivity of river channels in forested catchments. However, Piegay and Landon (1997) proposed logjam removal be selectively performed on a Rhone River tributary in France to increase bedload (sediment) availability to repair an incising drainage.

In the Au Sable River, a demonstration project to place woody debris, was undertaken to provide habitat enhancement, food production, and erosion control. Historically, the Au Sable River was not navigable because several reaches were so full of woody debris that the river seemed to disappear underground. These sites were used by early explorers, settlers, and American Indians as natural river crossings (ASRWRC 1996). They were removed in the late 1800s and early 1900s so logs cut for timber could then be floated downriver to mills.

ASRWRC (1996) research has determined that logjams and debris complexes in rivers are vital for proper functioning of biological components of a stream, because physical aspects of the river have a strong influence on the biological components, as follows:

- Fallen trees alter the flow of stream current.
- Flows are typically directed away from riverbanks, which may be unstable.
- Organisms seek out areas of slower current for resting (living in faster currents consumes energy and affects survival).
- Submerged trees help the currents to scour deep holes used by fish for refuge and cover.
- Large deadfalls trap debris and slow transport of organic material (leaves, woody twigs, etc.) important to river organisms.
- Aquatic organisms live on organic material, e.g., bacteria, fungi, shredding macroinvertebrates (mayflies and caddisflies), collecting macroinvertebrates, predatory insect larvae (stoneflies and dragonflies), and fish.
- Burrowing organisms use the fibrous woody tissue in the logs.
- Benefits realized from large woody debris include habitat variety, protective cover, feeding stations for invertebrates (crayfish), amphibians (frogs and toads), reptiles

(turtles, snakes), fish, wading birds (herons), mammals (raccoon), and habitat for insects and fish species.

Hax and Golladay (1998) found that benthic macroinvertebrate populations recovered more rapidly in woody debris than on sediments following an engineered streamflow disturbance. They attributed this to the stability of the woody debris retained in debris dams, which became an important refuge and source of re-colonizing organisms. Bilby and Bisson (1998) report an increase in abundance and changes in composition of macroinvertebrates when wood is added to stream channels. Additionally, fish use large woody debris as cover.

3.4.5 Endangered, Threatened, and Candidate Species, Species of Special Concern, and Sensitive Communities

Six species, e.g., bald eagle, western prairie fringed orchid, Neosho madtom, Neosho mucket mussel, rabbitsfoot mussel, and Ouachita kidneyshell mussel, were listed as federal and Kansas endangered or threatened species in the JRR project area (table 3-12) (USFWS 2000 and KDWP 2000). Additionally, two species were discussed in the FHNWR Comprehensive Conservation Plan (2000)—the peregrine falcon (federal-threatened) and flat floater mussel (Kansas-endangered). A biological assessment (BA) was prepared to address threatened, endangered, and candidate species listed by the USFWS and the KDWP (appendix D). However, new comments were solicited in 2008 and again in 2012 and received from the USFWS in order to reconfirm their 2000 comments. The only change was that the bald eagle had been removed from the ESA.

TABLE 3-12. FEDERALLY AND KANSAS LISTED SPECIES FOR THE JRR PROJECT AREA

Species	Status / Rank	Comments
Common Name (*Scientific Name*)	**Federal / Kansas / Global**	**Source and Habitat**
Bald Eagle (*Haliaeetus leucocephalus*)	US – Delisted KS – Threatened G4/S1B, SZN	Bald Eagle still protected under Migratory Bird Treaty Act. USFWS response letter. Transient use of larger trees in the vicinity of open water.
Peregrine Falcon *(Falco peregrinus)*	US – Threatened KS – Threatened G4/S1B, SZN	FHNWR management plan. Migrates through the JRR area, but does not nest.
Neosho Madtom (*Noturus placidus*)	US – Threatened KS – Threatened G2/S2	USFWS and KDWP response letters. Use shallow riffles with loose/uncompacted gravel bottoms.
Western Prairie Fringed Orchid (*Platanthera praeclara*)	US – Threatened KS – Threatened G2/S1	USFWS response letter. Grows in tallgrass silt loam soils, moist sand prairies, or hay meadows with full sunlight.
Neosho Mucket Mussel (*Lampsilis rafinesqueana*)	KS– Endangered G2/S1	KDWP response letter. Requires clean, in-stream gravel beds.

TABLE 3-12. FEDERALLY AND KANSAS LISTED SPECIES FOR THE JRR PROJECT AREA

Species	Status / Rank	Comments
Common Name (*Scientific Name*)	**Federal / Kansas / Global**	**Source and Habitat**
Rabbitsfoot Mussel (*Quadrula cylindrica cylindrica*)	KS– Endangered G3/S1	KDWP response letter. Requires clean, in-stream gravel beds.
Ouachita Kidneyshell Mussel (*Ptychobranchus occidentalis*)	KS – Threatened G3G4/S1	KDWP response letter. Requires clean, in-stream gravel beds.
Flat Floater Mussel *(Anodonta suborbiculata)*	KS – Endangered G5/S1	FHNWR management plan. Requires ponds, lakes, or sluggish mud-bottomed pools of creeks and rivers.

Rank: G2: Globally imperiled because of rarity; typically 6-20 occurrences, G3: Globally vulnerable because it is very rare and local throughout its range; typically 21–100 occurrences, G4: Globally apparently secure, uncommon but not rare, widespread; typically 100 occurrences or more. G5: Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery. S1: State critically imperiled because of extreme rarity; typically five or fewer occurrences, S2: State imperiled because of rarity; typically 6–20 occurrences, SZN: Zero occurrences / non-breeding population, occurs during migration (KNHI 2001).

Source: USFWS 2000, KDWP 2000, and KNHI 2001

The KDHE has classified the Neosho River (downstream from Council Grove Lake) and the Cottonwood River as special aquatic life-use waters (USFWS 1991). These are waters that contain unique habitat types and biota, or species that are listed as threatened or endangered in Kansas.

Bald Eagle (Haliaeetus leucocephelus)

The bald eagle was de-listed from the ESA in 2007 (FR 2007). However, it is still protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act and measures to minimize impacts to this species should still be implemented. It is considered transient through the project area, but some nest initiation behavior has been observed on the FHNWR (Gamble, pers. comm., 2001). Bald eagles are listed as common during the winter months and counts occur every other week from the latter half of October through the end of March (FHNWR 2000; Kraft and Culbertson, pers. comm., 2001).

The total season counts have ranged from as few as one bald eagle in 1974, to as many as 280 in 1988. On average, 10 to 20 individual bald eagles use the JRR area at any one time (Culbertson, pers. comm., 2001). Bi-weekly counts over the past 30 years have yielded no bald eagles observed (several periods), and as many as 104 individuals present in the latter half of February 1987 (KDWP 2001). During the year 2000, 65 bald eagle observations were recorded during the season: 4 in late December, 0 in early January, 8 in late January, 7 in early February, 29 in late February, 15 in early March, and 2 in late March (KDWP 2001).

In approximately 3 of the last 10 years, a pair (or possibly different pairs) of bald eagles performed nest initiation, but rapidly abandoned the behavior (Gamble, pers. comm., 2001). It

is possible that these were young eagles as they did not complete nest construction or initiate breeding or egg-laying activities. A successful nest site was reported from near the Coffey County Fishing Lake and the WCGS (Culbertson, pers. comm., 2001).

Typically, bald eagles use trees around JRR and along the Neosho River and its tributaries as perches for foraging, resting, and as roosts (Gamble, Kraft, and Culbertson, pers. comm., 2001). When ice formed on JRR, bald eagles were observed resting directly on the ice where they consumed waterfowl and fish from an open portion of the lake (Culbertson, pers. comm., 2001). Bald eagles may take fish and waterfowl directly, in addition to foraging or scavenging for dead or wounded animals.

Peregrine Falcon (Falco peregrinus)

The peregrine falcon is a federally and Kansas-threatened raptor (proposed for federal de-listing) that passes through the project area during spring and fall migration, but does not nest there (FHNWR 2000).

Western Prairie Fringed Orchid (Platanthera praeclara)

The western prairie fringed orchid (WPFO) is federally listed as threatened. The species may be found within unplowed mesic to wet-mesic prairies and sedge meadows on unglaciated, level to hilly sites, and on Pennsylvanian-age sediments covered with a thin, discontinuous mantle of loess residuum (USFWS 1996). The WPFO distribution in Kansas is generally north of JRR (Douglas, Franklin, Jackson, Jefferson, Leavenworth, Lyon, Osage, and Shawnee Counties) and the project area; the nearest population was known in the vicinity of Reading, Kansas, in northeastern Lyon County (Freeman, pers. comm., 2001). One historical account of the WPFO in Waverly Prairie, Coffey County, was reported during 1969, but the prairie was converted to cropland, which destroyed the former WPFO habitat (Freeman and Brooks 1989).

In eastern Kansas, WPFO habitat was described as mesic to wet-mesic prairies, and in northeastern Kansas it was described as wet-mesic to mesic tallgrass prairie. Freeman (pers. comm. 2001) stated that south of the Kansas River, the WPFO grows in mesic prairie (dominated by species of sedge, switchgrass, and big bluestem) and moist seeps that form along a contact of shale and limestone formations. The populations of WPFO in Kansas are small and none support greater than 50 individual plants (USFWS 1996). WPFO decline is principally attributed to the conversion of habitat to cropland.

The WPFO has not been documented within the JRR project boundaries. The habitat there is considered too dry to support the species (Minnerath, pers. comm., 2001). There is no mesic tallgrass or wet meadow habitat between the 1039.0-ft and 1041.0-ft elevation of the existing and proposed conservation pool (Minnerath, pers. comm., 2001). Within the area of the flood control pool, a mesic prairie site of approximately 380 acres was identified near Neosho Rapids, Kansas, approximately 3 miles northwest of the northwestern-most project boundary and within the flood easement boundary. This site is dominated by prairie cordgrass and eastern gamma grass and represents potential habitat for the WPFO, although no plants have been observed (Minnerath, pers. comm., 2001).

Neosho Madtom (Notorus placidus)

The Neosho madtom (NMT) is a federally and Kansas-listed threatened species of catfish that occupies gravel bars and smaller areas of gravel in rivers of the Neosho basin (USFWS 1991; Edds, pers. comm., 2001). The current distribution of the NMT includes the Neosho River from Commerce, Oklahoma, to extreme southeastern Morris County, Kansas; the Cottonwood River from its Neosho River confluence to central Chase County, Kansas; and the Spring River from its Neosho River confluence to western Jasper County, Missouri (USFWS 1991, NSRA 1996).

In the vicinity of John Redmond Dam, the NMT is thought to occupy gravel bars near Hartford, Kansas, approximately 5 miles upriver from the reservoir margin. The gravel bar that lies approximately 0.75 mile west of Neosho Rapids, Kansas, was sampled in 1994 and supported the NMT (27 individuals were captured) (NSRA 1996). This location represents a permanent monitor site and has been sampled every year from 1991–2000 (Tabor, pers. comm., 2001; Wildhaber et al. 2000). The two gravel bars near Hartford, Kansas, are located west of the State Highway (SH) 130 bridge and east of the Hartford recreation area loop road. Historic sampling (1950s through 1975) determined that two individual NMTs were present on the gravel bar west of the SH 130 bridge. The gravel bar east of Hartford, Kansas, has yet to be sampled for NMTs (Shaw, pers. comm., 2001).

Farther upriver from Neosho Rapids, Kansas, the NMT has been collected at the following general locations: (1) Lyon County – 13.0 km, 11.0 km, 7.25 km, 5.25 km, and 2.5 km east of Emporia, bridge site at SH 99; Emporia water intake at the Prairie Street bridge; 4.0 km west of Americus; 6.5 km north of Americus; and (2) Morris County – 1.0 km west of Dunlap, Kansas (NSRA 1996). In addition, eight collection sites have been identified for Lyon County and five for Chase County on the Cottonwood River above its confluence with the Neosho River (NSRA 1996).

Downriver from John Redmond Dam, the NMT has been found as near as Burlington, Kansas – City Park (NSRA 1996); however, there is a gradual increase in numbers of individual NMTs farther from the dam to the Oklahoma border (Tabor, pers. comm., 2001). The NMT has been collected below the dam at the following general locations: (1) Coffey County – Burlington City Park, 2.0 km, 2.5 km, and 3.0 km east of Burlington, Kansas; (2) Woodson County – at Neosho Falls, and 1.5 km east of Neosho Falls; (3) Allen County – 2.0 km west of Iola, Kansas, and downriver of the Humboldt Dam; (4) Neosho County – 3.0 km east of Chanute, Kansas, southwest of Erie, Kansas, 2.0 km south of Erie, 4.0 km west of St. Paul, Kansas, 3.0 km and 5.0 km south of St. Paul, and 19.5 km northeast of Parsons, Kansas; (5) Labette County – 13.0 km east of Parsons, downriver of the Oswego Dam, 2.5 km east of Oswego, Kansas, and downriver of the Chetopa Dam; (6) Cherokee County – 19.5 km west of Columbus, Kansas, and on Lightning Creek, 20.0 km west of Columbus; and (7) Ottawa County, Oklahoma; 10.0 km and 7.5 km west of Commerce, Oklahoma, and 7.0 km and 5.0 km west of Miami, Oklahoma (NSRA 1996).

NMTs are small, measuring less than 3 inches (approximately 38–78 mm) in length (Bulger et al. 1998), and occupy riffles or portions of riffles (Wildhaber et al. 2000). Young-of-the-year

tended to use areas with slower flow, lower substrate compaction, and shallower depths than did adults (Bulger et al. 1998). These catfish burrow into the substrate during the day and emerge to feed in the late afternoon through evening hours (USFWS 1991). NMTs feed at night on larval insects found among the gravel and pebbles (Cross and Collins 1995 in Wildhaber et al. 2000). Other madtom species that share the gravel bar habitat favored by NMTs include the slender madtom, stonecat, brindled madtom, and freckled madtom (USFWS 1991). Young-of-the-year channel and flathead catfish have also been found in this riffle habitat, in addition to species of minnows and darters (USFWS 1991).

Some NMT habitat features were summarized by Natural Science Research Associates (1996) from various studies, and a mean habitat range was determined as follows: (1) water depth = 17–20 cm to 46.3 cm; (2) water velocity = 10.0 cm/s to 50.0 cm/s at substrate level and 25.8 cm/s to 46.2 cm/s at 0.6 m depth; (3) water temperature = 1°C to 29°C; (4) dissolved oxygen = undetermined (minimum value <6 mg/l); (5) turbidity = undetermined; (6) substrate material = 8.0 mm to 40.0 mm and 65% – 69% gravel/pebble; (7) density of occurrence = 0.6-2.0/$10m^2$ (winter-spring) and 2.5-6.0/$10m^2$ (summer-fall); and (8) overall density = 0.3-1.2/$10m^2$ (winter-spring) and 0.8-2.0/$10m^2$ (summer-fall).

Based on samples collected throughout the year and research conducted by Bulger et al. (1998), the highest numbers of NMTs occur in riffles during daylight hours in late summer / early fall when young-of-the-year are believed to have recruited to the population (Wildhaber et al. 2000). Research further suggests that NMTs have a short life cycle (possibly annual) with young-of-the-year appearing with adult collections about the same time the adults begin disappearing from collections (Wildhaber et al. 2000). They probably spawn during the period of highest discharge during the summer (USFWS 1991).

Bulger et al. (1998) reported that most individuals spawned in their second summer (Age I individuals) and very few, if any, survived to spawn at Age II. Also, Bulger et al. (1998) observed the development of genital papillae and other external morphological characteristics in breeding adults. Courtship behavior was observed and included the carousel and tail curl, similar to behavior observed in other madtom species. Two successful spawning events were studied in the laboratory, and the NMT females produced 32 and 30 eggs, respectively (Bulger et al. 1998). Only two eggs survived, but these hatched in 8 days and produced young that were 13.0 mm and 14.0 mm in length. In two earlier studies, a NMT female produced 63 eggs in a flow aquarium at Emporia State University (Pfingsten and Edds 1994) and another produced approximately 60 eggs (Wilkenson and Edds 1997). Bulger et al. (1998) suggested that the small clutch size may be due to time of season (second clutch production) or stress related to the experimental environment.

Neosho Mucket Mussel (Lampsilis rafinesqueana)

The Neosho mucket mussel (NMM) is a Kansas-listed endangered species and is under consideration for listing as a candidate species by the USFWS, an action that may occur during the year 2001 (Mulhern, pers. comm., 2001). The NMM occupies gravel bars in the Neosho, Spring, and Verdigris Rivers (Obermeyer et al. 1997). The overall distribution of NMMs shows

regional endemism to the Arkansas River system, including the Neosho, Spring, Elk, Illinois, and Verdigris basins of Kansas, Missouri, Oklahoma, and Arkansas.
The NMM occupies shallow riffles and runs (mean depth 15.0–33.7 cm) across gravel bars, with stable and moderately compacted substratum, predominantly gravel with a minimum of silt. The mussels prefer riffles and runs with relatively clear, flowing water (Miller, pers. comm., 2001). Gravel bar stability is usually the result of some stabilizing force in the river, such as bedrock exposed along the river edge or bedrock on the river bottom (Miller, pers. comm., 2001). The NMM is a bradytictic breeder; the females attract hosts with a mantle lure (Obermyer et al. 1997). Potential larval hosts for the NMM include smallmouth and largemouth bass.

The NMM is probably extirpated from the Neosho River above JRR (Tabor, pers. comm., 2001), and was not located there by Obermyer et al. (1997) with the exception of some weathered shells. Downriver from the John Redmond Dam, 32 living NMMs and some weathered dead shells were located. The living individuals occupied 6 of 21 sites surveyed and were greater than 20 years old based on counts of annular rings. In contrast, 1,192 individual NMMs were collected in the Spring River and 77 in the Verdigris River (Obermyer 1997). In the Neosho River, the observed habitat used by NMMs had the following characteristics: depth = 39.6 cm; current speed = 16.0 cm/s and 27.0 cm/s (100% and 60% depths); substratum character = 41.3% gravel, 35.9% cobble, 14.9% sand, 4.4% boulder, and 3.3% mud; compaction rated 1.1 and siltation rated 1.4 (Obermyer et al. 1997).

Rabbitsfoot Mussel (Quadrula cylindrica cylindrica)

The rabbitsfoot mussel is a Kansas-listed endangered species that occupies gravel bars in the Neosho and Spring Rivers (Obermeyer et al. 1997). The overall distribution of rabbitsfoot mussels includes the Ozarkian and Cumberland faunal regions of 13 states, but it is most abundant in the Black River system of Arkansas (Obermeyer et al. 1997).

The rabbitsfoot mussel occupies shallow riffles and runs (mean depth 15.0–33.7 cm) across gravel bars, with stable and moderately compacted substratum, predominantly gravel with a minimum of silt. The mussels prefer riffles and runs with relatively clear, flowing water (Miller, pers. comm., 2001). Gravel bar stability is usually the result of some stabilizing force in the river such as bedrock exposed along the river edge or bedrock on the river bottom (Miller, pers. comm., 1997). The rabbitsfoot mussel is a tachytictic breeder whose larval hosts may include species of shiner (Obermeyer et al. 1997).

The rabbitsfoot mussel is probably extirpated from the Neosho River above JRR (Tabor, pers. comm., 2001), and was not located there by Obermyer et al. (1997) with the exception of some weathered shells. Downriver from John Redmond Dam, two living rabbitsfoot mussels and some weathered dead shells were located. A reproducing rabbitsfoot mussel population is known to occupy a gravel bar near Iola, Kansas (Miller, pers. comm., 2001). In the Neosho River, the observed habitat used by rabbitsfoot mussels had the following characteristics: depth = 12.5 cm; current speed = 27.5 cm/s and 38 cm/s (100% and 60% depth); substratum character = 60.0% gravel, 32.5% cobble, 7.0% sand, and 0.5% mud; compaction rated 1.0; and siltation rated 1.0 (Obermyer et al. 1997).

Ouachita Kidneyshell Mussel (Ptychobranchus occidentalis)

The Ouachita kidneyshell mussel is a Kansas-listed threatened species that occupies gravel bars in the Spring, Verdigris, and Fall Rivers (Obermeyer et al. 1997). Only weathered dead shells were observed in the Neosho and Cottonwood Rivers by Obermeyer et al. (1997)—the species may be extirpated from the river. The overall distribution of Ouachita kidneyshell mussels includes the Arkansas, Black, Red, St. Francis, and White River systems in Arkansas, Kansas, Missouri, and Oklahoma.

The Ouachita kidneyshell mussel occupies shallow riffles and runs (mean depth 15.0–33.7 cm) across gravel bars, with stable and moderately compacted substratum, predominantly gravel with a minimum of silt. The mussels prefer riffles and runs with relatively clear, flowing water (Miller, pers. comm., 2001). Gravel bar stability is usually the result of some stabilizing force in the river such as bedrock exposed along the river edge or bedrock on the river bottom (Miller, pers. comm., 2001). The Ouachita kidneyshell mussel is a bradytictic breeder; the females attract potential hosts with a mantle lure (Obermeyer et al. 1997). Potential larval hosts include orangethroat, greenside, and rainbow darters.

Flat Floater Mussel (Anodonta suborbiculata)

The flat floater mussel is a Kansas endangered species that was discussed as occurring in the Neosho River portion of the project area (FHNWR 2000). However, a research study with an extensive collection of mussels by Obermeyer et al. (1997) did not locate this species in the Neosho, Verdigris, or Spring Rivers. The flat floater mussel is considered locally abundant in the floodplain lakes, sloughs, and oxbows of the Mississippi and Ohio Rivers and their tributaries. Its habitat is described as ponds, lakes, or sluggish mud-bottomed pools of creeks and rivers (FMM 2001).

Sensitive Communities

The KDHE has classified the Neosho River downstream from Council Grove Lake and the Cottonwood River as special aquatic life-use waters (USFWS 1991). The general provisions of the Kansas surface water quality standards (K.A.R. 28-16-28c) state in part:

"… no degradation of water quality by artificial sources shall be allowed that would result in harmful effects on populations of any threatened or endangered species of aquatic life in a critical habitat…" The KDHE could issue a variance, however, if "important social and economic development" is impaired (USFWS 1991).

In addition, the KDWP (2000) stated: "The Neosho River immediately upstream from John Redmond Reservoir is Kansas-designated critical habitat for the Neosho madtom and Ouachita kidneyshell mussel. The Neosho River immediately downstream from JRR is designated critical habitat for the Neosho madtom, Ouachita kidneyshell mussel, and rabbitsfoot mussel. The Cottonwood River immediately upstream of John Redmond Reservoir is designated critical habitat for the Neosho madtom, Ouachita kidneyshell mussel, and the Neosho mucket mussel."

3.4.6 Wildlife Refuges and Wildlife Management Areas

Approximately 29,801 acres of land along the Neosho River are owned by the USACE from below John Redmond Dam to near Neosho Rapids, Kansas. In addition to overall site management by the USACE and direct management of approximately 9,784 acres, leases have been signed with the USFWS and KDWP to provide land management for FHNWR (18,545 acres) and OCWA (1,472 acres) (USACE 1976).

FHNWR was established in 1966 under the Fish and Wildlife Coordination Act of 1958 (16 USC 644) and is located on the upriver portion of JRR, including the approximately upper one-third of the conservation pool (FHNWR 2000). The refuge is managed primarily for migratory waterfowl. Its specific management focus includes:

- intensive use by ducks and geese during spring and fall migration
- intensive use by shorebirds during late summer migration
- farmlands managed on a share basis with area farmers—the refuge portion provides food for migrating waterfowl and resident wildlife
- numerous constructed ponds and shallow marshes provide additional waterfowl habitat
- closures are provided for waterfowl and bald eagle management
- public access restrictions are incorporated during periods of intensive waterfowl use

The breakdown of habitat types supported in the refuge are presented in table 3-13.

TABLE 3-13. ACREAGE OF HABITAT TYPES WITHIN THE FLINT HILLS NATIONAL WILDLIFE REFUGE

Habitat Type	Acreage
Wetlands	4,572
Open Water	1,400
Riparian Wetlands	680
Crop Land	3,917
Grassland	3,200
Woodland	2,400
Brushland	2,255
Administrative / Recreational	120
Total:	**18,544**

Source: USFWS 2002

Further, the Refuge Recreation Act (16 USC 460-1) states that a refuge may provide incidental fish and wildlife oriented recreational development, the protection of natural resources, and the conservation of endangered or threatened species. A Comprehensive Conservation Plan (CCP) (FHNWR 2000) has been prepared and will guide management decisions at FHNWR for the

next 15 years. The following legislative mandates are provided under the Refuge Improvement Act of 1997 to guide CCP development:

- Wildlife has first priority in the management of refuges.
- Recreation or other uses are allowed if they are compatible with wildlife conservation.
- Wildlife-dependent recreation activities such as hunting, fishing, and interpretation will be emphasized.

Six overarching goals have been prepared to guide refuge management and meet the Refuge Improvement Act of 1997; these goals are:

1. To restore, enhance, and protect the natural diversity on the FHNWR, including threatened and endangered species, by appropriate management of habitat and wildlife resources on FHNWR lands, and by strengthening existing and establishing new cooperative efforts with public and private stakeholders.
2. To restore and maintain a hydrological system for the Neosho River drainage by management of wetlands, control of exotic species, and management of trust responsibilities for the maintenance of plant and animal communities.
3. Provide opportunities for wildlife-dependent public access and recreational opportunities to include compatible forms of hunting, fishing, wildlife observation, photography, interpretation, and educational activities.
4. To protect, manage, and interpret cultural resources on the FHNWR for the benefit of present and future generations.
5. To strengthen interagency and jurisdictional relationships in order to coordinate efforts with respect to the FHNWR and surrounding area issues resulting in decisions benefiting fish and wildlife resources, while at the same time avoiding duplication of effort.
6. Improve staffing, funding, and facilities that would result in long-term enhancement of habitat and wildlife resources in the area of ecological concern, and support the achievement of the CCP goals and the goals of the National Wildlife Refuge System.

To support these goals, several objectives with measurable outcomes have been identified to guide FHNWR staff over the next 15 years. Completion of objectives depends on funding and annual staff size to address the following:

- Document existing flora and fauna of wetlands, grassland, riparian, savanna, and wooded habitats through baseline surveys and monitor habitats affected by management activities.

- Continue to protect populations of endangered and threatened species and maintain or improve their habitats on FHNWR lands.

- Manage waterfowl in accordance with the North American Waterfowl Management Plan, focusing on target species including the mallard, pintail, wood duck, and gadwall.

- Monitor population status of priority species of neotropical migratory birds, shorebirds, and other nongame migratory birds.

- Determine population objectives of key resident wildlife species and monitor the status of these species.

- Restore and maintain native species on FHNWR lands to re-establish native habitat communities through appropriate land management techniques and monitor re-establishment of native species as a result of restoration efforts.

- Re-establish native plants along the riparian areas of the Neosho River and its tributaries to benefit native aquatic and riparian communities of the Arkansas / Red River ecosystem and monitor re-establishment of native species as a result of restoration efforts.

- Encourage research with universities and other institutions that would improve the biological database of the FHNWR or contribute to habitat restoration and management activities that are compatible with FHNWR goals and requirements of the Refuge Act. These activities would be reviewed periodically by the USFWS and other representatives to evaluate the effectiveness for FHNWR needs.

- Improve water management to maintain and enhance 4,500 acres of current wetlands and restore another 600 acres of wetlands. Monitor and document habitat components through annual biological surveys of two to three key components (avifauna, vegetation, water quality, invertebrates, and fish).

- Develop and improve wildlife-compatible recreational opportunities on FHNWR lands that further citizen involvement and appreciation of the system. Through the completion and implementation of the Public Use Plan in tasks outlined in short- and long-term phases, public use would increase 15% over the next 5 years and by 50% by the year 2015.

- Develop and implement educational and interpretive programs to increase citizen understanding of the natural resources of the FHNWR and issues within the Arkansas / Red River ecosystem. Develop educational or interpretive programs specific to the FHNWR and initiate FHNWR participation in national education programs. Host various special events to offer the public an opportunity to participate in FHNWR activities.

- Initiate a variety of innovative outreach strategies to strengthen the existing FHNWR constituency and develop a broader base of public support in east-central Kansas. Create and develop one outreach product and/or publication to generate interest in the refuge over the next 5 years. Increase community presentations, community involved habitat restoration projects, and FHNWR staff representation at public events.

- Work with the community to develop an organization or avenue for receipt of private funding to subsidize environmental education programs, habitat restoration projects, or other community-based efforts benefiting wildlife habitats on FHNWR lands by the year 2010.

- Document, map, and monitor archaeological sites on current FHNWR lands and future acquisitions through a baseline archaeological survey and monitor known sites for disturbance or deterioration. Incorporate information about the archaeology of the area into one educational or interpretive product or program by the year 2005.

- Strengthen partnerships with the USACE and other private stakeholders within the community, KDWP, and other public agencies that are mutually beneficial and would ultimately benefit the fish and wildlife resources of the FHNWR and surrounding lands.

- Provide the personnel needed to accomplish the goals of the CCP through the addition of specific staff specialists and programs that encourage community volunteers.

- Provide a safe, efficient, and productive work environment for FHNWR employees and a safe infrastructure for visitors.

OCWA was established in 1966 and is located on the southeastern boundary of FHNWR and the southeastern portion of JRR. This state wildlife area is managed primarily for big game and upland species, e.g., white-tailed deer, wild turkey, mourning dove, bobwhite quail, cottontail rabbit, and squirrel. Its specific management focus includes:

- farmlands managed on a share basis with area farmers — the wildlife area portion provides food for resident upland game animals and migrating waterfowl
- fishing access and management, particularly for channel and flathead catfish, walleye, white bass, white crappie, and sunfish
- introduction of native ground cover for restoration sites, particularly tallgrass prairie species
- day use recreation

Permitted activities on the FHNWR include wildlife observation, hiking and sightseeing, photography, boating, picnicking, camping, fishing, hunting, wild food gathering, and fish bait collection. Interpretive trails are present and include Dove Roost Trail and the Headquarters Trails. OCWA provides wildlife observation, sightseeing, photography, boating, fishing, and hunting opportunities. The boundaries of these wildlife areas, in relation to JRR, are depicted in figure 3-13

3.5 AIR QUALITY

Air pollution is generated from many different sources including stationary (factories, power plants, smelters, dry cleaners, degreasing operations, etc.), mobile (cars, trucks, trains, airplanes, etc.), and naturally occurring (windblown dust, volcanic eruptions, etc.) (USEPA

2001). The Federal Clean Air Act of 1970 (CAA) (43 USC 7401 *et seq*., as amended in 1977 and 1990) provides the principle framework for national and state efforts to protect air quality and requires the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health, safety, and welfare from known or anticipated effects of air pollution. Amendments to the CAA require the USEPA to promulgate rules to ensure that federal actions conform to the appropriate state implementation plan. These requirements are known as the General Conformity Rule (40 CFR 51.100 *et seq*. and 93.100 *et. seq*.).

Federal agencies responsible for an action must determine if the action conforms to pertinent guidelines and regulations that control or maintain air quality in the region. Certain actions are exempt from conformity determination, including those actions associated with transfers of land or facilities where the federal agency does not retain continuing authority to control emissions associated with the properties. Federal actions may also be exempt if the projected emission rates would be less than the specified emission rate threshold known as *de minimis* limits.

NAAQS have been established by the USEPA, Office of Air Quality Planning and Standards (OAQPS), for six criteria pollutants that are deemed to potentially impact human health and the environment. These include: (1) carbon monoxide (CO); (2) lead (Pb); (3) nitrogen dioxide (NO_2); (4) ozone (O_3); (5) particulate matter <10 microns (PM_{10}); and (6) sulfur dioxide (SO_2). Ozone is not emitted directly into the air, but is formed when sunlight acts on emissions of nitrogen oxides and volatile organic compounds (USEPA 1998).

The primary and secondary NAAQS concentrations are presented in table 3-14. Primary standards are also known as health effects standards, which are set at levels to protect the most susceptible individuals in the human population (very young, very old, and those with respiratory problems such as asthma) (USEPA 2001). Secondary standards, also known as quality of life standards, set limits to protect public welfare including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

Since both short- and long-term exposures are addressed, a single pollutant may have more than one primary standard.

The state of Kansas has adopted the federal standards under K.A.R., Section 28-19-17a: *Incorporation of Federal Regulations by Reference* (KDHE 2001). Under K.A.R., Section 28-19-17b (d), “National ambient air quality standard, national primary ambient air quality standard, and national secondary ambient air quality standard mean those standards promulgated at 40 CFR Part 50, as in effect on 1 July 1989, which are adopted by reference.” Air monitoring is conducted at 27 sites within the state, which is considered somewhat more extensive than USEPA requirements (TCSG 2001). The federal and Kansas primary and secondary NAAQS are presented in table 3-14.

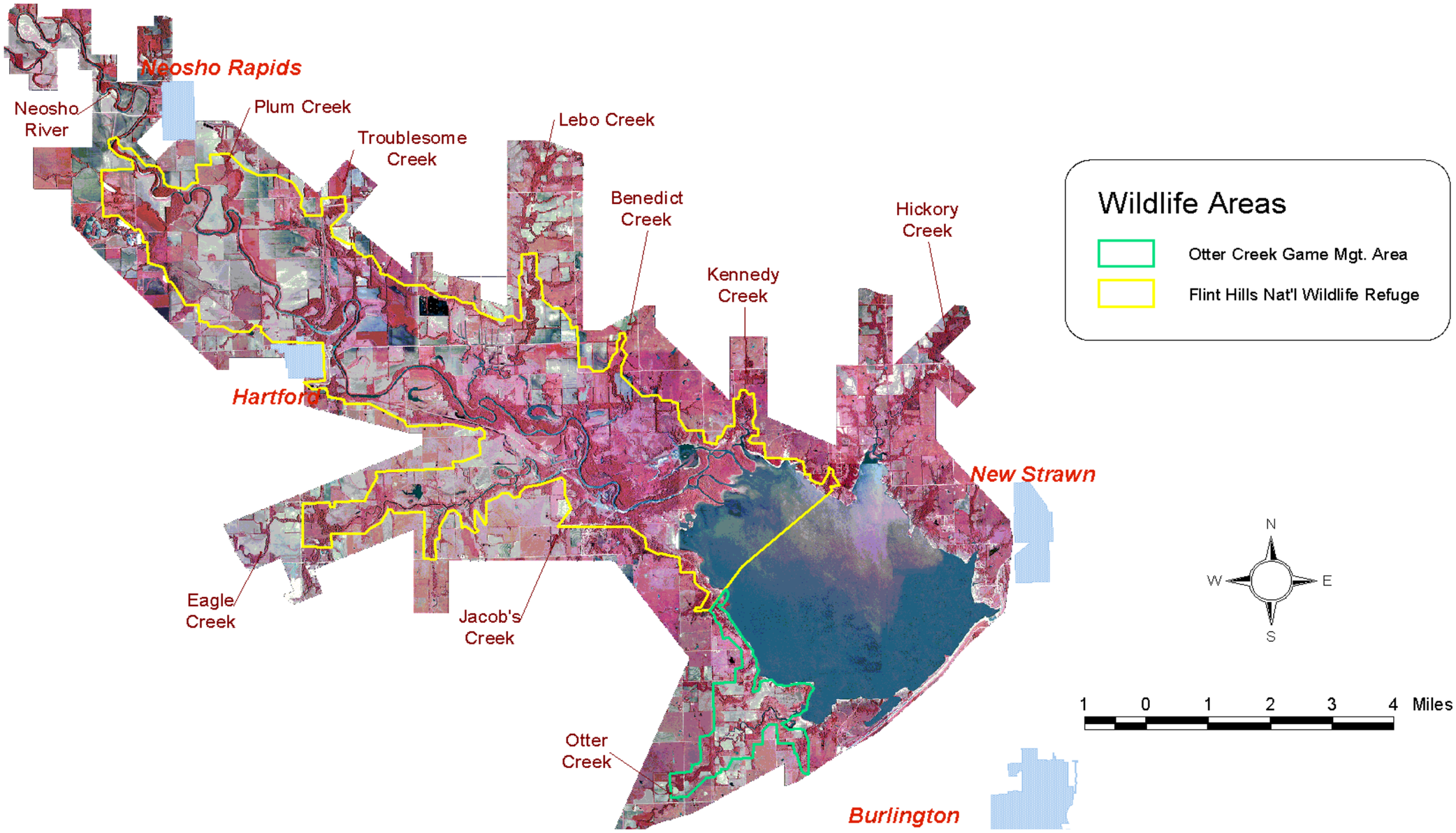


FIGURE 3-13. APPROXIMATE BOUNDARIES OF THE FLINT HILLS NATIONAL WILDLIFE REFUGE AND THE OTTER CREEK WILDLIFE MANAGEMENT AREAS

TABLE 3-14. NATIONAL AND KANSAS AMBIENT AIR QUALITY STANDARDS

USEPA and Kansas Ambient Air Quality Standards				
Pollutant	**Averaging Time**	**Primary NAAQS**	**Secondary NAAQS**	**Kansas Standards**
Nitrogen Dioxide	Annual (arithmetic mean)	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)
Sulfur Dioxide	Annual (arithmetic mean)	0.03 ppm (80 µg/m^3)	NA	0.03 ppm (80 µg/m^3)
	24 hour Average	0.14 ppm (365 µg/m^3)	NA	0.14 ppm (365 µg/m^3)
	3 hour Average	NA	0.5 ppm (1300 µg/m^3)	0.5 ppm (1300 µg/m^3)
Carbon Monoxide	1 hour Average	35.0 ppm (40 mg/m^3)	NA	35.0 ppm (40 mg/m^3)
	8 hour Average	9.0 ppm (10 mg/m^3)	NA	9.0 ppm (10 mg/m^3)
Ozone	1 hour Average	0.12 ppm (235 µg/m^3)	0.12 ppm (235 µg/m^3)	0.12 ppm (235 µg/m^3)
Lead	Quarterly Average	1.5 µg/m^3	1.5 µg/m^3	1.5 µg/m^3
Particulate Matter (PM_{10})	Annual (arithmetic mean)	50 µg/m^3	50 µg/m^3	50 µg/m^3
	24 hour Average	150 µg/m^3	150 µg/m^3	150 µg/m^3

Source: USEPA NAAQS, http://www.epa.gov/airs/criteria.html

[Note: NAAQS for ozone (8-hour average) and particulate matter ($PM_{2.5}$) have been developed but not yet legislated.]

It is important to understand the terms exceedance and violation of a standard, as they are not interchangeable. An exceedance is any single value greater than the standard. A violation occurs when the limits for both concentration and frequency of occurrence, as established in the CAA and its amendments, are exceeded. According to *The Green Book*, the Emporia, Kansas, area is in attainment for all criteria pollutants (USEPA 2001b).

Air quality has not been monitored by the KDHE in the Emporia, Kansas, area since the early to mid-1970s; at that time particulate matter was monitored (Gross, pers. comm., 2001 and Stewart, pers. comm., 2001). The current statewide monitoring network is focused on metropolitan areas where fine particulate matter and ozone tend to be more of a problem (Gross, pers. comm., 2001). The WCGS is located adjacent to JRR and regularly monitors selected radionuclide levels in the air (KDHE 2001b).

Radionuclides are monitored as part of the operation of the WCGS by weekly collection and laboratory analysis of continuous air samples taken at five locations on and in the vicinity of JRR (KDHE 2001). The five sampling locations are: (1) Sharpe, (2) east of the Coffey County Lake dam, (3) Burlington, (4) New Strawn, and (5) Hartford (figure 1-2). The site at Hartford serves as the control location for analysis and data interpretation. The major airborne isotope of

concern is radioiodine (I^{131}) and it is tested using a flow rate of about 30 liters per minute (lpm) through 47 millimeter (mm)-diameter glass fiber particulate filters and 5% tri-ethylene di-amine impregnated carbon cartridges. In addition, gross beta and gamma isotopic analyses are performed on the same cartridges.

Airborne sample analyses indicated that no radionuclides attributable to the WCGS operation were present above the lower limits of detection during state fiscal year (SFY) 2000 (KDHE 2001). The highest gross beta activity observed was 0.092 Pico Curies per cubic meter (pCi/m^3), due primarily to naturally occurring Radon-222 (Rn^{222}) progeny, specifically the long-lived isotope Lead-210 (Pb^{210}) (KDHE 2001). The range of gross beta activity was 0.010-0.092 pCi/m^3. For comparison, the range of gross beta activity recorded at the Hartford control site was 0.017–0.077 pCi/m^3. No gamma emitters attributable to WCGS operation were present above the lower limits of detection in any air particulate filters or charcoal cartridges evaluated.

3.6 AESTHETICS

The general viewscape of the JRR project area is rural, consisting of wooded rolling hills, wooded drainages, open agricultural fields, farmsteads, towns, infrastructure elements (roads, parking lots, powerlines, property fencing, etc.), the Neosho River, and John Redmond Dam and Reservoir (figure 1-2). The most visibly dominant features include John Redmond Dam and Reservoir and the pump facility for the WCGS, below the dam (figure 3-14).

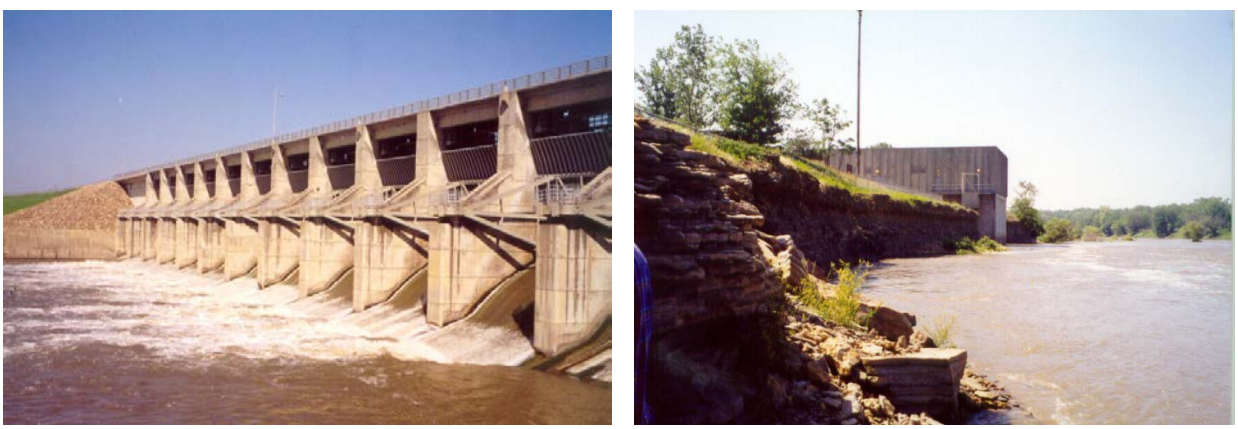


FIGURE 3-14. JOHN REDMOND DAM AND WATER OUTTAKE AT WOLF CREEK NUCLEAR POWER PLANT

3.6.1 Visual Characteristics of the JRR Site and Surrounding Area

Features present within the JRR site include the large dam and reservoir on the southeastern portion. The dam is an earthfill structure nearly 4 miles long and is 86.5 ft higher than the Neosho River at its crest (USACE 1996). The reservoir covers approximately 9,490 surface acres under normal operation, but could cover as much as 40,220 surface acres or higher during a major flood (USACE 1976 and 1996). The reservoir shoreline is approximately 58 miles long under normal operation.

The community of Burlington, Kansas, lies approximately 3 miles downriver from the dam, and New Strawn, Kansas, is located approximately 1 mile northeast of the reservoir. West of the reservoir are the towns of Hartford and Neosho Rapids, Kansas, which lie approximately 5 and 7 miles upriver, respectively. A few structures are also present at Ottumwa and Jacob's Creek Landing, Kansas, both within approximately 1 mile of the reservoir shoreline. There are no direct views of the lake from these communities because of the relatively flat land surfaces and medium-tall woodland vegetation.

The visual impression of Burlington is a small community with predominantly red brick office buildings and stores, and modest, family-oriented residential areas. Most residences have ample yards with landscaping and mature trees, and the yards become larger at the outskirts of town resembling small farms. Hartford, Neosho Rapids, and New Strawn are smaller residential communities with a minimum of businesses. The overall visual impression is one of modest, family-oriented towns, with large lawns and numerous trees to accent the urban landscape. Existing utilities such as electricity and telephone are provided via above-ground poles, which results in some visual clutter.

Available views onto a site are affected by distance, viewing angle, as well as the number and type of visual obstacles, both natural and human-made. Views can be from stationary areas such as campgrounds, or from mobile sources such as motor vehicles. Typically, views are analyzed as foreground (less than 0.25 mile), middle ground (0.25–3.0 miles), and background (more than 3.0 miles). Background views of John Redmond Dam and Reservoir would be very rare and may only be achieved from the corner of the dam structure.

Recreational facilities are scattered throughout the project site and include campgrounds, day use sites with boat ramps, and hiking / walking trails. Most of these sites have large parking areas, access roads, large grassy fields, and/or open agricultural fields providing an expansive experience in an otherwise wooded environment. Many acres are leased to grow agricultural crops and the fields provide breaks in the tree-covered landscape of the Neosho River valley. Agricultural fields that are not under cultivation, or fallow, become rapidly invaded by tall, coarse annual herbs in contrast to the row crops and alfalfa hay grown in cultivated fields. These recreational facilities and agricultural fields provide for clear, relatively unobstructed middle ground views across portions of the project area (figure 3-15).

FIGURE 3-15. VIEWS ACROSS FALLOW AND PLANTED AGRICULTURAL FIELDS

3.6.2 Viewer Groups and Sensitivity

Visual sensitivity is dependent on viewer attitudes, the types of activities in which people are engaged when viewing the site, and the distance from which the site will be seen. Overall, higher degrees of visual sensitivity are correlated with areas where people live, are engaged in recreational outdoor pursuits, or participate in scenic or pleasure driving. Conversely, visual sensitivity is considered low to moderate in industrial or commercial areas where the scenic quality of the environment does not affect the value of the activity.

Site visibility may also be affected by air quality, the measure of which involves human perception and judgment and has been described as the maximum distance that an object can be perceived against the background sky. Visibility is of value by citizens, although the value of good visibility is inherently subjective and difficult to quantify. Visibility can vary from clear to regional haze. There is no qualitative visibility standard for pristine and scenic rural areas; however, Section 169A of the CAA (1970, as amended), created a qualitative standard of the prevention of any future and the remedying of any existing impairment of visibility in mandatory Class I federal areas, which impairment results from human-caused air pollution.

The expectation of many visitors to JRR is to fish in the lake, river, or nearby Coffey County Fishing Lake, or to seek hunting opportunities, particularly waterfowl. Therefore, these visitors are not considered to be sensitive viewers because of the nature of their recreational pursuits. There are views of the dam and reservoir from the surrounding area, particularly from the highway across the dam, the OCWA day-use area, the dam site area (including Redmond Cove), and the Hickory Creek area. Below the dam at Riverside East and Riverside West campgrounds, the view is of the dam structure, pumping station for WCGS, and the Neosho River. Many of the views from below the dam are at least partially obstructed by landscape plantings and tall trees.

Most views from the north and south access roads are of the woodlands growing along the Neosho River and its tributary drainages, with occasional glimpses of the reservoir and/or the dam structure. A full view of the reservoir and dam structure only occurs from shoreline sites or while boating on the lake surface. The dam, but not the reservoir, can be viewed from recreational sites downstream. Views from bridges across the Neosho River result in only short distances before the river meanders and is hidden by riparian woodlands.

3.7 PRIME OR UNIQUE FARMLAND

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture (USDA). It is of major importance in providing the national short- and long-range needs for food and fiber (SCS 1982). In Coffey and Lyons Counties, the principal crops grown on prime farmland are grain sorghum, wheat, soybeans, and corn (SCS 1981 and 1982). Approximately 70% of the soils in Coffey County meet the requirements for prime farmland (SCS 1982).

Prime farmland is defined (USDA 2000) as: “land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Further, it could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0-6 percent.”

Unique farmland is defined (NEPA 2001) as: “land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods. Examples of such crops are citrus, tree-grown nuts, olives, cranberries, fruit, and vegetables.” The soils supporting pecan orchards along the Neosho River would be an example of unique farmland.

The state of Kansas has further identified farmland of statewide importance (AFT 2001) and defined it as: “farmland, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some may produce as high a yield as prime farmlands if conditions are favorable. Additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law.”

The common soils within JRR and along the Neosho River, fit the criteria for prime farmland, unique farmland, and farmland of statewide importance, e.g., Woodson silt loam, Verdigris silt loam, Summit silty clay loam (1%–4% slopes), Kenoma silt loam (1%–3% slopes), Eram silt loam (1%–3% slopes), and Dennis silt loam (1%–4% slopes) are considered prime farmland (NRCS 1993). The Kenoma silty clay loam (1%–3% slopes - eroded), and Dennis silty clay loam (2%–5% slopes – eroded) soils are considered farmland of statewide importance (NRCS 1993). In addition, Osage silty clay, Osage silty clay loam, Lanton silty clay loam, and Hepler silt loam soils meet the prime farmland designation if they are drained (NRCS 1993).

For compliance with the Farmland Protection Policy Act, this project was coordinated with the Natural Resources Conservation Service (NRCS) using a Farmland Conservation Impact Rating Form (A.D. 1006) (NRCS 1997). In a letter dated 11 March 2002 (appendix E), the USDA-NRCS stated that the project is not affected by the Farmland Protection Policy Act. This means that prime or unique farmland, as defined by the Farmland Protection Policy Act, would not be affected by the project.

Within the JRR site boundary, approximately 5,098 acres of land are available for lease to be farmed under cooperative farming agreements with the USACE, FHNWR, and OCWA. Although much of the land under farming agreements meets prime farmland soils descriptions, it is not considered prime farmland because it lies below the flood pool and is subject to periodic flooding diminishing the probability of successfully harvesting an annual crop (USDA 2002). The number of acres potentially farmed under each management program include 400 acres (USACE), 4,298 acres (FHNWR), and 400 acres (OCWA) (FHNWR 2000; Fry, pers. comm., 2001; Barlow, pers. comm., 2001). Because of flooding events along the Neosho River during the 1990s, successful farming of lower land tracts in the flood storage pool has occurred only about 2 of every 5 years.

3.8 SOCIOECONOMIC RESOURCES

The assessment area for socioeconomic effects of the proposed action and alternatives includes Coffey and Lyon Counties in southeastern Kansas, and lands within the floodplain downriver from JRR. Potentially affected socioeconomic conditions include area economic and population conditions, land use, recreation, and transportation. Activities in the Neosho River floodplain between JRR and Grand Lake could also be affected.

3.8.1 Economic and Demographic Trends and Conditions in Coffey and Lyon Counties

Population

Figure 3-16 displays recent U.S. Census population counts for Coffey and Lyon Counties. Between 2000 and 2010, Coffey County population fell by approximately 3%. According to the 2010 Census of Population, Coffey County had a year 2010 population of 8,601, approximately 3 % lower than the 2000 population level, and approximately 2% higher than the 1990 level.

Lyon County also experienced a population loss between 2010 and 2000 (approximately 6%), and approximately 3% loss compared to 1990.

Burlington, the Coffey County seat, had a 2010 population of 2,674, approximately 31% of total county population. Emporia, the Lyon County seat, had a 2010 population of 24,916, approximately 74% of total county population.

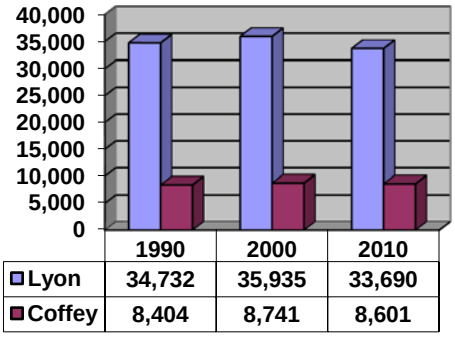


FIGURE 3-16. COFFEY AND LYON COUNTY POPULATION: 1990–2010 (SOURCE: KCCED 2001 AND US CENSUS BUREAU 2012)

Economy

Coffey County

The U.S. Bureau of Economic Analysis (BEA) publishes estimates of full- and part-time employment by Standard Industrial Classification (SIC). These statistics reflect employment by place of work. Figure 3-17 shows Coffey County employment by major SIC sector, based on 2010 BEA statistics.

A community's economic base includes those industries and businesses that bring income into the community from other areas of the state, nation, and the world. The Coffey County economy is based on electric power generation, natural resources, including agriculture, and manufacturing. The tourism / recreation industry also brings income into the county; most is spent in the retail and service sectors which also serve local residents.

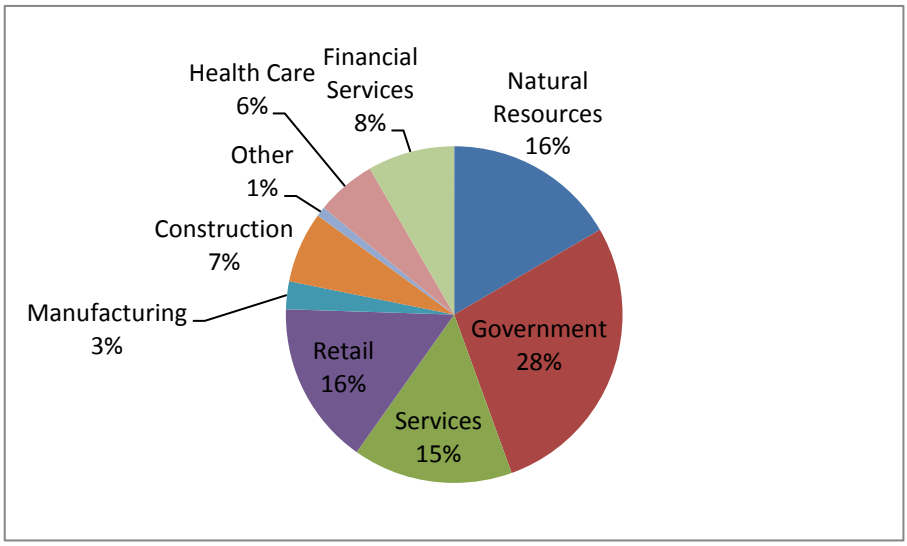


FIGURE 3-17. 2010 COFFEE COUNTY EMPLOYMENT PERCENTAGES BY MAJOR SECTOR (SOURCE: BEA 2010)

The government sector is the largest employer in Coffey County, with 1,327 jobs in 2010. Almost 91% of government jobs were in local government, including school district employment. Employment statistics for the WCGS, the largest private employer in the county, is included in the transportation and public utilities (TPU) sector. BEA does not display Coffey County TPU sector data for 2010, because the number of employers in that sector is relatively few. Based on a 2005 report by the Nuclear Energy Institute, WCGS employs 1,028 people of which, approximately 561 full-time employees live in Burlington, Fridley, Lebo, LeRoy and Waverly, Kansas. (Nuclear Energy Institute, 2005).

The retail and services sectors provided 16% and 15% of total employment, respectively. In 2007 Coffey County per capita retail sales were $12,228, about 98% of the average for the state of Kansas.

The combined Natural Resource sectors comprised about 16% of total 2010 BEA employment in the county. Between 2007 and 2002, the total number of farms in the county increased from 607 to 681. However, the total acres farmed decreased from 335,835 to 324,827, and the average farm size decreased from 553 acres to 477 acres.

During 2010, Coffey County had a per capita personal income of $43,279, which was 111% of the statewide average according to the Bureau of Economic Analysis.

Lyon County

Figure 3-18 displays 2010 employment statistics for Lyon County. Government is the largest sector in the county followed by Manufacturing. The Manufacturing sector includes a major meat packing plant, a major baked goods plant, and firms that manufacture automotive and industrial products, among others. The government sector includes Emporia State College, which is also a major employer (RDA undated). Retail and Services sectors provide the next highest percentage of employment at 14% and 12% respectively. In 2007, retail sales per capita in Lyon County were $13,179, about 106% of the statewide average for that year.

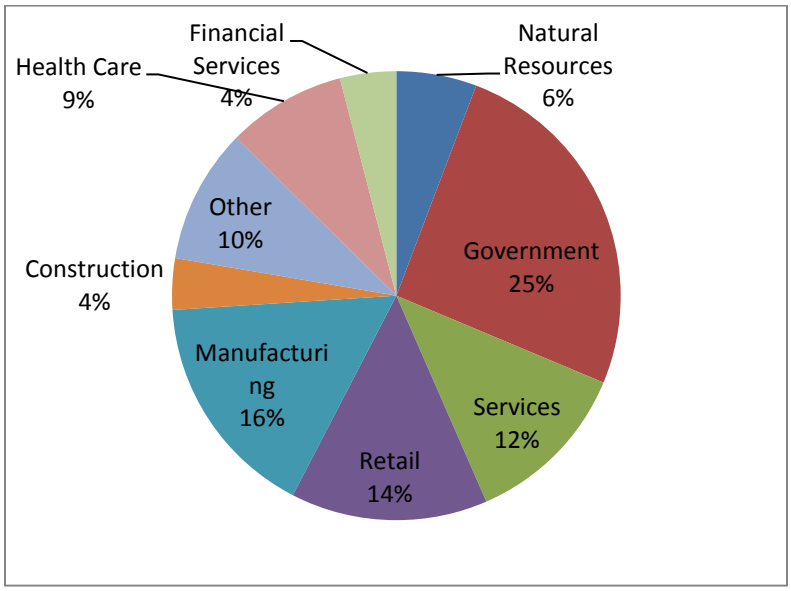


Figure 3-18. 1999 Lyon County Employment Percentages by Major Sector (Source: BEA 2010)

Natural Resources sector provided about 6% of total Lyon County employment. In 2007, there were 930 farms in the county, 32 more than in 2002. The total acres farmed decreased to 473,679 in 2007 from 493,853 acres in 2002. Correspondingly, the average size of farms also decreased from 550 in 2002 to 509 acres in 2007.

In 2010, Lyon County had a per capita personal income of $28,601, which was 73% of the statewide average according to the Bureau of Economic Analysis.

3.8.2 Land Use

The assessment area for land use includes lands associated with the JRR and surrounding areas.

Lands Associated with JRR

The JRR complex includes the lake, dam, and associated lands and flowage easements, the FHNWR, and the OCWA. The land area of each of these facilities is displayed in table 3-15. The percentage of each of the total project area is shown in figure 3-19.

TABLE 3-15. JOHN REDMOND RESERVOIR LAND AREA

USACE			USFWS	KDWP
JRR Water Area[1]	Flowage Easement	Land	Flint Hills NWR	Otter Creek
9,710 acres	10,505 acres	3,160 acres	18,545 acres	1,472 acres

Source: USACE 2001(a), USFWS 2000
[1]Acreage at 1039 msl conservation pool level.

John Redmond Reservoir

The USACE holds fee title to approximately 29,801 acres of land associated with JRR, and has flowage easements on an additional 10,502 acres. The USACE manages JRR (9,710 acres at the current conservation pool level of 1039 MSL) and 3,160 acres of adjacent land.

JRR was developed for flood control, water supply, water quality, and recreation purposes. The reservoir and associated lands are also managed for wildlife objectives. USACE lands associated with JRR include lands designated for intensive and low-density recreation use and wildlife management. There are six developed public-use areas on USACE-managed land, including five that have recreation parks providing camping (recreational vehicle, tent, and trailer), picnic areas, drinking water, and sanitary facilities (USACE 1996). Additional recreation facilities present on USACE-managed lands include an overlook facility, parking areas, trails, a swimming beach, and five boat ramps.

USACE lands include approximately 400 acres of land that has been leased for agricultural purposes in the past. Currently, the land is not leased because of frequent flooding and the difficulty in removing the resultant wood debris (Simmons, pers. comm., 2001).

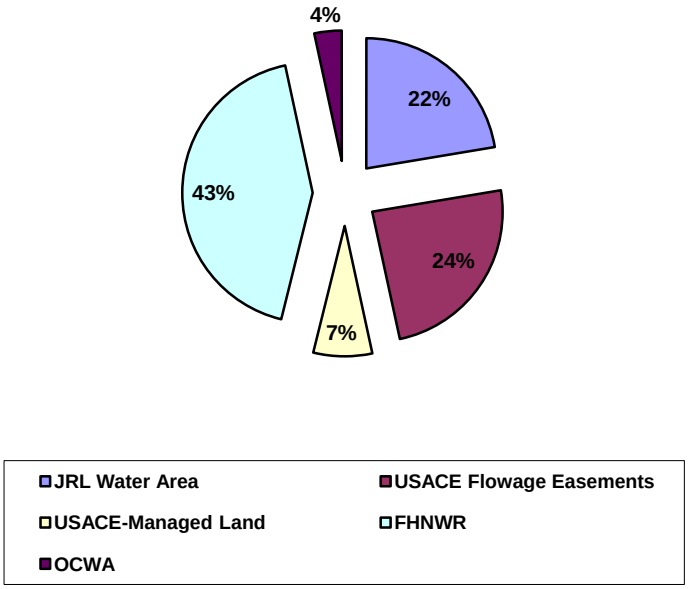


FIGURE 3-19. LAND PERCENTAGES BY MANAGING AGENCY OR CATEGORY (SOURCE: USACE 2001A, USFWS 2000)

Flint Hills National Wildlife Refuge

The FHNWR, located on the upper portion of JRR, consists of 18,545 acres owned by the USACE, which is leased and managed by the USFWS under a cooperative agreement. The total land area is 25% wetlands (4,572 acres), 8% open water (1,400 acres), 3% riparian wetlands on the Neosho River and associated creeks (680 acres), 17% grasslands (3,200 acres), 13% woodlands (2,400 acres), 12% brushlands (2,255 acres), 21% croplands (3,917 acres) and 0.6% administrative and recreational roadways (120 acres) (FHNWR 2000).

The FHNWR is managed primarily to benefit migrating and wintering waterfowl in the central flyway. A variety of management practices are used to provide food and cover for waterfowl, shorebirds, neotropical migrants, and native species. The refuge also provides habitat for white-tailed deer, wild turkey, bobwhite quail, and an assortment of other mammals, birds, reptiles, and insects.

Public use activities currently permitted at FHNWR include wildlife observation, hiking, photography, sightseeing, boating, picnicking, camping, fishing, wild food gathering, and hunting. Fish bait gathering is allowed for personal use and firewood gathering is allowed by permit. Public facilities on FHNWR include parking areas, boat ramps, hiking trails, and an observation tower (FHNWR 2000).

Currently, the USFWS maintains 3,917 acres of cropland on FHNWR, which is leased to 14 cooperative farmers. The share of crops for the USFWS ranges from 10% in flood prone areas to 45% on higher ground. The land is difficult to lease because it floods frequently in low lying areas, and removing the resulting wood debris is expensive and time consuming (Gamble, pers. comm., 2001).

Otter Creek Wildlife Area

The USACE has licensed the KDWP to manage the 1,472-acre OCWA. Otter Creek is managed primarily for upland game species, including bobwhite quail, mourning dove, wild turkey, cottontail rabbit, squirrel, and white-tailed deer. The OCWA also provides fishing access and management, particularly for channel and flathead catfish, as well as wildlife observation, sightseeing, photography, boating, and hunting opportunities. There are no developed facilities on OCWA. Interpretive trails are present and include the Dove Roost Trail and the Headquarters Trails (Barlow, pers. comm., 2001).

Approximately 400 acres of the OCWA is available for agricultural leases, but these lands have been flooded about 3 out of every 5 years in recent times. During productive years, the KDWP leaves approximately 25% of the crop in the field to provide forage for wildlife. The cropland is becoming more difficult to lease, and the KDWP may convert a portion of the cropland to natural grasses for wildlife cover and forage.

Land Use on Adjacent Areas

Coffey County adopted the John Redmond Reservoir Plan for Land Use and Transportation about the time JRR was first constructed. The land immediately outside the boundary of the USACE land is zoned agricultural, which allows for a wide variety of land use (Zurn, pers. comm., 2001). Other nearby land use within Coffey County includes an airstrip and several small cemeteries. The Coffey County communities of New Strawn (2000 population 425) and Ottumwa (2000 population unknown) are all located within close proximity to JRR.

A portion of the FHNWR lies within Lyon County. Most Lyon County land in the vicinity of FHNWR is zoned agricultural, except for a quarry and several parcels in conservation easements. The Lyon County communities of Hartford (2000 population 500) and Neosho Rapids (2000 population 274) are located adjacent to FHNWR (Borst, pers. comm., 2001; Post, pers. comm., 2001).

Recreation Activities

Recreation resources exist on JRR, FHNWR, and OCWA. In all areas, sightseeing and fishing, primarily for channel and flathead catfish, are the recreation activities that generate the greatest number of year-round visits. Although the KDWP has had recent success in maintaining a population of hybrid white bass / wiper, maintaining a sportfish population on JRR has proven difficult because young fish are flushed downstream on an annual basis (Kostinec et al. 1996). Fishing visitation has declined in recent years because several more attractive (in terms of sportfish populations and water quality) fishing alternatives have been developed in the vicinity of JRR. These include the Coffey County Fishing Lake and several municipal lakes. Although the presence of these lakes has generally reduced fishing activity on JRR and adjacent lands, it has resulted in an increase in camping activity in JRR campgrounds because camping facilities are not available at these alternative lakes.

During the fall, hunting, primarily for waterfowl and upland game, is a major recreation activity on JRR, FHNWR, and OCWA. Wildlife observation, particularly birding, is increasing as a recreation activity on these facilities. A number of trails that support wildlife observation activities have been developed on both JRR lands and FHNWR. The KDWP encourages the use of a water management plan for JRR that promotes habitat and forage for waterfowl and shorebirds (Jirak, pers. comm., 2001). Water sports are not a major activity on JRR because of the shallow depth of the lake and quality (turbidity) of the water.

Table 3-16 displays visitation statistics by management area for 1998 through 2000. Recreation visits have been increasing in all areas except OCWA. The decrease in OCWA use may be the result of increased fishing opportunities elsewhere in the area.

TABLE 3-16. **ANNUAL VISITS, BY MANAGEMENT AREA 1998–2011**

	1998	1999	2000	2011
USACE JRR	17,012	21,507	32,372	148,447
USFWS FHNWR	35,030	37,000	52,000	N/A
KDWP OCWA	30,635	21,672	10,675	N/A
Total	**82,677**	**80,127**	**95,047**	**148,447**

Source: USACE, USFWS, KDWP

Recreation Activities on JRR

Table 3-17 displays seasonal percentages of recreation use by major activity for JRR. Totals for all activities are greater than 100% because some visitors engage in more than one recreation activity per visit. Sightseeing is the major recreation activity on JRR during all seasons, ranging from 45% to 65% of total visits during the period. Fishing is the second most popular activity ranging from 23% to 39% of total visits, except during winter, when hunting is the second most popular activity, totaling 34% of all visits (USACE 1999–2000). Recreation percentages are assumed to be the same.

TABLE 3-17. SEASONAL PERCENTAGE RECREATION VISITS BY ACTIVITY: SPRING 1999 – SUMMER 2000

	Camp	Picnic	Boat	Fish	Hunt	Water Ski	Swim	Other	Sight-See
Spring 1999	2.49%	8.26%	0.08%	23.28%	7.03%	0%	0%	6.19%	63.87%
Summer 2000	17.28 %	11.11%	2.24%	32.74%	0%	0.13%	9.12%	5.41%	46.66%
Fall 2000	0.0%	5.12%	0.96%	39.22%	8.63%	0.0%	0.0%	5%	45.32%
Winter 2000	0.0%	2.19%	0.02%	18.13%	35.28%	0.0%	0.0%	1.18%	49.68%

Source: USACE Tulsa District 1999–2000

Recreation Activities on FHNWR

Recreation facilities are discussed in Section 3.8.2, figure 3-20 displays the percentage of each of the major recreation uses on FHNWR for 2000. Other activities, which include wildlife viewing, generate the most recreation visits for FHNWR. Hunting and fishing are also major activities. In years when the water level plan has been implemented, or in years when natural conditions allow for lowered water levels in the spring followed by raised water levels in the fall, both bird watching and waterfowl hunting visits increase dramatically (Jirack, pers. comm., 2001; Kostinec et al. 1996).

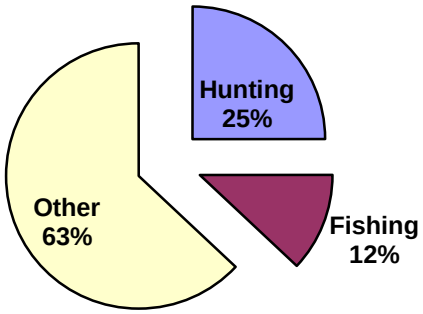


FIGURE 3-20. FHNWR PERCENTAGE OF RECREATION USE BY TYPE: 2000 (SOURCE: GAMBLE 2001B)

(Other includes wildlife viewing, walking, driving, photography, visitor's center, etc.)

Recreation Activities on OCWA

Most visitors to OCWA engage in wildlife viewing, hunting, or fishing activities. Of those visitors who either fish or hunt, an estimated 60% of visitors hunt and the remaining 40% engage in fishing, primarily for channel catfish along Otter Creek. The white bass spring run also generates a number of fishing visits (Barlow, pers. comm., 2001).

3.8.3 Economic Effects of John Redmond Reservoir

The economic effects of JRR include those associated with flood control, water storage and supply, and recreation. Other economic effects include employment and the procurement of local goods and services for the operation and maintenance of the reservoir and associated facilities, which would not be affected by the proposed action or alternatives and are not considered in this assessment.

Flood Control

JRR provides flood protection for lands along the Neosho / Grand River below the dam. While the dam does not prevent all flooding, it substantially reduces the amount of flooding downstream (USACE 1996).

The economic value of flood control is calculated as the dollar amount of damage prevented. As of September 2000, the cumulative total of flood damage prevented by the reservoir and dam since the project became operational is estimated to be $780.5 million (Fulton, pers. comm., 2012).

Water Storage and Supply

JRR provides water storage for two programs operated by the KWO: the Water Marketing Program and the Water Assurance Program (KWO 1996). These programs are operated by the KWO to ensure that an adequate supply of water is developed, managed, and maintained to meet, as nearly as possible, the long range water supply needs of municipal and industrial water users within Kansas.

Wolf Creek Nuclear Generating Station

Under the Water Marketing Program, the KWO is contracted for an annual 9,672 million gallons per year (MGY) of water supply at JRR, for use by KG&E in supplementing the cooling lake at WCGS. This supplemental source of water is necessary because evaporation in most years is greater than inflow in the WCGS cooling lake (Lewis 2001a). KG&E pays $0.10 per thousand gallons of water, based on a formula that requires payment for 50% of the allotment at the beginning of the contract year and subsequent payment for water used over that amount on a per thousand gallon basis. Over the past 4 years, KG&E has paid the minimum annual amount of $483,600. In other years, however, KG&E has used as much as 74% of the total allotment (Buttenhoff, pers. comm., 2001).

Cottonwood and Neosho River Basins Water Assurance District Number 3

The Water Assurance Program provides supplemental water to a number of municipal and industrial users. The Kansas Water Assurance Program was developed to meet the needs of municipal and industrial water supply users whose needs could not be economically and institutionally met by other means. During periods of drought, natural stream flow may be significantly reduced. Municipal and industrial water users along a stream who hold appropriation rights to the natural flow may find their ability to use the surface water is severely limited at a time when their demand for water is at its highest. Many of these users are located below federal lakes.

The CNRB was formed on 31 August 1993. The contract and operations agreement with this district were signed on 28 August 1996. There are 21 municipal and industrial members of this district including:

- City of Council Grove
- City of Cottonwood Falls
- City of Emporia
- City of Hartford
- City of Burlington
- City of Leroy
- Woodson County Rural Water District No. 01
- Public Wholesale Water Supply District No. 5
- City of Iola
- City of Humboldt
- Monarch Cement
- Ash Grove Cement
- City of Chanute
- City of Erie
- City of St. Paul
- City of Parsons
- Crawford County Rural Water District No.6
- Kansas Army Ammunition
- KG&E
- City of Oswego
- City of Chetopa

Each of these customers, except the cities of Council Grove, Cottonwood Falls, Emporia, and Hartford, are hydrologically below JRR. There are no other major reservoirs in this reach of the river to supplement flows during periods of drought. In addition, groundwater is only available in limited quantities within the alluvial valley. These 16 municipalities and industries located downriver from JRR are directly dependent on water provided from assurance storage during times of low streamflow (Lewis, pers. comm., 2001).

Members receive water supply service through releases from storage in Marion, Council Grove Lakes, and JRR. The district pays the state for costs associated with the storage space for 10,000 ac-ft of water in these lakes and reservoirs. JRR stores 3,500 ac-ft of the total, for which CNRB is paying the state $291,370 in 10 annual installments. In addition to these costs, the district makes annual payments for operation, maintenance, and repairs associated with the storage space dedicated to district use, and an annual cost for administration and enforcement (KWO 1996).

Recreation

JRR and associated facilities (OCWA and FHNWR) provide a variety of recreation opportunities including fishing, hunting, wildlife viewing, hiking, camping, and boating. Each of these activities results in economic activity in the study area and elsewhere in the state. Over 29,100 angler days per year of angler use occurs on the river between Council Grove and JRR, and 63,900 angler days of use between the JRR and the Kansas-Oklahoma state line. Both reaches are considered to have an excellent sport fishery, especially for catfish. The principal fishing areas are limited, and generally restricted to adjacent towns, road crossings, low ware or overflow dams, and reservoir tailwaters (USFWS 2002).

Two documents have recently provided estimates of the economic effects of recreation visits to JRR and nearby facilities. The USFWS, KDWP, and USACE prepared a study on the economic impact of water level management for the JRR (Kostinec et al. 1996). That study, based on previous studies of the economic contributions of bird and waterfowl recreation (Southwick Associates 1995), estimated that each hunting trip contributed $162 to the economy. In 1996, this estimate yielded an economic value of $3,240,000 for wildlife-related recreation trips, according to the study. Many shorebird watching and waterfowl hunting visits to JRR are made by out-of-area and out-of-state visitors, particularly in years when natural conditions or implementation of the water level management plan results in large numbers of migrating birds (Hotaling, pers. comm., 2001; Jirak, pers. comm., 2001).

Coffey County Economic Development estimates that overnight visitors to nearby Coffey County Fishing Lake spend $100 per day, and day visitors spend $30 per day (CCED undated). Although fishing generates a substantial number of visits to JRR, FHNWR, and OCWA, most fishing visits are believed to be associated with catfish and hybrid bass, and most are made primarily by local residents. The Coffey County Fishing Lake and several nearby municipal lakes are believed to attract the bulk of out-of-area visitors (Jirak, pers. comm., 2001).

3.8.4 Lands Within the Floodplain Downriver from JRR

Lands within the floodplain along the Neosho River from JRR to Grand (Pensacola) Lake are largely privately held and primarily in agricultural use. Agriculture is a major land use and economic activity throughout the Neosho / Grand River Basin. The alluvial soils within the floodplain, which support row crop production (primarily corn and soybeans), livestock grazing, timber production, and pecan orchard cultivation, play a key role in area productivity (G/NRBC 1996; Kilgore, pers. comm., 2001).

Flooding in the Neosho River basin occurs primarily on agricultural lands and riparian woodlands within the floodplain. Flooding occurs during high rainfall / runoff events in the basin between JRR and Grand (Pensacola) Lake, when high rainfall / runoff events are combined with channel capacity or lower releases from JRR, or when greater than channel capacity releases are passed downstream from JRR to avoid risk of project failure. In recent years, inundation of portions of the floodplain has occurred, on average, about once a year according to local estimates (Kilgore, pers. comm., 2001; Newkirk, pers. comm., 2001).

Flooding effects on crops have ranged from major to minimal, depending on the water depth, duration, and time of year that the inundation occurred. Other effects of flooding include bank caving, channel degradation, loss of soil, and movement of nutrients, fertilizer, and pesticides. Flooding affects agricultural lands, water quality, and aesthetic and recreational resources along the river (G/NRBC 1996). There are no known studies of the effects of flooding on the agricultural economy in the Neosho River basin between JRR and Grand (Pensacola) Lake (Fogleman, pers. comm., 2001; Kilgore, pers. comm., 2001).

When flooding occurs on the Neosho River below JRR, four houses located northeast of the city of Burlington in Coffey County, are routinely affected. During severe floods, basements of some businesses and homes within Burlington are also flooded. Riverbank caving is also a concern in Burlington. During the November 1998 flood, a dike and road east of the city were threatened. A portion of a road within the city has been relocated due to riverbank caving, and a riverbank reconstruction project is currently planned to stabilize a portion of the Neosho River (Newkirk, pers. comm., 2001).

Neosho Basin Pecan Orchards

The land area used for pecan orchards in Kansas increased from under 3,000 acres in 1982 to almost 6,000 acres in 1997, nearly doubling during the 15-year period (Coltrain et al. 1999). Pecan trees are best suited to deep alluvial soils; therefore, pecan orchards are typically found in floodplains (Reid 1995). An estimated 80% of Kansas pecan orchards are located along the Neosho River and its tributaries below JRR. The greatest number of orchards are located in Cherokee and Neosho Counties, with substantially smaller numbers in Labette, Montgomery, Chautauqua, Wilson, Crawford, Allen, Bourbon, Woodson, and Coffey Counties (Reid, pers. comm., 2001). Pecan trees in the Neosho Basin are generally native trees, which have become established naturally rather than planted in areas (orchards) from which other species have been removed.

Pecan orchards are susceptible to flooding at two times during the year. Pecan harvest occurs in November, December, and January when pecans are shaken from trees and collected using rubber-finger sweeps. Water moving through the orchards during harvest can wash the nuts away and wet soils can damage the nuts.

Pecan orchards are also susceptible to flooding during the growing season. During the spring and summer, periods of relatively mild flooding (frequent or extended periods of relatively low water levels) can damage trees and affect crops. Saturated soils during this period inhibit the ability of the trees to absorb oxygen and water from the soil. Short periods of saturation will result in leaves that yellow and fall prematurely, destroying or damaging the current year crop and potentially affecting the crop in the subsequent season. Longer-term exposure to saturated soils can result in the loss of the tree (Reid, pers. comm., 2001).

Table 3-18 displays Kansas pecan production and value for 1993 through 1999. The dramatic drop in production in 1998 was the result of flooding along the Neosho River that occurred during the harvest season of that year (Reid, pers. comm., 2001).

TABLE 3-18. KANSAS PECAN PRODUCTION AND VALUE: 1993–1999

	1993	1994	1995	1996	1997	1998	1999
Utilized Production (1,000 lbs.)	1,800	3,600	500	200	4,200	50	5,000
Value of Production ($1,000)	$900	$3,672	$460	$196	$2,814	$44	$3,400

Source: USDA 1992–1999

[1]Utilized production is the amount sold plus the quantities used at home or held in storage.

Transportation

JRR and associated facilities are located about 8 miles south of I-35. SH 75, located 1 mile east of JRR, provides access to the area from the north and south. SH 130 provides access from I-35. A variety of Coffey and Lyon County roads provide access to JRR, FHNWR, and OCWA.

USACE-, USFWS-, and KDWP-maintained roads provide access within these facilities. Certain roads within these facilities are inundated during periods when the USACE is required to impound waters to prevent downstream flooding (Gamble, pers. comm., 2001).

During scoping, a concern was noted for the bridge on SH 130, north of Hartford, regarding trees under the bridge restricting water flow. KDOT reviewed this bridge in the field and believes that maintenance on the bridge is adequate. This bridge is scheduled to be replaced in 2006 or 2007 (Adams, pers. comm., 2001).

3.9 CULTURAL RESOURCES

As a major waterway in the central Plains, the entire Neosho River valley can be classified as an area of high sensitivity for the location of archaeological remains (Hofman, Logan, and Adair 1996:203–220). This section describes prehistoric and historic cultural remains that have been recorded on USACE property around JRR, approximately 107 miles of shoreline, between the elevation of 1035.0 ft and 1045.0 ft. This corridor defines the area of potential effect for cultural resources.

3.9.1 Cultural History Sequence

The following regional chronology, after Rust (2001), is adopted in the SFES:

- Paleo-Indian 12,000 to 8500 B.P.
- Plains Archaic 8500 to 2500 B.P.
- Plains Woodland 2000 to 1000 B.P. (A.D. 1 to 1000)
- Plains Village A.D. 1000 to 1600
- Protohistoric A.D. 1500 to 1825
- Historic A.D. 1825 to present

To aid in comparing divergent cultures and sequences in the central Plains, Hofman, Logan, and Adair recommend the use of general adaptation types to characterize prehistoric cultural traditions (1996:203–220).

Paleo-Indian

Specialized, large game hunting by small bands of hunter-gatherers was the adaptation type associated with this period. Signature stone tools are unnotched projectile points of fluted or lanceolate type, often found in contexts where mammoth or bison remains also occur. Structural remains are poorly understood, the probable result of a mobile lifestyle and the use of perishable construction materials. Three main complexes identified within this period are Clovis or Llano (12,000–10,600 B.P.), Folsom or Lindenmeier (10,900–10,100 B.P.), and Plano or Dalton (10,500–8000 B.P.).

Plains Archaic

Plant foraging was an important subsistence strategy of hunter-gatherer groups in this period, and was associated with increased seasonal variability of resources during the mid-Holocene Hypsithermal. Repeated occupation of sites, features such as rock-lined hearths and roasting pits, and grinding tools reflect intensive plant processing and the cyclical exploitation of resources. Bison were hunted on a smaller scale than previously, with greater reliance on small mammals, mussels, and fish. Stone tools were often thermally cured, and included distinctive stemmed and notched projectile points. The Mesoindian period is traditionally divided into Early (8500–6500 B.P.), Middle (6500–4500 B.P., and Late (4500–2500 B.P.) periods.

Plains Woodland

Archaeologists in Kansas use the term Early Ceramic to describe Woodland cultural components. Incipient horticulture was the adaptation type associated with this period, marked by the introduction of cultigens in the central Plains. Evidence for semi-permanent villages, increased reliance on wild and domestic plants, widespread use of ceramics, and elaborate burials reflect the more sedentary lifestyle of Woodland cultures. Small game remained essential in subsistence. Tool assemblages are distinguished by small, corner-notched projectile points, which suggest invention of the bow and arrow.

Plains Village

Horticulture, supplemented by hunting and gathering, was the adaptation type associated with Village societies. Gardening tools were recognized in artifact assemblages, along with triangular arrowpoints for hunting and pottery types that in Kansas serve to denote this period as the Middle Ceramic. Villager cultures are often identified in lowland terraces of waterways where gardening was viable. The Pomona culture variant is associated with watersheds in southeastern Kansas. Distinguishing traits include shell-tempered pottery and a scarcity of cultigen remains such as maize, possibly reflecting less dependence on farming than in other Villager cultures (Logan 1996:123–125; Brooks 1989:88-89).

Protohistoric

This period was defined by transitory contacts of European explorers in the central Plains, substantiated by little or no historical documentation. Lifeways were subsumed under the Plains Village adaptation type, but distinctive Late Ceramic archaeological complexes were identified, including the Great Bend aspect with sites in south-central Kansas. Great Bend manifestations likely represent the proto-Wichita villages encountered by Francisco Coronado in 1541 (Hofman 1989:93–95). Proto-Wichita sites are also identified in north-central Oklahoma (Bell, Jelks, and Newcomb 1967).

Historic

The Reservation period (1825–1900) was marked by the displacement and resettling of American Indian tribes throughout the greater study region. Between 1825 and 1835, reserves were established for the Osage and New York Indians in southeast Kansas. The Cherokee Nation was created in northeastern Oklahoma in 1828, soon thereafter incorporating the Quapaw and Seneca Tribes. After the Civil War, the area was further divided into reserves for the Peoria, Ottawa, Wyandotte, and others. From 1838 to 1871, the Neosho Agency held jurisdiction over all tribes except the Cherokee (Harris 1965). Between the 1830s and 1850s, Anglo-Americans legally occupied tribal lands to operate mission schools, trading posts, ferries, mills, and blacksmith shops (Tracy 1970:174–177; Harris 1965:42–43).

The early part of the American period (1850–present) is marked by increasing Anglo-American land speculation and enhanced military supply lines through the study region that connected Fort Gibson, Fort Scott, and Fort Leavenworth during the Civil War. Pioneer settlement of

homesteads and towns began in earnest in southeastern Kansas during the 1860s, following the removal of American Indian tribes to Oklahoma. This trend was somewhat delayed in northeastern Oklahoma where the Cherokee Nation maintained a loose hold on sovereignty. By the 1890s, however, towns such as Miami and Ottawa were firmly rooted (Benedict 1922; Nieberding 1983).

3.9.2 Previous Investigations

Forty-eight archaeological sites have been recorded over the past 30 years in the area of potential effect (1035.0 ft–1045.0-ft elevation) around JRR (table 3-19). Comprehensive investigations have been published in: *Appraisal of the Archaeological Resources of the John Redmond Reservoir* (Witty 1961), *Salvage Archaeology of the John Redmond Lake* (Witty 1980), *Archaeological Investigations in the John Redmond Reservoir Area* (Rogers 1979), *Archaeological Investigations at John Redmond Reservoir, East-Central Kansas, 1979* (Thies 1981), and *John Redmond Reservoir Historic Properties Management Plan* (Anonymous 1997). More recently, a Phase II shoreline survey was undertaken by e²M in 2000, with results presented in *An Archaeological Survey of John Redmond Reservoir* (Rust 2001). The survey was followed by Phase III test excavation and evaluation of selected sites by e²M in 2001 (Rust 2005).

A review of the Historic Preservation Management Plan (HPMP) database files prior to the e²M fieldwork indicated that 27 of the 47 sites had been destroyed, mitigated, or deemed insignificant. Site revisitation during the Phase II survey determined that an additional 15 sites had been destroyed (in most cases by flooding) or currently lacked evidence of significance. Six sites, three of which were discovered in 2000, were the focus of Phase III investigations in 2001. Historic sites 14CF101, 14CF102, 14CF103, and 14CF105, and prehistoric sites 14CF311 and 14CF313 (these last two now defined as one site 14CF311), were considered eligible for nomination to the National Register of Historic Places (NRHP) by the USACE. However, the Kansas State Historical Society did not concur with this conclusion, and deemed these sites ineligible for the NRHP (appendix G). Site 14CF104 was tested and considered ineligible by both the USACE and the Kansas State Historical Society (appendix G).

The sites are briefly described below under the appropriate period. General locational information for the sites may be found in appendix G.

TABLE 3-19. SITES AT JOHN REDMOND RESERVOIR WITHIN THE AREA OF POTENTIAL EFFECT

Site	Status	Reference
14CF027	Recommended Not NRHP Eligible	Rogers 1979
	Destroyed	HPMP 1997
14CF037	Recommended Not NRHP Eligible	Rogers 1979
	Destroyed	HPMP 1997

TABLE 3-19. SITES AT JOHN REDMOND RESERVOIR WITHIN THE AREA OF POTENTIAL EFFECT

Site	Status	Reference
14CF041	Recommended Not NRHP Eligible	Rogers 1979
	Destroyed	HPMP 1997
14CF047	No Recommended Not NRHP Eligible	Rogers 1979
	Destroyed	HPMP 1997
14CF101	Formerly Determined Not NRHP Eligible	Rust 2005
14CF102	Formerly Determined Not NRHP Eligible	Rust 2005
14CF103	Formerly Determined Not NRHP Eligible	Rust 2005
14CF104	Formerly Determined Not NRHP Eligible	Rust 2005
14CF105	Formerly Determined Not NRHP Eligible	Rust 2005
14CF302	Destroyed	Rust 2005
14CF303	Destroyed	Rust 2001
14CF311	Formerly Determined Not NRHP Eligible	Rust 2005
14CF313	Formerly Determined Not NRHP Eligible	Rust 2005
	South extension of current 14CF311	Wilmeth 1960 (KSHSSR)
14CF314	Recommended Not NRHP Eligible	Witty 1961
	Destroyed	HPMP 1997
14CF319	Recommended Not NRHP Eligible	Theis 1979 Wilmeth 1960 (KSHSSR) Rust 2001
14CF320	Recommended Not NRHP Eligible	Wilmeth 1960 (KSHSSR)
	Destroyed	Theis 1979 HPMP 1997
14CF321	Recommended Not NRHP Eligible	Witty 1961
	Destroyed	HPMP 1997
14CF324	Destroyed	Rust 2001
14CF325	Recommended Not NRHP Eligible	Witty 1961 HPMP 1997
	Destroyed	Rust 2001
14CF326	Destroyed	Rust 2001
14CF327	Recommended Not NRHP Eligible	Witty 1961 Theis 1983 (KSHSSR) HPMP 1997

TABLE 3-19. SITES AT JOHN REDMOND RESERVOIR WITHIN THE AREA OF POTENTIAL EFFECT

Site	Status	Reference
14CF330	Mitigated	Witty 1980
	Destroyed	Rust 2001
14CF331	Mitigated	Witty 1980 HPMP 1997
14CF333	Recommended Not NRHP Eligible	Witty 1961 Rust 2001
14CF343	Destroyed	HPMP 1997
14CF350	Recommended Not NRHP Eligible	Theis 1979 HPMP 1997
14CF351	Recommended Not NRHP Eligible	Maul 1979 (KSHSSR) HPMP 1997 Rust 2001
14CF352	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
14CF353	Recommended Not NRHP Eligible	Theis 1981
	Destroyed	HPMP 1997
14CF354	Destroyed	HPMP 1997
14CF355	Destroyed	HPMP 1997
14CF356	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
14CF357	Recommended Not NRHP Eligible	Theis 1981 Rust 2005
14CF360	Recommended Not NRHP Eligible	Theis 1981
	Destroyed	HPMP 1997
14CF361	Recommended Not NRHP Eligible	Theis 1981
	Destroyed	HPMP 1997
14CF362	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
14CF363	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
14CF364	Recommended Not NRHP Eligible	Theis 1979
	Destroyed	HPMP 1997
14CF365	Recommended Not NRHP Eligible	Theis 1981
	Destroyed	HPMP 1997
14CF369	Recommended Not NRHP Eligible	Rust 2005
14CF389	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
14CF390	Recommended Not NRHP Eligible	Theis 1981
	Destroyed	HPMP 1997

TABLE 3-19. SITES AT JOHN REDMOND RESERVOIR WITHIN THE AREA OF POTENTIAL EFFECT

Site	Status	Reference
14CF391	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
14CF1316	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
	Destroyed	Rust 2001
14CF1318	Recommended Not NRHP Eligible	Theis 1981 HPMP 1997
	Destroyed	Rust 2001
14CF1329	Recommended Not NRHP Eligible	Theis 1983 (KSHSSR)
	Destroyed	HPMP 1997
14CF1335	Destroyed	Rust 2001
14CF1336	Destroyed	Rust 2001

KSHSSR = Kansas State Historical Society Site Report

3.9.3 Prehistoric Resources

Two prehistoric sites (now combined as one) were identified within the area of potential effect around JRR. [Note: In the discussion, KSHSSR = Kansas State History Society Site Report.]

Paleo-Indian

Although potential for the discovery of Paleo-Indian sites in alluvial settings of the central Plains is great (Hofman, Logan, and Adair 1996:208), components of this period are not reported within the areas of potential effect.

Plains Archaic

JRR site 14CF311/313 yielded Plains Archaic surface artifacts (side-notched projectile points, thermally cured cherts) in addition to later prehistoric lithic and ceramic artifacts. Part of the site area is overlain by historic activity. Limited subsurface testing was negative, but the extent of the surface material shows potential for a large, possibly long-term occupation area (Rust 2005, Witty 1961, KSHSSR 1960).

Plains Woodland (Early Ceramic)

Components of this period are not reported within the areas of potential effect.

Plains Village

In addition to Mesolithic artifacts, JRR site 14CF311/313 produced Pomona Villager lithics including a drill fragment and a potsherd (Witty 1961, Rust 2005).

Protohistoric

Protohistoric sites are not well documented in the JRR area, and none have been recorded in the area of potential effect (Rust 2001:16).

3.9.4 Historical Resources

Four historic sites are identified in the JRR area of potential effects. Sites discussed are organized according to historic adaptation types as presented by Lees (1996:140–49).

Resettled American Indian Adaptation

There are no sites from the Resettled American Indian Adaptation period within the JRR area of potential effect.

Transportation Adaptation

There are no sites from the Transportation Adaptation period within the JRR area of potential effect.

Industry Adaptation

There are no sites from the Industry Adaptation period within the JRR area of potential effect.

Rural Settlement Adaptation

Four sites in this category have been investigated in the JRR area of potential effect (Rust 2001: 41-56, Rust 2005). Sites 14CF101, 14CF102, 14CF103, and 14CF105 lie within close proximity to each other and are remnants of the historic Otter Creek community (Pleasant Township), which was first settled in 1858. Phase III test excavations on the first three sites, all originally farmsteads, revealed *in situ* courses of stone foundation walls associated with deep deposits of artifacts. More than 2,000 artifacts were recovered from four excavated units. Preliminary analysis, combined with historical research and extensive oral interviewing of living descendants, suggest 14CF101 and 14CF102 may date to circa 1860, and 14CF103 to the 1880s. Site 14CF105 preserves substantial surface remains, and an early phase probably also dates to the late nineteenth century.

3.10 HAZARDOUS, TOXIC, OR RADIOLOGICAL WASTES

This section describes existing conditions within the JRR project area with regard to potential environmental contamination on the site, or that may enter the site, via surface water and the sources of releases to the environment. Contaminant pathways have been identified by the USFWS (Blackford 1999 in FHNWR 2000) and radiological analyses are conducted by WCGS (KDHE 2001), using portions of the JRR site as controls.

A recent contaminant assessment process was completed by the USFWS for FHNWR and radionuclides are monitored for the WCGS, including sites within and near JRR (FHNWR 2000, KDHE 2001). The most likely pathways for contaminants to enter JRR are through runoff water and the activities associated with agriculture, flood control, and public recreation (Blackford 1999 in FHNWR 2000). Radionuclides could enter the JRR environment via air or water pathways (KDHE 2001). The highways and roads, railroads, and oil and gas pipelines in the vicinity could also provide sources of contaminants to the project site.

Because the FHNWR is an overlay on the JRR flood control lands, flooding is common during the spring and fall seasons. On average, flooding of the FHNWR occurs as follows:

- entire refuge flooded (95% of refuge lands) occurs 1 in 10 years
- severe refuge flooding (75% of the refuge lands) occurs 1 in 7 years
- moderate refuge flooding (50% of the refuge lands) occurs 1 in 4 years
- minor refuge flooding (25% of the refuge lands) occurs annually

Since establishment in 1966, the entire refuge (95%) has been flooded more frequently than 1 in 10 years, e.g., 1973, 1985, 1986, 1993, 1995, 1998, and 1999 (Blackford 1999 in FHNWR 2000). Floodwater can bring contaminants to the project site and are a major contaminant pathway. Some sources of contaminants potentially carried in floodwater from the drainage basin include: (1) municipalities (Emporia, Neosho Rapids, Hartford, etc.,) that have sanitary sewage, automobile parts manufacturing, a slaughterhouse and meat packing plant, commercial bakery, dog food plant, and petroleum product storage facilities; (2) agricultural land where livestock feedlot runoff and chemicals used for fertilizer, weed control, and insect control are applied, and sediments are washed from fields; and (3) lead deposited historically through hunting and fishing activities.

A summary of contaminant issues identified in Blackford (1999 in FHNWR 2000) includes:

- chlordane compound concentrations in fish sufficient to result in consumption advisories annually
- fish kills associated with livestock feedlot runoff during the 1970s
- biota samples containing levels of PCB, atrazine, heavy metals (lead, mercury, and arsenic)
- sediment samples containing lead
- detection of strong chemical / pesticide odors by onsite personnel following precipitation events during the spring planting season
- surface water analyses that identified triazines, 2,4-D, and alachlor

- all drainages are turbid
- Eagle Creek has documented heavy metal concentrations and a livestock feedlot is currently in operation on its banks, updrainage of JRR

Environmental radiation data collection has occurred at the WCGS since 1984, one year prior to operation in 1985 (KDHE 2001). The purpose of the operational environmental radiation surveillance program is to detect, identify, and measure any radioactive material released to the environment in effluents resulting from the operation of WCGS. Samples are taken of air; direct radiation monitoring; surface water; groundwater; drinking water; milk; sediment and soil; fish, game animals, and domestic meat; and terrestrial and aquatic vegetation. The samples taken on the JRR project site are used as controls and are collected at Hartford, Kansas (air), JRR (aquatic vegetation, sediments), and the Neosho River below John Redmond Dam (fish, surface water). A total of 1,088 samples were collected during 2000 at WCGS (KDHE 2001).

The results of direct radiation monitoring show no significant changes from preoperational data. Airborne sample analyses show no radionuclides attributable to the operation of WCGS were present above the lower limits of detection. Further, analyses of terrestrial vegetation, soil, milk, grain, and vegetable samples show no radionuclides present that are attributable to the operation of WCGS.

Elevated readings of radionuclides were determined for surface water, sediment, and fish (KDHE 2001). The beta emitter H^3 concentration for water samples collected in Coffey County Lake was 16,678 picoCuries per liter (pCi/l) or 83% of the National Primary Drinking Regulation maximum contaminant level of 20,000 pCi/l. All other surface water, groundwater, and drinking water samples collected show no radionuclides present attributable to the operation of WCGS.

Sediment samples have been excellent indicators for long-term buildup of fission and activation product activity levels in Coffey County Fishing Lake (KDHE 2001). The highest activation product activity observed during 2000 was 816 ± 37 picoCuries per kilogram (pCi/kg)-dry Cobalt-60 (Co^{60}) from a Coffey County Fishing Lake bottom sediment sample. The highest fission product activity during 2000 was 680 ± 200 pCi/kg-dry Cesium-137 (Cs^{137}) from a Coffey County Fishing Lake shoreline sediment sample. Of 45 fish samples, two showed notable radionuclide concentrations. A composite sample of walleye collected at the Ultimate Heat Sink of Coffey County Fishing Lake resulted in 41 ± 16 pCi/kg Cs^{137}. The highest H^3 tissue concentration was 11,003 pCi/kg-wet in a smallmouth buffalo sample taken from the lake discharge cove. No other radionuclides attributable to WCGS operation were found. The regulatory limit set for a citizen in terms of projected dose equivalent, is 100 mrem/yr. Using the results for Co^{60} and Cs^{137} reported above, an average-sized man consuming 21 kg/year (46.2 lbs/year) of contaminated fish would receive a committed effective dose equivalent of 0.058 mrem, far below the regulatory limit (KDHE 2001).

4.0 ENVIRONMENTAL IMPACTS

4.1 INTRODUCTION

This section examines potential environmental impacts of the proposed action and alternatives on the nine resource areas identified in the affected environment section of this document: geology and soils; hydrology and water resources; biological resources; air quality; aesthetics; prime or unique farmland; socioeconomic resources; cultural resources; and hazardous, toxic, and radiological wastes. For each resource area, consideration is given to whether potential environmental impacts would result from the proposed action or alternatives and whether they are short term or long term, mild or significant, and adverse or beneficial. Consideration of potential cumulative effects is also presented.

As defined by NEPA, significant impacts are those that have the potential to significantly affect the quality of the human environment. “Human environment” is a comprehensive phrase that includes the natural and physical environments and the relationship of people to those environments (40 CFR 1508.14). Whether or not a proposed action “significantly” affects the quality of the human environment is determined by considering the context in which it will occur and the intensity of the action. The context of the action is determined by studying the affected region, the affected locality, and the affected interests within both. Significance varies, depending on the setting of the proposed action (40 CFR 1508.27). The intensity of an action refers to the severity of the impacts, both regionally and locally. The level at which an impact is considered significant varies for each environmental resource area.

The area, or region of influence for an action, is defined for each environmental resource based on the areal extent that would be affected directly or indirectly by the proposed action. The determination of the region of influence is based on guidance provided by regulatory agencies or professional judgment.

4.2 GEOLOGY AND SOILS

Geology and soil resources for an area consist of the surface and subsurface soils and bedrock, and their respective physical characteristics. Concerns relating to geology and soil resources include the impacts of an action that would result in geologic or soil-related hazards, i.e., subsidence, land sliding, erosion, expanding or collapsing soils and bedrock, and seismic activity. In addition, the limiting of access to mineral resources, unique geologic features, or paleontological resources are also areas of concern.

Topography is the change in elevation over the surface of an area, and is generally the product of the geology and soil resources for a given area. Therefore, effects on topography are also included under this geology and soil resources section.

TABLE 4-1. ENVIRONMENTAL RESOURCES AND REGION OF INFLUENCE

Environmental Resource	Region of Influence (no action alternative)	Region of Influence (dredge John Redmond Reservoir)	Region of Influence (phased pool storage reallocation)	Region of Influence (proposed action: storage reallocation)
Geology and Soils	No region of influence	Sediment disposal area	John Redmond Reservoir and downriver effects	John Redmond Reservoir and downriver effects
Hydrology and Water Resources	John Redmond Reservoir	John Redmond Reservoir and downriver effects	John Redmond Reservoir and downriver effects	John Redmond Reservoir and downriver effects
Biological Resources	No region of influence	Sediment disposal areas, Upriver, John Redmond Reservoir, and downriver effects	Upriver, John Redmond Reservoir, and downriver effects	Upriver, John Redmond Reservoir, and downriver effects
Air Quality	No region of influence	John Redmond Reservoir vicinity	No region of influence	No region of influence
Aesthetics	No region of influence	Sediment disposal area, John Redmond Reservoir, and downriver effects	John Redmond Reservoir	John Redmond Reservoir
Prime or Unique Farmlands	No region of influence	Sediment disposal area	Upriver, John Redmond Reservoir, and downriver effects	Upriver, John Redmond Reservoir, and downriver effects
Socioeconomic Resources	Allen, Anderson, Bourbon, Cherokee, Coffey, Crawford, Labette, Lyon, Neosho, Wilson, and Woodson Counties, Kansas	John Redmond Reservoir vicinity, and Coffey and Lyon Counties, Kansas	Allen, Anderson, Bourbon, Cherokee, Coffey, Crawford, Labette, Lyon, Neosho, Wilson, and Woodson Counties, Kansas	Allen, Anderson, Bourbon, Cherokee, Coffey, Crawford, Labette, Lyon, Neosho, Wilson, and Woodson Counties, Kansas
Cultural Resources	John Redmond Reservoir, and downriver effects	Sediment disposal areas, John Redmond Reservoir, and downriver effects	John Redmond Reservoir, and downriver effects	John Redmond Reservoir, and downriver effects
Hazardous, Toxic, or Radiological Wastes	No region of influence	Sediment disposal area, John Redmond Reservoir, and downriver effects	No region of influence	No region of influence

No Action Alternative

Potential effects on geology and soil resources through the implementation of the no action alternative are precluded by the fact that the no action alternative for JRR does not involve any activities that would contribute to changes in existing conditions. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on geology or soil resources as a result of implementing the no action alternative.

Dredge John Redmond Reservoir

The two expected methodologies for dredging the conservation pool are the excavation and hauling of sediments offsite or siphoning of sediments to a location downriver of John Redmond Dam. Depending on the method selected for dredging activities, the dredge John Redmond Reservoir alternative would result in potential effects on geology and soil resources regarding the placement of dredge materials. If the disposal area is offsite, the selected location for the dredge materials would potentially bury geology or soil resources not identified under the "Affected Environment" section of this document; resulting in long-term, adverse effects, the significance of which would be dependent upon the geology or soil resource. The dredge method incorporating siphoning would not result in short- or long-term, insignificant or significant, beneficial or adverse effects on geology or soil resources. Over the long term, the siphon dredge method would be most similar to the natural sediment transportation effects of the Neosho River.

Phased Pool Storage Reallocation

As indicated in the "Affected Environment" section of this document, the JRR site is not in the vicinity of geologic or soil-related hazards, i.e., subsidence, land sliding, erosion, expanding or collapsing soils and bedrock, and seismic activity. Nor are there any mineral resources, unique geologic features, or paleontological resources identified in the vicinity of JRR. The majority of the soils in the vicinity of the Neosho River valley are delineated as potentially unique or prime farmland, and raising the JRR conservation pool would result in flooding approximately 405 acres of such soils (figure 4-1).

However, the conservation pool is currently allowed to remain at the final phased pool storage-reallocation elevation of 1041.0 ft above sea level for a period of at least 3 months annually, thereby compromising the use of these soils as unique or prime farmland already. This was iterated by the USDA-NRCS as well, in their response to the Farmland Protection Policy Act coordination letter submitted for this project (appendix E). In addition, these soils are currently being intermixed with sediments of the Neosho River due to wave action and flooding under the present JRR conditions.

Potentially unique and prime farmland soils are located downriver of JRR in the Neosho River valley. The phased pool storage reallocation alternative would reduce the flood control capacity of John Redmond Dam by 3.18%, resulting in minor increased flooding of these soil resources;

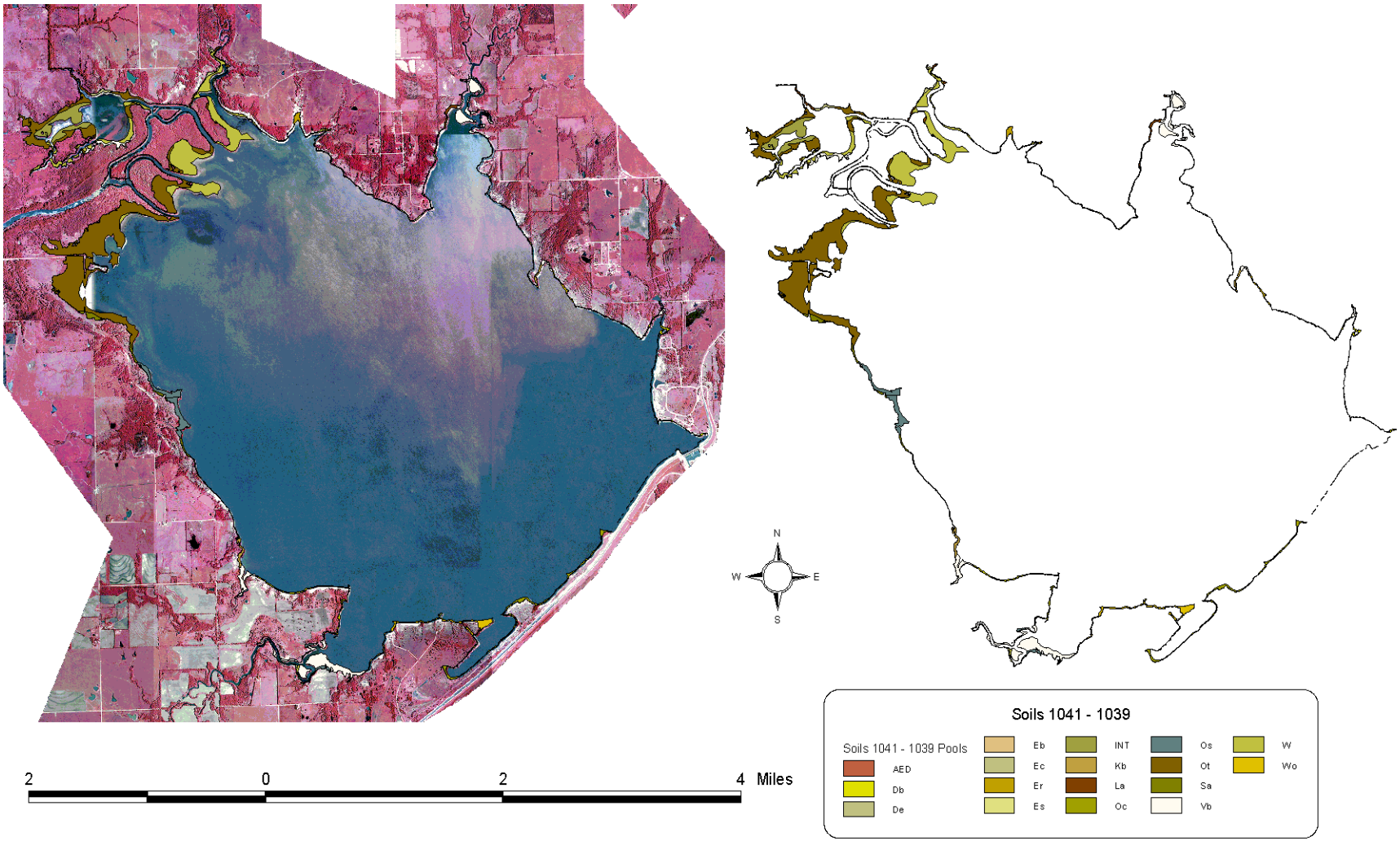


FIGURE 4-1. SOILS AFFECTED BY THE POOL RAISE TO 1041.0 FT

however, effects of the flooding of these soils would be negligible. Based on the nature of the geology and soil resources associated with the JRR site and vicinity, implementation of the phased pool storage reallocation alternative would result in long-term, insignificant, adverse effects, both within the conservation pool and downriver of JRR.

Proposed Action: Storage Reallocation

The proposed action: storage reallocation, would result in the same geology and soil resources environmental impacts as the phased pool storage reallocation alternative; therefore, this action would result in long-term, insignificant, adverse effects both within the conservation pool and downriver of JRR.

4.3 HYDROLOGY AND WATER RESOURCES

Hydrology and water resources for an area consist of the surface and groundwater within a region. Environmental concerns pertaining to hydrology and water resources include the availability, quality, and quantity of surface and groundwater; and control of floodwaters.

Hydrology and water resources issues identified during the scoping meetings and agency coordination included the following comments:

- The need to remove the logjam at the inlet of John Redmond Reservoir.
- Include a seasonal pool management plan in the storage reallocation study.
- The way the USACE operates John Redmond Dam is causing riverbank erosion.
- Detention ponds should be built upriver from John Redmond Reservoir to trap sediments.

No Action Alternative

The potential effect on hydrology and water resources through the implementation of the no action alternative is a decrease in availability of surface water resources for the state of Kansas. Currently, the sediment load in JRR is as predicted; however, sediment has been inequitably distributed between the flood and conservation pools for the life of the JRR project, resulting in a greater decrease in the conservation pool and ultimately, of the water supply storage capability of JRR. The USACE has an agreement with the state of Kansas for water storage for industrial and municipal uses, and as the sediment continues to accumulate in the conservation pool at JRR, the storage capacity is diminishing, thereby reducing the availability of water for the state of Kansas. At the current sedimentation rate, the conservation pool at JRR will be unable to store enough water to meet the requirements of the state of Kansas by the end of the life of the dam. In addition, less available water concentrates suspended sediments, nutrients (species of nitrogen and phosphorus), pesticides, and major metals and trace elements, which may have detrimental effects on reservoir water quality through increased sedimentation, accelerated eutrophication, decreased light penetration, potentially harmful effects to human health and aquatic organisms, and a general decrease in recreational value. This could also adversely affect TMDLs for siltation and eutrophication in JRR. The inability of JRR to store

adequate water volume would result in a long-term, significant, adverse effect on water resources for the state of Kansas.

Dredge John Redmond Reservoir

The dredge John Redmond Reservoir alternative would potentially result in both beneficial and adverse effects on hydrology and water resources for JRR. The beneficial effect would be an increase in storage capacity of the dam, thereby creating a greater availability of surface water resources for the state of Kansas and improved downriver flood control. This alternative would also allow the USACE to meet their water storage requirement as agreed to with the state of Kansas. In addition, by not increasing the conservation pool elevation, the John Redmond Dam would be able to maintain the maximum flood pool volume, minimizing downriver effects of flooding events on the Neosho River. The effects of implementing the dredge John Redmond Reservoir alternative would be considered long term, insignificant, and significant beneficial.

The potential adverse effect of the dredge John Redmond Reservoir alternative is the possibility of causing potential contamination of lake sediments to become waterborne. Due to the use of the reservoir as a waterfowl hunting management area, there is a potential for lake sediments to contain lead from shot, and because JRR lies within an agricultural region, there is the potential that the lake sediments contain residual contamination in the form of pesticides and fertilizers from runoff of agricultural lands. Dredging activities would disturb these sediments, thereby exposing buried or settled contaminants. At certain concentrations, these contaminants could not only present a threat to aquatic biota within JRR, but could also be passed through the spillway and into the lower reaches of the Neosho basin. This is also likely to adversely affect TMDLs for siltation and eutrophication in JRR.

If contaminated, the dredged sediments would result in a negative effect on the selected sediment disposal location as well. The two expected dredge alternatives are the excavation and hauling of sediments out of the conservation pool and the siphoning of lake sediments to a location downriver from JRR. Either dredge alternative would result in the inappropriate placement of potentially contaminated lake sediments. The dredge John Redmond Reservoir alternative would result in long-term, insignificant, and significant, beneficial (storage capacity and flood control), and short-term, adverse (water contamination) effects. The significance of these effects would be dependant upon the contamination level of the sediments.

Phased Pool Storage Reallocation

One of the potential adverse effects on hydrology and water resources through the implementation of the phased pool storage reallocation alternative is a reduction of flood control capabilities of John Redmond Dam. Raising the elevation of the conservation pool to the 1041.0-ft elevation reduces the current storage capacity of the JRR flood-control pool by 3.18%, causing downriver effects of flooding on the Neosho River to increase. However, based on calculations performed by the USACE's SUPER computer program, the effects of downriver flooding as a result of raising the John Redmond Dam conservation pool elevation would be negligible ("Affected Environment" Section 3.3). John Redmond Dam controls the surface water runoff from an approximately 3,015-square mile area. The Grand (Pensacola)

Lake (Lake O' the Cherokees), downriver from John Redmond Dam, controls surface water runoff from an area of approximately 5,973-square miles, of which 2,958-square miles comes from uncontrolled drainage sources. Accordingly, approximately 50.5% of the surface water flowing to Grand (Pensacola) Lake comes through the John Redmond Dam and 49.5% comes from uncontrolled drainage sources. During a precipitation event in the Neosho River drainage basin, and assuming an even distribution of precipitation throughout, the flooding effects at Grand (Pensacola) Lake would receive an additional 1.61% of runoff if the JRR conservation pool was maintained at an elevation of 1041.0 ft. This equates to an additional 0.19-in per ft of floodwater increase in backwater elevation.

Historically, flooding on the Neosho River occurred with flooding of agricultural lands downriver of John Redmond Dam. The resultant downriver floods generally last approximately 6 days before the floodwaters recede to non-flood conditions. Backwater effects from Grand (Pensacola) Lake (downriver from JRR) floods an unknown amount of land during these flood events, some of which are used for agricultural purposes. The public perception is that without maximizing the flood pool capacity of John Redmond Dam, the downriver flooding will continue to be of longer duration and potentially of greater magnitude; however, the increase in downriver flooding would be considered negligible as a significant portion of the floodwater below JRR comes from uncontrolled sources. Therefore, the effects of loss in flood control capacity at John Redmond Dam would be long term, insignificant, and adverse.

Other potential effects of the implementation of the phased pool storage reallocation alternative include effects on surface water quality and quantity, downriver erosion, sedimentation, and dam operations. Based on the current water quality of the inflowing water to JRR compared to the outflow water quality, an increase in conservation pool elevation would likely result in a negligible reduction of outflow sediment load and an insignificant increase in temperature. A decrease in outflow sediment load would potentially increase the erosion capability of the Neosho River below JRR, causing greater channel incision and a reduction of fine sediments within the river channel. However, due to the out-flow sediment load reduction being negligible, the increased erosion capabilities would also be negligible. Effects on other water quality parameters within JRR would require a more intense hydrology study and would likely be found to improve negligibly. Currently, operation of John Redmond Dam involves the reduction in the conservation pool elevation during winter months from the 1039.0-ft to 1037.0-ft elevation to avoid ice damage to dam structures. An increase in conservation pool elevation to the 1041.0-ft elevation would potentially result in damage to these structures; however, mitigation measures would likely address this issue.

A potential beneficial effect on hydrology and water resources through the implementation of the phased pool storage reallocation alternative is an increase in the volume of water being stored at JRR. Increased water depths would dilute concentrations of physical, chemical, and bacteriological parameters and decrease sediment resuspension, which could improve conditions related to the siltation and eutrophication TMDLs for JRR. The USACE has an agreement with the state of Kansas to provide water storage for industrial and municipal uses annually, and as a result of raising the conservation pool, would be capable of meeting this water supply commitment through the life of the project (2014). There would be long-term, insignificant, adverse (flooding, impacts to dam structure, and increased downriver erosion capabilities), long-term, insignificant, beneficial (improved reservoir water quality), and long-

term, significant, beneficial (increased water storage) effects on hydrology or water resources as a result of implementing the phased pool storage reallocation alternative. Effects on the logjam would be negligible, but would likely result in increased sedimentation of the area as a result of elevated backwater effects.

Proposed Action: Storage Reallocation

The proposed action: storage reallocation, would result in the same hydrology and water resources environmental impacts as the phased pool storage reallocation alternative; therefore, this action would result in long-term, insignificant, adverse (flooding, impacts to dam structure, and increased downriver erosion capabilities), insignificant, beneficial (improved reservoir water quality), and significant, beneficial (increased water storage) effects on hydrology or water resources.

4.4 BIOLOGICAL RESOURCES

Biological resources for the JRR area include vegetation resources or land cover types (figure 4-2), i.e., woodlands, shrublands, and grasslands; wetlands resources; wildlife resources; fisheries and aquatic resources; endangered, threatened, and candidate species, species of special concern, and sensitive communities; and wildlife refuges and wildlife management areas. Environmental concerns pertaining to biological resources include the disturbance, alteration, or destruction of wildlife and plant species and their habitat.

Biological resources issues identified during the scoping meetings and agency coordination included the following comments:

- The need to preserve Neosho madtom habitat.
- Determine if the increased conservation pool limit KDWP seasonal pool manipulation plans.
- Raising the conservation pool will adversely impact the KDWP OCWA (1,600 acres) and make it flood more frequently.
- Animals are being forced out of their habitat because of higher water levels (i.e., increasing crop damage and increasing car/deer accidents).

In addition, the USFWS prepared a Fish and Wildlife Coordination Act report to address potential impacts of the proposed conservation pool raise. The Fish and Wildlife Coordination Act report is provided in appendix F. Finally, a BA was prepared to address threatened, endangered, and candidate species listed by the USFWS and the KDWP (appendix D). Updated comments were solicited from and received from the USFWS in order to reconfirm their 2000 comments. The only change was that the bald eagle had been removed from the ESA. As in 2000 and subsequent updates in 2008 and 2012, the USFWS continues to support the Corps' determination that the reallocation action is not likely to adversely affect T&E species over and above current operations at John Redmond. Copies of that correspondence can also be found in Appendix D.

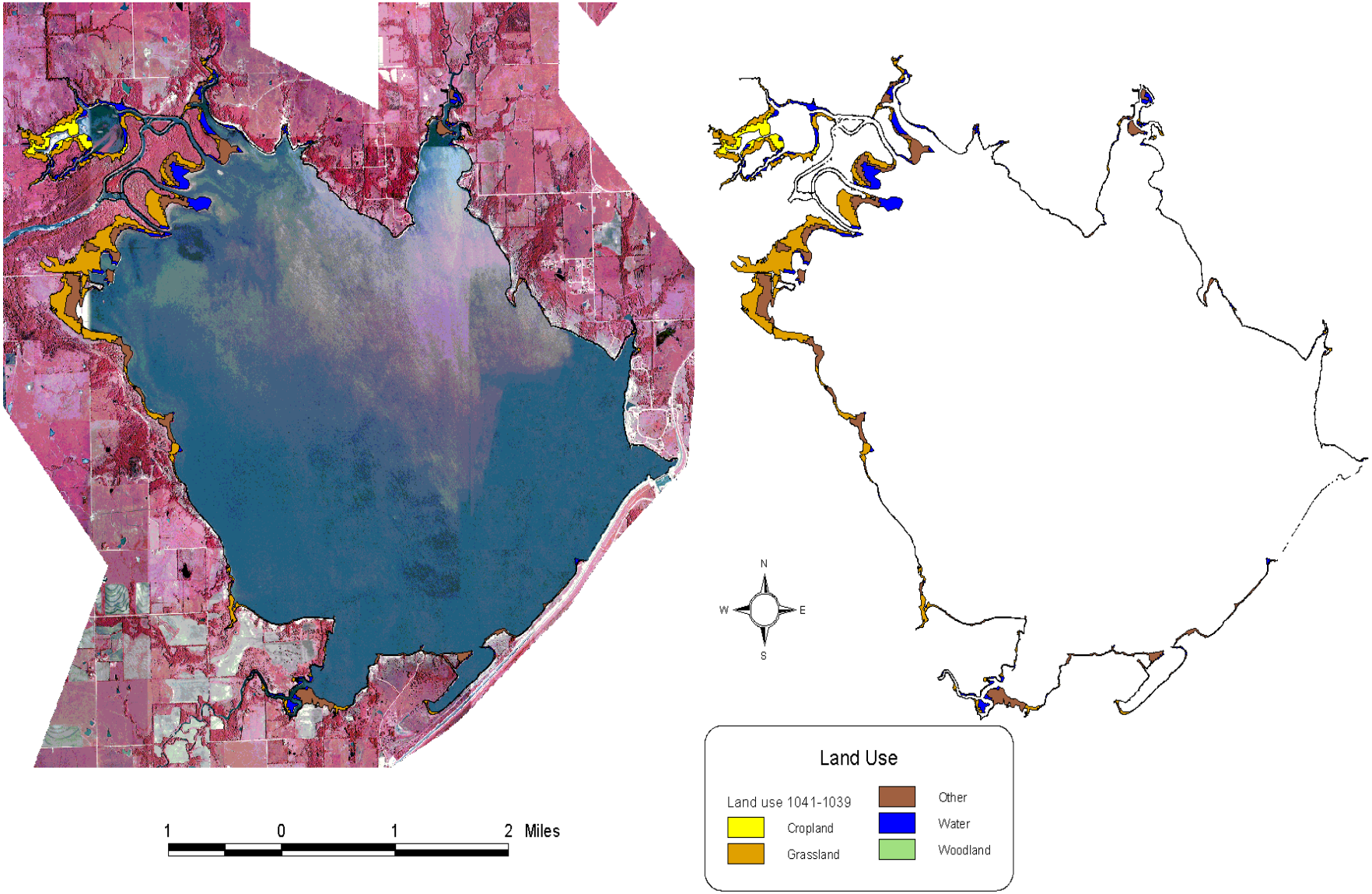


FIGURE 4-2. LAND COVER TYPES AFFECTED BY THE POOL RAISE TO 1041.0 FT

No Action Alternative

Potential effects on biological resources through the implementation of the no action alternative are precluded by the fact that the no action alternative for JRR does not involve any activities that would contribute to changes in existing conditions. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on biological resources as a result of implementing the no action alternative.

Dredge John Redmond Reservoir

Potential effects on biological resources through implementation of the dredge John Redmond Reservoir alternative are both beneficial and adverse. The beneficial effect as a result of this alternative is the increased water storage capacity of JRR, which in turn would result in the availability of improved water quality and quantity for downriver releases during drought conditions in the region of the Neosho River. The ability to release better quality water and for a longer duration would substantially aid in the preservation of the fisheries and aquatic wildlife below John Redmond Dam, particularly the benthic macroinvertebrates. This effect is considered long term, insignificant, and beneficial.

Potential adverse effects for this alternative include the disturbance of the bald eagle population that winters at JRR and other wildlife, redistribution of contaminants, potential for increased exposure risks to wildlife, and increased sediment load of the Neosho River below John Redmond Dam. Depending on the time of year the dredge activities are performed, either anticipated dredge alternative would have the potential to disturb the bald eagle population and other wildlife as a result of the presence and noise of human and heavy equipment activity. In addition, the lake would likely be drained to a significantly lower level to accommodate the excavation and haul dredge method, which would temporarily reduce the fish and waterfowl populations on which the bald eagles feed. Because JRR is not considered critical habitat for the bald eagle, this effect is considered short term, insignificant, and adverse.

An additional adverse effect of this alternative is the potential to expose wildlife to contaminants that have possibly settled in the lake sediments. Possible contamination of JRR sediments include pesticides and fertilizers from agricultural activities and lead shot from hunting activities. Disturbed sediments would release the contamination into the water, which could be adsorbed by vegetation and ingested by aquatic wildlife. Waterfowl are particularly susceptible to the accidental ingestion of lead shot, which can be fatal. Wildlife that feed on the vegetation, waterfowl, and aquatic species may also ingest toxins. This effect is considered short term, insignificant, and adverse.

Dredging, through the siphoning of sediments to a location below JRR, would result in the same contamination-related adverse effects, but would also include adverse effects as a result of increased sediment load and potential contaminants in the Neosho River below John Redmond Dam. The increased sediment load would cover food sources and change riverbed substrate; thereby affecting spawning beds and benthic macroinvertebrate habitat. The Neosho madtom, Neosho mucket mussel, and the rabbitsfoot mussel occupy gravel beds below JRR and prefer gravel bars with minimal silt, and riffles and runs with relatively clear flowing

water. Because this alternative would affect federally threatened and Kansas threatened and endangered species, this effect is considered long term, significant, adverse.

The dredge John Redmond Reservoir alternative would have no short- or long-term, significant or insignificant, adverse or beneficial effects on the following biological resources: vegetation, wetlands, terrestrial wildlife, and wildlife refuges and wildlife management areas.

Phased Pool Storage Reallocation

Vegetation resources would be adversely affected through the implementation of the phased pool storage reallocation alternative, with the greatest effect being to wetlands habitat and woodland types. Approximately 270 acres of wetlands habitat (including moist soil units managed by FHNWR), 40 acres of grassland, 51 acres of cropland, and 195 acres of woodland would be inundated by the increase in the conservation pool elevation to the 1041.0 ft elevation (figure 4-2). Essentially, the wetlands, consisting of emergent and shrub-scrub vegetation, would be flooded and the new vegetation would become predominately aquatic. Because of the importance of wetlands to the ecological system, the net loss of wetlands habitat in excess of 1 acre is regulated by the federal government, specifically by the USACE, and must be mitigated. Therefore, the loss of up to 270 acres of wetlands would be considered a long-term, significant, adverse effect. Implementation of this alternative would also represent an irreversible and irretrievable commitment of resources.

Depending on the depth of water over the inundated grassland and cropland, these vegetation communities would be drowned and likely altered to either wetlands or aquatic vegetation communities. Both the cropland and grassland vegetative communities are common in the vicinity of JRR and their loss would be considered long term, insignificant, and adverse.

The inundation of the floodplain woodland type would result in the drowning of trees and the creation of snags in either wetlands or aquatic vegetation environments. Currently, existing snags would topple at a faster rate (from 1 to 3 years) due to the inundation from increased water depth and wave action. The newly created snags would stand for approximately 5 to 8 years before toppling (based on observations of other USACE reservoirs). The lower shrubs and small trees associated with the woodlands would also be inundated, resulting in additional vegetation loss. The effects on grassland, cropland, and woodland through the implementation of the phased pool storage reallocation alternative would be considered short and long term, insignificant, adverse, with the potential to be long term, significant, beneficial if wetlands are created through the inundation of the cropland, grassland, and woodland. Although there would be a permanent loss of wetlands, grasslands, croplands, and woodlands, these losses would be mitigated, as described in Section 5.4, and it is expected that mitigation would offset all of the losses.

Effects on wildlife resources through the implementation of the phased pool storage reallocation alternative would result from the loss of terrestrial habitat and the increase in aquatic habitat. The loss of terrestrial habitat around the conservation pool of JRR would have a short-term, insignificant, adverse effect on large and small mammal populations; shore, upland game, and passerine bird populations; and reptiles, amphibians, and insects. Essentially, these

wildlife populations would be affected by the decrease in acreage of habitat until new habitat is created, which would take approximately 2 to 5 years to develop and 5 to 10 years to mature. Unless similar wildlife management techniques, such as pool elevation management, are employed after the implementation of the phased pool storage reallocation alternative, the shorebird habitat would be greatly reduced. The increase in aquatic habitat would have a short-term, insignificant, beneficial effect on waterfowl and bald eagles. The newly inundated aquatic environment would be rich in nutrients for approximately 5 to 8 years creating an improved food source for fish and waterfowl.

In addition, the snags generated would provide additional shelter for the waterfowl. The bald eagles would benefit from increased populations of waterfowl and fisheries as a food source. While there would be the toppling of existing snags that the bald eagles use for perches and roosts, there would be additional perching / roosting areas created through the inundation of existing woodlands. There would be no effect on terrestrial wildlife downriver from John Redmond Dam. Impacts on wildlife resulting from the implementation of the phased pool storage reallocation alternative are considered short term, insignificant, adverse, and beneficial. There would be no short- or long-term, significant, or adverse impacts to wildlife as a result of implementing the phased pool storage reallocation alternative.

Effects on fisheries and aquatic resources would occur due to the increase in aquatic habitat generated through the implementation of the phased pool storage reallocation alternative. The new aquatic habitat would be high in nutrients and provide shelter for fish and aquatic wildlife for approximately 5 to 8 years (Jirak, pers. comm., 2001). The effect on aquatic wildlife through implementation of the phased pool storage reallocation alternative would be short term, insignificant, and beneficial. The beneficial effect on fisheries and aquatic resources in the Neosho River below John Redmond Dam, from implementing this alternative, result from the increased water storage capacity of JRR. This, in turn, would result in the availability of improved water quality and quantity for downriver releases during drought conditions in the region of the Neosho River. The ability to release better quality water and for a longer duration would substantially aid in the preservation of the fishery and aquatic wildlife below the John Redmond Dam, particularly the benthic macroinvertebrates. This effect is considered long term, insignificant, and beneficial.

As mentioned in the “Affected Environment,” Section 3-4, of this document, there are several federally and state listed, threatened and endangered species identified in the vicinity of JRR. These species include the bald eagle, peregrine falcon, Neosho madtom, western prairie fringed orchid, Neosho mucket mussel, rabbitsfoot mussel, Ouachita kidneyshell mussel, and flat floater mussel. Of these species, there is only documentation to support that the bald eagle, peregrine falcon, Neosho madtom, Neosho mucket mussel, and rabbitsfoot mussel are located within the affected environment of JRR. The other species have either been extirpated from the area or do not occur there. In addition, the peregrine falcon only passes through the project area during spring and fall migration, but does not nest there (FHNWR 2000). Effects on the bald eagle from the implementation of the phased pool storage reallocation alternative are short term, insignificant, and beneficial, as a result of the increased waterfowl and fisheries food source. Effects on the Neosho madtom, Neosho mucket mussel, and rabbitsfoot mussel are associated mostly with the downriver effects on the Neosho River below JRR, and would

include improved water quality and available quantity for release during drought conditions in the Neosho River valley. The impact on these species as a result of implementing the phased pool storage reallocation alternative would be considered long term, insignificant, and beneficial. Minor backwater effects to the Neosho madtom may occur.

Effects on wildlife refuges and wildlife management areas from implementing the phased pool storage reallocation alternative are described under the vegetation, wildlife, fisheries and aquatic resources, and federally and state listed threatened and endangered species sections above, as they apply to the conservation pool and upriver from JRR. Therefore, the implementation of the phased pool storage reallocation alternative would result in short- and long-term, insignificant, beneficial, and adverse effects and long-term, significant, adverse effects.

Proposed Action: Storage Reallocation

Effects on biological resources through the implementation of the proposed action: storage reallocation alternative, would result in the same impacts as the phased pool storage reallocation alternative. Essentially, this action would result in the inundation of woodland, cropland, grassland, and wetlands, resulting in existing vegetation loss and establishment of new vegetation types, particularly aquatic and palustrine wetlands vegetation. The impacts resulting from the proposed action are considered short- and long-term, insignificant, beneficial, and adverse effects and long-term, significant, adverse effects.

4.5 AIR QUALITY

Air quality for an area pertains to the condition of the ambient air whether the result of natural or human-made causes. Primary concerns regarding air quality are the impacts on ambient air quality conditions (NAAQS); impacts on attainment or non-attainment areas; and compliance with local, state, and federal implementation plans, including air emission permits.

No Action Alternative

Potential effects on air quality that would result from the no action alternative are precluded by the fact that the no action alternative for JRR does not involve any activities that would contribute to changes in existing air emissions. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on air quality as a result of the no action alternative.

Dredge John Redmond Reservoir

Depending on the method employed for dredging activities, the dredge John Redmond Reservoir alternative would result in potential short-term, insignificant, adverse effects on air quality. If the activities utilized to dredge JRR consist of the excavation and removal of sediments by hauling, there is the potential to generate particulate matter during the dredging and hauling activities. This potential is dependent on the timing of the dredging activities and

would result in the greatest effects during periods of low precipitation. Short- or long-term, significant, beneficial or adverse effects on air quality are not anticipated as a result of implementing the dredge John Redmond Reservoir alternative.

Phased Pool Storage Reallocation

Potential effects on air quality through the implementation of the phased pool storage reallocation alternative are precluded by the fact that the phased pool storage reallocation alternative for JRR does not involve any activities that would contribute to changes in existing air emissions. Short- or long-term, insignificant or significant, beneficial or adverse effects on air quality are not anticipated as a result of implementing the phased pool storage reallocation alternative.

Proposed Action: Storage Reallocation

The proposed action: storage reallocation, would result in the same air quality environmental impacts as the phased pool storage reallocation alternative; therefore, this action would result in no short- or long-term, insignificant or significant, beneficial or adverse effects on air quality.

4.6 AESTHETICS

Aesthetics for a location is the product of the appearance of an area to an individual and is highly subjective. Aesthetics are often measured by the visual characteristics of a site or the visibility a location may offer of another site. Potential impacts pertaining to aesthetics include effects of an action on aesthetic character and visual resources within a site or surrounding area. The methodology for determining the significance of an action's impact was based on the identification of sensitive viewsheds, review of site photographs, and evaluation of topographic alterations. Determination of the significance of an action is based on the extent of the alteration to landforms, vegetation, natural appearance, and the project's increased visibility.

No Action Alternative

Potential effects on aesthetics through the implementation of the no action alternative are precluded by the fact that the no action alternative for JRR does not involve any activities that would contribute to changes in existing site conditions. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on aesthetics as a result of implementing the no action alternative.

Dredge John Redmond Reservoir

The two expected methodologies for the dredging effort are the excavation and hauling of sediments offsite or siphoning of sediments to a location downstream of John Redmond Dam. Employment of the first expected dredging methodology would result in potential effects on aesthetics, particularly in the area of excavation and hauling activities and placement of dredge materials. Depending on the selected location for the excavated sediments, there would be a

potential for effects on aesthetic character and visual resources through the changing of the topography in the vicinity of JRR. In addition, excavation and hauling activities would likely result in the temporary drainage of JRR, the creation of temporary haul roads, and the presence of heavy construction equipment and trucks. Dredging of sediments through siphoning could potentially result in the creation of a heavy sediment load in the Neosho River downriver from JRR, and would likely result in the creation of sandbars and changes in the river course. Effects on aesthetics through the implementation of the dredge John Redmond Reservoir alternative would be considered, but the sediment placement location and methodology would need to be reviewed. Short- or long-term, significant, beneficial, or adverse impacts to aesthetics are not expected as a result of implementing the dredge John Redmond Reservoir alternative.

Phased Pool Storage Reallocation

Effects on aesthetic character and visual resources through the implementation of the phased pool storage reallocation alternative would primarily be the result of the alteration to vegetation, particularly regarding inundation of the riparian woodlands near the inlet of JRR. Currently, the trees associated with this habitat are inundated for a period of approximately 3 months annually; however, an increase of the conservation pool elevation to the 1041.0-ft elevation would result in the flooding of 195 acres of this woodland. As a result, inundated woodland stands would drown, leaving snags. These snags would stand for approximately 8 to 10 years before they would topple, thereby minimizing the impact to the aesthetic character of the site. On a lesser scale, the lower shrublands, grasslands, and wetlands along the perimeter of JRR, with particular concentration near the inlet of the Neosho River, would also be inundated resulting in drowned vegetation; however, because this vegetation is less visible, this effect would be less of an impact on the aesthetic character of the site. Impacts resulting from the implementation of the phased pool storage reallocation alternative are considered short term, insignificant, and adverse. Short- or long-term, significant, beneficial or adverse impacts to aesthetics are not expected as a result of implementing the phased pool storage reallocation alternative.

Proposed Action: Storage Reallocation

Effects on aesthetic character and visual resources through the implementation of the proposed action: storage reallocation, would result in the same impacts as the phased pool storage reallocation alternative. Essentially, this action would result in the inundation of woodlands, shrublands, grasslands, and wetlands, resulting in drowned vegetation. These impacts to aesthetics would be minimized in approximately 8 to 10 years when the snags would topple. The impacts resulting from this action are considered short term, insignificant, and adverse. There would be no short- or long-term, significant, or adverse impacts to aesthetics as a result of implementing the proposed action: storage reallocation.

4.7 PRIME OR UNIQUE FARMLAND

No Action Alternative

Potential effects on prime or unique farmland through the implementation of the no action alternative are precluded by the fact that the no action alternative for JRR does not involve any activities that would contribute to changes in existing conditions. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on prime or unique farmland as a result of implementing the no action alternative.

Dredge John Redmond Reservoir

The two expected methodologies for the dredging effort are the excavation and hauling of sediments offsite or siphoning of sediments to a location downriver of John Redmond Dam. Depending on the method selected for the dredging activities, the dredge John Redmond Reservoir alternative would result in potential effects on prime or unique farmland; particularly in the area of the placement of dredge materials. Due to most of the Neosho River valley being classified as prime or unique farmland, the selected location for the dredge materials would likely bury prime or unique farmland. The excavation and hauling of lake sediments would result in a long-term, insignificant, adverse effect because of the abundance of additional prime and unique farmland in the area. The dredge method incorporating siphoning would not result in short- or long-term, insignificant or significant, beneficial or adverse effects on prime or unique farmland.

Phased Pool Storage Reallocation

The majority of the soils in the vicinity of the Neosho River valley are delineated as potentially prime or unique farmland, and raising the JRR conservation pool would result in flooding approximately 405 acres of such soils (figure 4-1). However, currently the conservation pool is allowed to remain at the final phased pool storage reallocation elevation of 1041.0 ft above sea level for a period of at least 3 months annually. Therefore, the use of these soils as prime or unique farmland has already been compromised. This was iterated by the USDA-NRCS as well, in their response to the Farmland Protection Policy Act coordination letter submitted for this project (appendix E). In addition, these soils are currently being intermixed with sediments of the Neosho River due to wave action and flooding under the present JRR conditions. In addition, these soils are currently being intermixed with sediments of the Neosho River due to wave action and flooding under the present JRR conditions.

Potentially prime or unique farmland soils are located downriver of JRR in the Neosho River valley and the phased pool storage reallocation alternative would reduce the flood control capacity of John Redmond Dam by approximately 3.18%, resulting in a negligible increase in flooding of these soil resources. The effects of flooding these soils would be long term, insignificant, and adverse. Based on the nature of the prime or unique farmlands associated with the JRR site and vicinity, implementation of the phased pool storage reallocation alternative would result in long-term, insignificant, and adverse effects downriver.

Proposed Action: Storage Reallocation

The proposed action: storage reallocation, would result in the same prime or unique farmland environmental impacts as the phased pool storage reallocation alternative; therefore, this action would result in long-term, insignificant, adverse effects, both within the conservation pool and downriver.

4.8 SOCIOECONOMIC RESOURCES

Potential socioeconomic impacts of the proposed action and alternatives include effects on economic and demographic conditions, recreation, land use, transportation, and agricultural activities in the Neosho River basin below JRR.

Socioeconomic issues identified during scoping and agency coordination include the following:

- potential damage to crops in the vicinity of JRR (both from the raised reservoir level and from wildlife forced out of FHNWR and OCWA)
- isolation of farmlands near JRR resulting from increased inundation of easement lands
- damage to land and crops within the Neosho River floodplain below JRR associated with increased duration and frequency of flood events
- effects on recreation resources on JRR, FHNWR, and OCWA
- backwater effects on the SH-130 bridge north of JRR
- economic and land-use effects of dredging
- effects on end-users of water sold to the KWO under the no action alternative

4.8.1 Economic and Demographic Conditions

No Action Alternative

Under the no action alternative, the role played by JRR in local economic and demographic conditions would remain unchanged during normal rainfall years. However, during severe drought years, direct effects of the no action alternative would include potential loss of a portion of the water supply for the CNRB and for KG&E's WCGS.

Continued siltation of JRR is expected to reduce the water supply capacity of the conservation pool by 25% at the 50-year design life of the reservoir. CNRB contracts for storage of 10,000 ac-ft in Marion Reservoir, Council Grove Lake, and JRR. JRR stores 3,500 ac-ft of the total. The reduction of 25% of JRR storage capacity at design life would represent a loss of about 9% of the district's total water storage allocation of 10,000 ac-ft (assuming constant supply levels in the other two lakes). The 21 municipalities and industries in the district are directly dependent on water provided from assurance storage during times of low stream flow. In severe drought years, this 9% reduction in water storage could result in loss of water supply for communities, rural users, and industries in CNRB. Depending on the severity and duration of the drought, indirect impacts could include economic distress for commercial and industrial

users, hardship for residential users, and a reduction in the amount of water available for fire suppression and other municipal purposes.

The conservation pool at JRR also stores an annual 9,672 MGY of water supply for use by KG&E in supplementing the cooling lake at its WCGS. This supplemental source of water is necessary because evaporation in most years is greater than inflow in the WCGS cooling lake. The loss of 25% of water storage would reduce the amount available to meet the WCGS water supply contract by a corresponding amount. Although WCGS has not used its full water allotment since filling the cooling lake, it has used as much as 74% (1991). The 25% reduction in water available for cooling purposes at WCGS could reduce KG&E's ability to operate the plant during years when additional water capacity is needed.

Effects of the no action alternative on area economic and demographic conditions would be short or long term, significant, and adverse depending on the severity and duration of a drought.

Dredge John Redmond Reservoir

For this assessment, it is assumed that an amount of sediment equal to 25% of the 34,900 ac-ft of contracted water storage on JRR, or 8,725 ac-ft would be dredged. Cost estimates for the dredge John Redmond Reservoir alternative have not been prepared, but a KWO estimate of dredging costs from small lakes in South Dakota is $5,600 per ac-ft of sediment removed (Lewis, pers. comm., 2001b). Using this estimate, a total cost of about $49 million could be anticipated for mechanical dredging of JRR. Actual costs could vary depending on such factors as economies of scale, dredging methods, location of the disposal area for dredged material, and composition of the sediment. If JRR sediment is found to contain hazardous substances, the cost of disposal could increase.

The dredge John Redmond Reservoir alternative would result in additional economic activity in Coffey and Lyon Counties in terms of direct and indirect employment and income. Direct employment and income would occur if local contractors and/or workers were selected to perform portions of the dredging work. Indirect employment and income would result from local expenditures by dredging contractors and employees for goods and services.

Depending on the location of the sediment disposal site, the dredge John Redmond Reservoir alternative has the potential to affect land use and transportation conditions in Coffey and/or Lyon Counties. Dredging activities could negatively affect recreation activities on JRR, FHNWR, and OCWA by disturbing fish and wildlife and diminishing the quality of the recreation experience. A reduction in recreation visits would have a corresponding negative effect on the local tourism and recreation economy. These short-term impacts would be localized and cease upon completion of dredging activities. In the long term, impacts on recreation activities would be positive, as water depth to bottom of the lake would increase, providing additional boating access.

The effects of this alternative on area economic and population conditions would likely be beneficial, although there could be some minor reduction in recreation-related spending in the county. If local contractors and employees were hired, this alternative would be significantly

beneficial to the area economy in the short term. Overall, the dredge John Redmond Reservoir alternative would result in short-term, significant, beneficial effects on economic and demographic conditions.

Storage Reallocation in a Phased Pool Raise

Raising the conservation pool in JRR in a phased pool raise culminating at 1041.0 ft would more frequently flood some portions of the USACE-managed lands adjacent to JRR, FHNWR, and OCWA. Although this flooding may affect certain land uses and activities on these lands, the phased raise in the conservation pool level would not substantially affect economic and population conditions in Coffey and Lyon Counties. None of the managing agencies would alter operating levels as a result of the phased pool raise alternative, although there may be some replacement of roads and facilities that would be more frequently inundated. Because the affected roads and facilities are routinely inundated at the 1041.0-ft level and above during rainfall impoundment and implementation of the water level management plan, replacement of roads and facilities is anticipated to be relatively minimal. Consequently, the effect of the phased pool storage reallocation alternative on area economic and demographic conditions would be long term, insignificant, and adverse.

Proposed Action: Storage Reallocation

The effects of the proposed action: storage reallocation, on local economic and demographic conditions would be identical to those of the phased pool storage reallocation alternative at the culmination of the pool raise. Therefore, the proposed action: storage reallocation would result in long-term, insignificant, adverse effects on economic and demographic conditions.

4.8.2 Land Use

No Action Alternative

The no action alternative would not affect land-use conditions as described in Section 3.8.2. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on land-use resources as a result of implementing the no action alternative.

Dredge John Redmond Reservoir

Under the dredge John Redmond Reservoir alternative, land use associated with JRR would remain similar to existing conditions with three possible exceptions. A relatively small portion of land would be required for a staging area during dredging operations. Staging operations would displace existing land use for the duration of dredging operations, after which the land would be reclaimed.

Mechanical dredging would require land for disposal of sediment and perhaps construction of a haul road. Neither a disposal site or haul route has been identified. Sediment disposal would displace existing land use for the duration of dredging activities and perhaps permanently, depending on the reclamation plan for the site.

Land use effects of the dredge John Redmond Reservoir alternative would be short term, insignificant, and adverse. However, depending on composition of the sediment, and the selection of a disposal site and haul route, land-use effects could be long term, significant, and adverse. These impacts cannot currently be addressed.

Phased Pool Storage Reallocation Alternative

Based on an assessment of the Kansas Biological Survey GIS database, the phased pool storage reallocation alternative would routinely inundate an additional 556 acres of land surrounding JRR. This would be about 2% of the 29,800 acres of land owned by the USACE when the 1041.0-ft conservation pool level is reached. At the conservation pool level of 1041.0 ft, lands in the following categories would be inundated (Randolph, pers. comm., 2001):

- 51 acres of cropland
- 40 acres of grassland
- 195 acres of woodland
- 166 acres of water (ponds and streams)
- 270 acres of shrub-scrub, palustrine wetlands, and aquatic plant communities

The 405 acres of potentially farmable land was coordinated with the NRCS using a Farmland Conversion Impact Rating Form (A.D. 1006, 1997). The 405 acres is a part of the 556 acres that would be routinely inundated. Coordination with the NRCS is required under the Farmland Protection Policy Act (NRCS 1981). Correspondence for this coordination is presented in appendix E.

Although the phased pool storage reallocation alternative would result in long-term loss of these lands for recreation use, wildlife forage, and habitat, the loss represents only a marginal change over existing conditions. Historically, these lands have been routinely inundated for periods of up to several months during rainfall impoundment and during implementation of the JRR water level management plan. The affected land represents a relatively small amount of the total land area associated with JRR, and given the existing frequency of flooding, these losses would be long term, insignificant, and adverse.

The 51 acres of cropland affected by the phased pool raise alternative are routinely flooded under existing conditions and, therefore, are difficult to lease. Consequently, removal of these lands from crop production would not substantially affect farming income or economic conditions in the two-county area, and would only minimally reduce forage for wildlife.

However, lands adjacent to the 1041.0-ft level, which are less frequently affected by rainfall impoundment and water level management actions, may be more routinely flooded or flooded for slightly longer periods of time. Such events may temporarily affect the use of the land for wildlife forage and habitat and for recreation purposes. It also may result in an increase of the amount of cropland that is difficult to lease because of flooding. The phased pool storage reallocation alternative would also inundate a boat ramp, parking area, and portions of an access road at the Jacob’s Creek area.

Because the elevation of the flood pool would not be raised, land use on private lands adjacent to JRR, FHNWR, and OCWA would not be affected by implementation of the phased pool storage reallocation alternative. However, raising the conservation pool would result in a slight increase in frequency and duration of flooding of a portion of JRR flood easements. It may also slightly increase the frequency and duration of periods when farmers are unable to access lands because easements are flooded. Land-use impacts of the phased pool storage reallocation alternative would be long term, insignificant, and adverse.

Proposed Action: Storage Reallocation

The land-use impacts of the proposed action: storage reallocation, would be identical to the phased pool storage reallocation alternative at the culmination of the pool raise; therefore, the effects would be long term, insignificant, beneficial, and adverse.

4.8.3 Recreation

No Action Alternative

Potential effects on recreation resources associated with the no action alternative would be limited to a continued deterioration of boating conditions, as the depth to bottom in portions of the reservoir would continue to be reduced by siltation. The effect of the no action alternative on recreation resources would be long term, insignificant, adverse.

Dredge John Redmond Reservoir

Impacts on recreation resources and activities would result from noise and activity in the vicinity of the dredge site, staging area, disposal site, and along the haul route. The noise and associated activities may displace wildlife and result in a diminished recreation experience for some users. Some recreation facilities and wildlife habitat could be temporarily displaced by the staging area, haul route, and sediment disposal site. The dredge John Redmond Reservoir alternative would have a short-term, insignificant, adverse effect on recreation resources.

Phased Pool Storage Reallocation Alternative

Recreation resources and activities under the phased pool storage reallocation alternative would be similar to existing conditions with the following relatively minor exceptions:

- Larger numbers of fish may be present for the 5- to 8-year period following the water level raise because of improved habitat among the water-covered vegetation. The increase in fishing opportunities would be primarily limited to catfish, as other sportfish species may be affected by high flows during releases.

- Similarly, increased numbers of waterfowl species should be present on the lake during the fall, responding to improved habitat in the water-covered vegetation. The larger waterfowl population would likely attract more hunters.

- Shorebird watching activities could be adversely affected if the water level management plan does not include a reduction in water level during shorebird migration (July and August).

- The slight potential for more frequent inundation of lands adjacent to JRR could concentrate deer in the outer portions of FHNWR and OCWA, making them more vulnerable to hunters during hunting season and potentially more vulnerable to vehicle collisions at any time. It is also possible that displaced deer could forage on private lands, resulting in economic loss for farmers. Given the relatively small land area that would be flooded by the phased pool storage reallocation alternative, these effects are anticipated to be minimal.

- The 2-ft increase in depth to bottom at the culmination of the pool raise should make the lake somewhat more attractive to boaters.

- A boat ramp, parking lot, two dikes and outlet works, and portions of an access road in FHNWR would be inundated and unavailable for use.

The effects on recreation resources associated with the phased pool storage reallocation alternative would be short term, insignificant, beneficial, and adverse.

Proposed Action: Storage Reallocation

The effects of the proposed action: storage reallocation, on recreation resources would be identical to those of the phased pool storage reallocation alternative at the culmination of the pool raise. Therefore, the proposed action: storage reallocation, would result in short-term, insignificant, adverse effects on recreation resources.

4.8.4 Economic Effects of John Redmond Reservoir

No Action Alternative

Under the no action alternative, the economic effects of JRR would be similar to the descriptions in Section 3.8, with the exception of those associated with water storage and supply. The diminished capacity of the conservation pool would mean that the USACE could not guarantee the fulfillment of its water storage and supply contracts with the KWO. In severe drought years, when full water supply commitments are required, the member communities, rural water districts, and industrial users in the CNRB could experience economic losses from the 9% reduction in committed water supply. KG&E could also experience economic losses associated with the 25% reduction in water to supplement the cooling lake at WCGS. The effects of the no action alternative on JRR would be short or long term, significant, and adverse, depending on the severity and duration of a drought.

Dredge John Redmond Reservoir

The dredge John Redmond Reservoir alternative would increase economic activity in Coffey and Lyon Counties from the expenditures associated with project cost (estimated at $49 million using costs from another project). The amount accruing to the local economy would depend on the number of local contractors and employees hired to perform portions of the project, and on the amount of goods and services contractors and employees obtain from local vendors. These economic benefits could be offset by a reduction in recreation activities related to impacts of dredging activities on wildlife and on the recreation experience. However, in the aggregate, the effects of the dredge John Redmond Reservoir alternative would be short term, significant, and beneficial.

Storage Reallocation in a Phased Pool Raise

Raising the conservation pool by 2 ft would result in a corresponding reduction in the capacity of the flood control pool. However, based on results of the USACE SUPER model, this reduction is estimated at less than 3.18% of total flood pool capacity (see Section 3.3.3). Although this reduction could contribute to slightly more frequent releases of water and releases of slightly longer duration, the USACE anticipates no discernable difference in discharge duration or in exceedance frequency of maximum day discharge between conservation pool elevations at 1039.0, 1040.0, 1040.5, and 1041.0 ft (see Section 3.3). In the case where releases from JRR combine with downstream rainfall and runoff to create flooding, the contribution of the reduction in flood control pool at JRR would be minimal. Consequently, the phased pool storage reallocation alternative would minimally diminish the economic value of flood control in cases when releases at JRR are dictated by the design capacity of the facility. The reduction in flood control capabilities would have a long-term, insignificant, adverse affect on local economic conditions.

The phased pool storage reallocation alternative would allow the USACE to continue to fulfill contractual obligations with the KWO for water storage and supply. Consequently, economic aspects of water storage and supply would remain as described in Section 3.8.4. This effect would be long term, significant, and beneficial.

Because recreation resources, particularly waterfowl and fishing habitat, would be slightly enhanced for 5 to 8 years under the phased pool storage reallocation alternative, the beneficial economic effects of recreation activities would be negligibly increased during this short-term period. Therefore, the economic effects of the phased pool storage reallocation alternative on JRR would be long term, insignificant, adverse and short and long term, significant, beneficial, and adverse.

Proposed Action: Storage Reallocation

The economic effects of the proposed action: storage reallocation, would be identical to those of the phased pool storage reallocation alternative at the culmination of the pool raise. Therefore, the effects would be long term, insignificant, adverse, and short and long term, significant, beneficial, and adverse

4.8.5 Land and Crops within the Floodplain Downriver from JRR

According to the scoping record and subsequent interviews conducted for this assessment, the primary concern raised by residents downriver of JRR is the loss of flood pool capacity, which would result from a raise in the conservation pool level. Specific issues include: a concern for riverbank caving and resultant loss of land, increased duration and frequency of flooding associated with diminished flood pool capacity in JRR, and the resultant damage to crops and pecan orchards. Concern was also raised that any increase in the frequency and duration of flooding would exacerbate riverbank caving and flooding in and near the city of Burlington.

No Action Alternative

The no action alternative would not affect land or crops within the floodplain downriver from JRR because the conservation pool elevation would remain at the 1039.0-ft level. The potential for flooding of lands within the floodplain between JRR and Grand (Pensacola) Lake would be unaffected by the no action alternative. There would be no short or long term, insignificant or significant, beneficial or adverse effects on land or crops within the floodplain downstream from JRR as a result of the no action alternative.

Dredge John Redmond Reservoir

The effects of the dredge John Redmond Reservoir alternative on lands within the floodplain between JRR and Grand (Pensacola) Lake would be negligible. Because the conservation pool elevation would remain at 1039.0 ft, the potential for flooding would be unaffected by this alternative.

Storage Reallocation in a Phased Pool Raise

Raising the conservation pool elevation by 2 ft would result in a loss of less than 3.18% of flood pool capacity. The results of the USACE SUPER model runs used for this assessment indicate that although the amount of downstream discharge from JRR would increase, there would be no discernable difference in discharge duration or in exceedance frequency of maximum daily discharge between conservation pool elevations at 1039.0, 1040.0, 1040.5, and 1041.0 ft (see Section 3.3). Based on the USACE SUPER model findings, the contribution of the 2-ft raise in the conservation pool to flood events would be minimal. Therefore, no significant adverse economic or land-use effects of the phased pool storage reallocation alternative are anticipated to occur in the floodplain downstream of JRR. However, flooding of agricultural lands and pecan orchards will likely continue to occur under the phased pool storage reallocation alternative (or any of the alternatives considered for this assessment).

The effects of the phased pool raise alternative on lands within the Neosho River floodplain would be considered long term, insignificant, and adverse.

Proposed Action: Storage Reallocation

The effects of the proposed action: storage reallocation, on lands in the floodplain between JRR and Grand (Pensacola) Lake would be identical to those of the phased pool storage reallocation alternative at the culmination of the pool raise. Therefore, the effects would be considered long term, insignificant, and adverse.

4.8.6 Transportation

No Action Alternative

The no action alternative would not affect existing area transportation conditions. Consequently, transportation conditions in and adjacent to JRR, FHNWR, and OCWA would remain essentially as they are today under this alternative. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on transportation conditions as a result of the no action alternative.

Dredge John Redmond Reservoir

The effects of the dredge John Redmond Reservoir alternative on area transportation conditions would be dependent on the dredging method and the selection of a sediment disposal site. If a disposal site on JRR, FHNWR, or OCWA lands were selected, roads internal to these facilities would be affected. If a disposal site on private lands were selected, the haul program could also affect county roads and state and federal highways. Affects of the haul program would include accelerated maintenance demands resulting from increased heavy truck traffic, and increased potential for accidents. The effects of this alternative on transportation conditions could occur both within and outside of federal lands, and would be short term, insignificant, and adverse.

Storage Reallocation in a Phased Pool Raise

The elevation of the flood pool would remain unchanged; therefore, the phased pool raise alternative would not affect area highways and county roads, including the bridge on SH-130 north of JRR. Access roads within the affected 2% of federal lands (JRR, FHNWR, and OCWA) would be flooded. Some roads immediately adjacent to the affected lands would be more frequently flooded during rainfall impoundment and implementation of water level management plans These effects would be long term, insignificant, and adverse, with mitigation measures.

Proposed Action: Storage Reallocation

The effects of the proposed action: storage reallocation on area transportation conditions would be identical to those of the phased pool storage reallocation alternative at the culmination of the pool raise. Therefore, the effects would be long term, insignificant, and adverse, with mitigation measures.

4.8.7 Environmental Justice (Executive Order 12898)

Executive Order 12898 (*Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*) was published in the *Federal Register* (59 FR 7629) (1994). Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations (defined as those living below the poverty level).

The potentially affected areas for the proposed action and alternatives include Coffey and Lyon Counties, and counties in the Neosho River drainage below JRR, including Allen, Anderson, Bourbon, Cherokee, Crawford, Labette, Neosho, Wilson, and Woodson.

Table 4-2 displays minority and poverty status for the state of Kansas and potentially affected counties. The percentage of racial minorities in every affected county, except Lyon County, is well below the statewide average for minority populations. In Lyon County, the minority population is concentrated in the city of Emporia. In contrast, the percentage of people living below the poverty level in every affected county is greater than the statewide percentage.

TABLE 4-2. MINORITY AND PERSONS LIVING BELOW POVERTY LEVEL: STATE OF KANSAS AND COUNTIES IN THE NEOSHO RIVER WATERSHED

	Percent Minority (2000)	Percent Below Poverty Level (1995)
State of Kansas	13.9	11.0
Allen County	5.2	15.3
Anderson County	2.6	12.9
Bourbon County	5.9	17.8
Cherokee County	7.7	17.5
Coffey County	3.0	10.3
Crawford County	6.7	16.9
Labette County	10.7	15.3
Lyon County	16.7	13.3
Neosho County	5.1	14.7
Wilson County	3.2	15.0
Woodson County	3.0	15.0

Source: U.S. Bureau of the Census: 2000 Decennial Census and Small Area Income and Poverty Estimates Program, February 1999

The conclusion of this assessment is that none of the alternatives considered would result in significant adverse effects for human populations, with the possible exception of the dredge John Redmond Reservoir alternative. This alternative could have adverse impacts if the sediments were found to contain hazardous components. Consequently, because adverse health or environmental impacts are not anticipated for any human populations under any alternative

(with the possible exception of the dredge John Redmond Reservoir alternative), minority and low-income persons would not be disproportionately affected by the implementation of any of the alternatives contained in the assessment.

4.8.8 Protection of Children (Executive Order 13045)

Executive Order 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*) was signed during 1997. The policy of the executive order states that each federal agency:

1. Shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children.

2. Ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Executive Order 13045 defines environmental health risks and safety risks as "… risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest, such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to."

No health and safety impacts resulting from exposure to environmental contamination or hazardous materials have been identified for the no action alternative, phased pool storage reallocation alternative, or proposed action: storage reallocation. The composition of JRR sediments is insufficiently known; therefore, the dredge John Redmond Reservoir alternative has the potential to expose contamination. Potential disposal sites and haul routes for the sediment have also not been identified. Therefore, it is not currently possible to assess potential effects of this alternative on the health of children.

4.9 CULTURAL RESOURCES

This section addresses potential effects of the proposed action and alternatives on cultural resources located on the shoreline of JRR. For evaluation purposes, the cultural resources under concern are subsumed under the category of "site" as defined by the NRHP: the location of a significant event, a prehistoric or historic occupation or activity, or a building or structure, whether standing, ruined, or vanished, where the location itself possesses historic, cultural, or archaeological value, regardless of the value of any existing structure (NRHP 1997).

Whether significance has been demonstrated or never assessed, the evaluation of impacts on cultural resources was made using NRHP criteria for eligibility (36 CFR 60.4). Eligible sites are those that:

- are associated with events that have made a significant contribution to the broad patterns of our history

- are associated with the lives of persons significant in our past
- embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
- have yielded, or may be likely to yield, information important in prehistory or history

Adverse effects on cultural resources may include, but are not limited to (36 CFR 800.5 (2):

- physical destruction or damage to the property
- alteration of the character of a property
- neglect of a property that causes its deterioration
- transfer, lease, or sale of a property without enforceable conditions to ensure preservation

Effects such as these are weighed against the criteria of eligibility to determine the significance of the impact. Consideration includes reasonably foreseeable short-term and long-term effects (36 CFR 800.5(a)(1)).

The primary concern for cultural resources on the JRR shoreline is ongoing and future erosion caused by flooding and bank caving. The effects of recreational use and vandalism are currently considered to have minimal effect. Agricultural uses are, for the most part, conducted around the reservoir, but away from the shoreline. Such practices are, therefore, considered to have minimal effect on cultural resources.

Of the known prehistoric and historic sites around JRR, none are considered to be eligible for listing on the NRHP. The USACE and the Kansas State Historical Society have determined that no historic properties would be affected. Correspondence regarding this process and this determination may be found in Appendix G location in Volume II.

No Action Alternative

There would be no short- or long-term, significant, beneficial, or adverse effects on cultural resources found along the JRR shoreline.

Dredge John Redmond Reservoir Alternative

There would be no short- or long-term, significant, beneficial, or adverse effects on cultural resources found along the JRR shoreline.

Phased Pool Reallocation Alternative

There would be no short- or long-term, significant, beneficial, or adverse effects on cultural resources found along the JRR shoreline.

Proposed Action: Storage Reallocation

The proposed action: storage reallocation, would result in the same cultural resource environmental impacts as the phased pool storage reallocation alternative. There would be no short- or long-term, significant, beneficial, or adverse effects on cultural resources found along the JRR shoreline.

4.10 HAZARDOUS, TOXIC, OR RADIOLOGICAL WASTES

Environmental concerns pertaining to hazardous, toxic, or radiological wastes consist of impacts to storage and disposal of these materials; spill contingency, waste management, and pollution prevention; asbestos, radon, lead-based paint, PCBs, and radioisotopes; ordinance use and disposal; and storage tanks.

No Action Alternative

Potential effects on hazardous, toxic, or radiological wastes through the implementation of the no action alternative are precluded by the fact that the no action alternative for JRR does not involve any activities that would contribute to changes in existing conditions. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on hazardous, toxic, or radiological wastes as a result of implementing the no action alternative.

Dredge John Redmond Reservoir

Potential effects on hazardous, toxic, or radiological wastes through the implementation of the dredge John Redmond Reservoir alternative would be a result of the disturbance of lake sediments. As a result of the historic use of JRR as a hunting location for waterfowl there is a potential for lead contamination of the lake sediments. In addition, being located within an agricultural region, JRR has the potential of having pesticide and fertilizer contamination of sediments. This potential contamination could be disturbed, thereby creating the ability for the lead to leach out of the lake sediments into the waters of JRR when it is refilled following the dredging activities. Also, waterfowl tend to accumulate lead pellets in their gizzard while foraging, resulting in death. There is also the potential that excavated sediments will contain lead and would affect the site selected for sediment disposal. The effects of implementing the dredge John Redmond Reservoir alternative on hazardous, toxic, or radiological wastes would be short term, insignificant, and adverse.

Phased Pool Storage Reallocation

Potential effects on hazardous, toxic, or radiological wastes through implementation of the phased pool storage reallocation alternative are precluded by the fact that the phased pool storage reallocation alternative for JRR does not involve any activities that would contribute to changes in existing conditions affecting these wastes. There would be no short- or long-term, insignificant or significant, beneficial or adverse effects on hazardous, toxic, or radiological wastes as a result of implementing the phased pool storage reallocation alternative.

Proposed Action: Storage Reallocation

The proposed action: storage reallocation, would result in the same hazardous, toxic, or radiological wastes environmental impacts as the phased pool storage reallocation alternative; therefore, there would be no short- or long-term, insignificant or significant, beneficial or adverse effects on hazardous, toxic, or radiological wastes as a result of implementing the proposed action: storage reallocation.

4.11 CUMULATIVE IMPACTS

Cumulative impacts on environmental resources result from incremental impacts of an action when combined with other reasonably foreseeable future actions. Cumulative impacts can result from individually insignificant, but collectively significant, actions undertaken over the same period of time by individuals or various agencies (federal, state, and local). In accordance with NEPA, consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the near future is required.

Growth and development are expected to continue in the vicinity of JRR; therefore, cumulative adverse impacts on resources would be expected even when added to the beneficial impacts of activities associated with the proposed action or alternatives.

Finally, the KWO is currently evaluating alternatives for funding and implementing dredging John Redmond Reservoir. This potential action would be in addition to the conservation pool raise described in this FSFES. Any cumulative effects resulting from this potential proposed future action would be addressed in additional NEPA documentation.

4.12 COMPARISON OF ALTERNATIVES AND CONCLUSION

Based on the comparison of the proposed action and the alternatives (table 4-2), the environmentally preferred action is the proposed action or the storage reallocation in a phased pool raise alternative. The no action alternative results in the least amount of environmental impacts, but it does not ensure adequate water supply per agreements with the state of Kansas. Dredging of John Redmond Reservoir would primarily result in short- and long-term, insignificant, adverse impacts, depending on the mitigation measures employed. Storage reallocation, whether the proposed action or the alternative, would primarily result in short- and long-term, insignificant, beneficial, and adverse effects and a long-term, significant effect that would require mitigation. Cumulative impacts for the proposed action or alternatives are also presented in table 4-3 and indicate that there are no cumulative impacts as a result of the proposed action or alternatives.

TABLE 4-3. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

Environmental Resource	No Action Alternative	Dredge John Redmond Reservoir Alternative	Phased Pool Storage Reallocation Alternative	Proposed Action: Storage Reallocation
Geology and Soils	No insignificant or significant impacts; no mitigation measures would be required.	Long term, insignificant or significant adverse depending upon mitigation.	Long term insignificant adverse; no mitigation would be required.	Long term insignificant adverse; no mitigation would be required.
Hydrology and Water Resources	Long term significant adverse; mitigation measures would be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Short term insignificant or significant adverse (depending on the level of sediment contamination); mitigation measures may be required.	Long term insignificant and significant beneficial; no mitigation measures would be required. Long term insignificant adverse; replacement measures have been completed.	Long term insignificant and significant beneficial; no mitigation measures would be required. Long term insignificant adverse; replacement measures have been completed.
Biological Resources	No insignificant or significant impacts; no mitigation measures would be required.	Long term insignificant beneficial; no mitigation measures would be required. Short term insignificant and long term significant adverse; mitigation measures would be required.	Short and long term insignificant beneficial and adverse, and long term significant beneficial and adverse; mitigation measures would be required and have been completed.	Short and long term insignificant beneficial and adverse, and long term significant beneficial and adverse; mitigation measures would be required and have been completed.
Air Quality	No insignificant or significant impacts; no mitigation measures would be required.	Short term insignificant adverse impacts; mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.
Aesthetics	No insignificant or significant impacts; no mitigation measures would be required.	Short and long term insignificant adverse; mitigation measures may be required.	Short term insignificant adverse; no mitigation measures would be required.	Short term insignificant adverse; no mitigation measures would be required.
Prime or Unique Farmland	No insignificant or significant impacts; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.

TABLE 4-3. SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS

Environmental Resource	No Action Alternative	Dredge John Redmond Reservoir Alternative	Phased Pool Storage Reallocation Alternative	Proposed Action: Storage Reallocation
Socioeconomic Resources	Long term insignificant adverse; no mitigation measures would be required. Short and long term significant adverse; mitigation measures would be required.	Short term significant beneficial and short term insignificant adverse; no mitigation measures would be required.	Short and long term insignificant beneficial and adverse; no mitigation measures would be required. Short and long term significant beneficial and adverse; mitigation measures would be required and have been completed.	Short and long term insignificant beneficial and adverse; no mitigation measures would be required. Short and long term significant beneficial and adverse; mitigation measures would be required and have been completed.
Cultural Resources	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.	Long term insignificant adverse; no mitigation measures would be required.
Hazardous, Toxic, or Radiological Wastes	No insignificant or significant impacts; no mitigation measures would be required.	Short term insignificant adverse; mitigation measures may be required (depending on the level of sediment contamination).	No insignificant or significant impacts; no mitigation measures would be required.	No insignificant or significant impacts; no mitigation measures would be required.
Cumulative Impacts	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.	No insignificant or significant cumulative impacts; no mitigation measures would be required.

5.0 MITIGATION REQUIREMENTS

5.1 INTRODUCTION

The John Redmond, Marion, and Council Grove Dams were constructed in the upper Neosho basin as mitigation for uncontrolled flooding along the Cottonwood and Neosho Rivers (USACE 1976). The Neosho basin covers approximately 6,300-square miles, with 3,015-square miles draining through the reservoir system, while 3,285-square miles are uncontrolled in Kansas and Oklahoma below John Redmond Dam (KWO 2001). The dam structures were introduced to decrease the intensity of flood peak flows and provide a more controlled and less damaging release of floodwaters downriver. All three dams were constructed following the heaviest flooding of the Neosho River on record, which occurred during 1951 (Juracek et al. 2001).

In the SFES, mitigation refers to actions that allow project-related impacts, identified in Section 4.0, to be minimized or in some cases nullified. Mitigation is typically developed after all impacts have been identified; however, some mitigation measures may be identified earlier in the NEPA process. Mitigation measures must be feasible in order to receive consideration during the impact analysis process. Under Section 1508.20 of NEPA (1969), the description of mitigation includes:

- avoiding the impact altogether by not taking a certain action or parts of an action
- minimizing impacts by limiting the degree of magnitude of the action and its implementation
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- compensating for the impact by replacing or providing substitute resources or environments

Certain assumptions were considered relative to normal dam and reservoir operation by the USACE for flood control and other purposes before mitigation measures were developed. These assumptions included:

- The Neosho basin covers and drains approximately 6,300-square miles, approximately 3,015-square miles drains through John Redmond Dam and Reservoir, and approximately 3,285-square miles drain uncontrolled below John Redmond Dam.

- During flood events, the reservoir would fill above the proposed 1041.0-ft elevation of the proposed raise and phased raise alternatives, and also above the 1039.0-ft elevation of the dredging and no action alternatives. The higher level could be as much as 1068.0 ft in elevation. A higher water level elevation would be held for an undetermined amount of time per each event and releases downriver would be made as determined under the Water Control Manual procedures (USACE 1996) and to reduce riverbank

erosion downriver from John Redmond Dam. Several high water events are likely to occur during the course of a calendar year.

- During drought events, water would be released from the reservoir to accommodate water quality flows for municipalities and calls on contracted water storage downriver.

- A water level management plan would be reviewed and prepared annually, on an agreed upon time frame, to address USACE, USFWS, KWO, KDWP, and other agency needs at the JRR site. This plan would address wildlife habitat needs, particularly during peak waterfowl and shorebird migration, and safety needs for the dam structure such as ice build-up and damage during winter months.

- Sediments would continue to deposit in the reservoir in approximately the same locations as currently, and would continue to reduce the storage capacity and flood control volume of JRR through the design life of the project (CY 2014).

- Debris and sediments would continue to deposit in the flood control pool upriver of the conservation pool in the area known as the logjam.

The following sections present each resource area for which impacts were assessed.

5.2 GEOLOGY AND SOILS

Geology and soil resources in the project area would not receive additional impacts under the no action alternative.

Dredge John Redmond Reservoir

Geology and soils resources would be buried under a spoil pile of dredged material at the disposal site under the excavation and hauling scenario. Further, the soils may be classified as prime or unique farmland and are discussed under Section 5.7. Specific mitigation measures to be considered for the dredging alternative are:

- Survey potential disposal sites for important geologic and soils features and avoid using sites of high geologic and soils values.

Phased Pool Storage Reallocation and Proposed Action: Storage Reallocation

Geology and soils resources in the pool raise area would be inundated. Downriver soils may experience minor levels of increased flooding. Mitigation to reduce soil erosion downriver by decreasing releases as slowly as possible to slow the rate of fall in the river stage is currently in place (USACE 1996). No additional mitigation is proposed.

5.3 HYDROLOGY AND WATER RESOURCES

Hydrology and water resources would receive impacts related to all of the alternatives under consideration.

No Action Alternative

A decrease in water supply capacity due to sedimentation would result under the no action alternative. Under present conditions, this loss could not be mitigated, and adequate water would not be available during drought years. The SFES evaluates three alternatives to mitigate this loss of water supply capacity under contract with the state of Kansas.

Dredge John Redmond Reservoir

Water storage sufficient to meet the needs of the state of Kansas would result from either method described for this alternative. Dredging sediments from JRR could disturb contaminants that become waterborne, causing wildlife exposure onsite and/or release downriver, causing exposure to water users and wildlife in the Neosho River below the dam. Sediment disposal sites may require selection based on siting studies because of the contaminant levels. Contaminated sediments are likely to contain lead from fishing weights and spent shot used historically for waterfowl hunting, agricultural pesticides and fertilizers washed from farm fields in the drainage basin, and municipal and industrial contaminants. Potential mitigation measures for this alternative could include the following:

- Conduct sediment sampling to determine the chemical composition and nature of any contaminants present.
- Determine proper timing for any release of sediment downriver.
- Separate the work area from active reservoir storage to the extent possible.
- Dewater sediments to the extent possible prior to hauling.
- Develop a dredging and disposal plan relative to the type and level of contaminants identified.
- Determine the interaction of contaminants in the water column, the concentration, and the adequacy of downriver water treatment facilities to treat the water for domestic use.

Phased Pool Storage Reallocation and Proposed Action: Storage Reallocation

Water storage sufficient to meet the needs of the state of Kansas would result from this alternative. The mitigation discussion for hydrology and water resources for both of the pool raise alternatives would be the same and is presented here. The 3.18% reduction in flood control capacity at John Redmond Dam would result in long-term, adverse downriver hydrologic effects that are currently mitigated to the extent possible by flood flow storage and control at the dam, using the procedures presented in the Water Control Manual (USACE 1996). Because of the mitigation for flood flows currently in place, the adverse impact downriver is considered insignificant. Water quality effects associated with a water raise are not considered significant and mitigation is not recommended. The physical effect of ice formation against the dam structure could require mitigation, as follows:

- Lower the water level during the winter months to avoid ice formation and the resultant damage to structures, to the extent possible.

Raising the reservoir pool will require a modification and upgrade to the dam's bulkhead. Effects on the logjam are considered negligible; however, the site should be monitored. Mitigation as a result of either pool raise alternative is not recommended.

5.4 BIOLOGICAL RESOURCES

The site vegetation, wetlands, wildlife, fisheries, rare species, and management areas are currently affected because of flood storage events and water level management for wildlife resources at JRR. No significant impacts to the biological resources would occur nor would mitigation be required for the no action alternative. Biological resources would receive project-related impacts from the dredge John Redmond Reservoir, phased pool storage reallocation, and proposed action: storage reallocation alternatives.

Dredge John Redmond Reservoir

Dredging sediments would result in additional water storage for the state of Kansas, which would result in improved water quality and quantity downriver, over the long term. This would benefit the downriver fishery and particularly the Neosho madtom, rabbitsfoot mussel, and Neosho mucket mussel, species of concern that occupy gravel bar habitats. In addition, dredging would avoid drowning shoreline vegetation, particularly woodland and wetlands habitats. The dredging alternative would hold the lake elevation at 1039.0 ft, which would have a negative effect on shorebird habitat. The unvegetated shoreline that currently exists between the 1039.0 ft and 1041.0 ft elevation would become vegetated with predominantly shrubs and trees, eliminating the open sand beaches and mudflats. This alternative eliminates backwater effects on two moist soil units managed by the FHNWR. A beneficial impact also occurs when the new shoreline vegetation is flooded to support waterfowl and fisheries habitat under the existing water level management plan.

Potential adverse impacts for the dredge alternative include temporary impacts to overwintering bald eagles and waterfowl, increased sediment load in the Neosho River below John Redmond Dam, and potential wildlife exposure to contaminates. Specific mitigation measures to be considered for the dredging alternative are:

- Avoid existing vegetation to the extent possible during dredging, hauling, and disposal operations, and revegetate disturbed sites with appropriate native vegetation following dredging activities.
- Survey disposal sites for rare species of plants and wildlife.
- Avoid existing wetlands during dredging, hauling, and disposal operations.
- Time sediment dredging and haul activities to avoid early morning and late afternoon periods for sensitive wildlife species.
- Do not discharge sediments downriver during low flow periods.

Phased Pool Storage Reallocation and Proposed Action: Storage Reallocation

The mitigation discussion for biological resources for both of the pool raise alternatives would be the same and is presented here. Raising the water level of the conservation pool would result in additional water storage for the state of Kansas, which would result in better water quantity and quality downriver, over the long term. This would benefit the downriver fishery and particularly the Neosho madtom, rabbitsfoot mussel, and Neosho mucket mussel, species of concern that occupy gravel bar habitats. Shoreline vegetation would be inundated, including wetlands habitat totaling approximately 270 acres, and backwater effects on the moist soil units managed by the FHNWR. The newly flooded shoreline vegetation would enhance both the fishery and waterfowl habitats of JRR for approximately 5 to 8 years.

Potential impacts for the conservation pool raise alternatives include beneficial temporary impacts to overwintering bald eagles because of an increase of waterfowl and fish for forage. A loss of shorebird habitat would occur if the pool elevation is held during the summer migration. Specific mitigation measures to be considered for the pool raise alternatives are:

- Allow newly inundated grassland and agricultural land to re-vegetate to aquatic, wetlands, and shoreline riparian communities, replacing and slightly increasing the amount of such habitat present.
- Reintroduce woodland species to abandoned agricultural land.
- Manage former moist soil units to support aquatic or semi-aquatic wetlands types.
- Establish a water level management plan, when possible, to expose shorebird habitat during the summer migration, and provide fishery habitat by allowing annual vegetation growth.
- Control non-native plant populations and species using an integrated approach of manual control, mowing, prescribed burning, and chemical applications, where appropriate.

Mitigation recommendations have been prepared by the USFWS (2001) and have been reviewed and discussed with the USACE. The six recommendations prepared by the USFWS as part of the Fish and Wildlife Coordination Act report (appendix F) included:

1. The Strawn boat launching ramp and parking area be replaced / relocated above elevation 1041.0-ft NGVD, but within the same general area to accommodate angler and hunter access as a cost of the project.
2. The USACE replace the Strawn Flats and Goose Bend #4 dikes, outlet works, and pumping facilities (see figure 3-12) at a site to be determined by the USFWS, but within FHNWR, as a cost of the project.
3. The USACE initiate an environmental management plan in the Neosho basin, integrating reservoir operations and management with conservation of and management of all natural resources within the basin, with particular emphasis on providing protection and enhancement for species of concern.
4. An annual water level management plan be jointly developed by all agencies involved, and implemented.

5. Provisions be made for post-development impact evaluations (follow-up studies) for potential wetlands development immediately above elevation 1041.0-ft NGVD.
6. Additional land be acquired (does not mean purchase as the only option) for the project and be made available to the USFWS or the KDWP for wildlife management under terms of the existing cooperative agreement or license.

The USACE provided an analysis of the Fish and Wildlife Coordination Act Report (appendix F) in order to address the recommendations made. The USACE responded to the recommendations as follows (responses listed in the order the recommendations were presented above):

1. The existing Strawn Flats boat ramp and parking lot on the FHNWR would be inundated by the proposed pool raise. Replacement of the facilities to a suitable area nearby can be accomplished south of the existing location in the Fitch Hill area. The new location is above 1041 NGVD and was identified by the USFWS as the best location for replacement after a site visit by interested parties on 1 February 2008. Garner Road, which currently provides access to the area, is a county-owned and maintained public roadway, thereby rendering this location most feasible.

   Current primary users of the Strawn Flats Boat Ramp (which would be inundated by the pool raise) are fishermen and waterfowl hunters. The USFWS estimates that around 1,000 boating visits to the lake are made via this ramp facility. There is one other ramp located on the south side of the lake that may be used as an alternate launch facility. However, access to Strawn Flats from this alternate ramp involves a 3- to 4-mile trip across the lake, often under treacherous wind and wave conditions. Replacement of this ramp facility is therefore imperative to continued access and use of lake resources in this area.

   The originally estimated replacement cost of the boat ramp and parking lot was $125,000; however, the USFWS completed the work with in-house labor and materials for an actual cost of $10,722.00, which was paid in full by the KWO in November 2012.

3. The existing Strawn Flats and Goose Bend #4 dikes, outlet works and pumping facilities (see figure 3-12) would be inundated and subject to damaging increased wave action/erosion. The USFWS proposes to raise the existing dikes and pump site two feet to maintain operability of the facility. Therefore, this measure could be accomplished with modification to existing facilities and relocation and complete reconstruction would not be required. These dikes, outlet works, and pumping facilities are critical to refuge operations for wildlife and habitat management. They therefore require modification to ensure their continued operation and protection when the proposed pool rise is complete.

   The originally estimated replacement cost of the Strawn Flats and Goose Bend #4 Dikes, Outlet Works, and Pumping Facilities was $46,500; however, the USFWS completed the work with in-house labor and materials for an actual cost of $41,520.00,

of which $30,000.00 was the financial responsibility of the KWO and paid in full in November 2012.

The pool rise would inundate 243 acres of wetland/moist soil management units and 166 acres of riparian woodlands as described in the SFES. The 243 acres of wetlands would be replaced one-for-one at various locations within the refuge (Map 3) which can generally be described as the Hartford Units. Replacement of wetlands will maintain the current level of habitat for waterfowl, shorebirds, and other water birds, and will complement existing wetlands surrounding the Hartford area. These units are critical for the benefit of migrating waterfowl, and for the mission supporting establishment of the turkey and deer hunting. These units within the refuge improve water quality from the Neosho River by filtering out sediments before water is released from the refuge back to John Redmond Lake. Replacement locations are abandoned agricultural fields in low lying areas on FHNWR. The low areas would be excavated out at a 9:1 slope and designed to be flooded during high water periods. Replacement of wetland units are critical to continued operation of the FHNWR and its mission.

The USFWS proposes to replace the 166 acres of lost riparian woodlands along existing riparian borders at various locations on the refuge. Riparian woodlands provide important habitat for a variety of fish and wildlife species and have positive benefits to receiving water quality. Their replacement is therefore critical to refuge management. Three hundred bur oak and pecan tree seedlings would be planted and treated with herbicide. The total estimated cost for both wetland and riparian woodland replacement is $600,000.

The originally estimated replacement cost to replace the wetlands was $245,356 and to replace the woodlands $53,400, for a total cost of $298,756.00. However, the USFWS completed the work with in-house labor and materials for an actual cost for wetland replacement of $119,088.00 and replacement of riparian woodlands of $34,982.00. These costs were paid to the USFWS by the KWO from 2009 to 2012, with the final payment received by the USFWS in November 2012.

3. The USACE partially concurred with initiating an environmental management plan in the Neosho basin, stating that such an initiative should be coordinated at the state level due to the many potentially interested parties (state and federal agencies, local interest groups, private landowners, etc.) being involved in such an action.

4. The USACE concurred with the USFWS stating that consideration would be given to developing a water level manipulation plan compatible with the new conservation pool and its operations; however, the KWO and KDWP would need to draft such a plan.

5. The USACE concurred with the USFWS stating that a GIS database has been developed that could be used to assess changes in wetlands development. A reservoir water quality model (CE-QUAL) was developed by the Tulsa District; Kansas State University, in cooperation with the KWO, initiated development of the Soil and Water

Assessment Tool (SWAT). Outputs from the SWAT model can be input into the CE-QUAL model to measure the effect of changes in the Neosho basin on the reservoir.

6. The USACE did not concur with acquiring additional land to be made available to the USFWS or the KDWP for wildlife management. The USACE recognizes that this recommendation was to replace the loss of wetlands and riparian woodlands. Therefore, the USACE negotiated with the agencies that 243 acres of wetlands / moist soil units, and 166 acres of riparian woodlands, will be replaced on the FHNWR at suitable areas jointly determined by the USFWS, USACE, and KDWP. As previously noted, the KWO has fully funded the replacement requirements at the wildlife refuge.

An additional replacement measure was the need to upgrade the bulkhead at the dam. The existing bulkhead was designed for use to the 1039.0 elevation. The bulkhead was reconstructed beginning in 2010 to accommodate the potential pool raise to the 1041.0 elevation to allow safe operation of the dam. The bulkhead improvements were funded under the American Reinvestment and Recovery Act.

5.5 AIR QUALITY

Air quality would not receive further impacts under the no action alternative, phased pool storage reallocation, or proposed action: storage reallocation alternatives. Because the JRR area is in attainment for all criteria pollutants, mitigation is not required.

Dredge John Redmond Reservoir

Under the dredging alternative, mitigation measures to abate PM_{10} emissions (dust) would be required, particularly on haul roads, areas of excavation, and sediment disposal sites, and during periods of low precipitation. Airborne pollutants would also be generated from the exhaust of heavy dredging, excavating, hauling, and earth-moving equipment and vehicles driven to the site by workers. Potential mitigation measures that could be implemented include the following:

- Apply water as necessary to provide dust abatement from all actively disturbed sites, for all unpaved roads, parking lots, and staging areas, and sediment disposal area.
- Use electricity from powerlines / poles rather than temporary diesel or gasoline-powered generators.
- Reduce truck speeds to15 mph or less on all unpaved roads.
- Cover all trucks hauling dry sediments, silt, sand, or other loose materials and maintain at least 2 ft of freeboard.
- Revegetate temporary haul roads and sediment disposal sites with appropriate native vegetation to abate dust following the dredging project.
- Encourage ride-sharing or other forms of shared transportation to reduce worker vehicle emissions to the site.
- Continue monitoring airborne radionuclide concentrations at the WCGS and vicinity per KDHE sampling and emergency response protocols.

5.6 AESTHETICS

Aesthetics as a resource would not receive further impacts under the no action alternative and mitigation would not be required.

Dredge John Redmond Reservoir

Dredging would result in the short-term presence of dredge, excavation, hauling and spreading equipment, private vehicles, and construction workers. This equipment and activity would be visible in the conservation pool from the John Redmond Dam road, the reservoir shoreline, a few other access points at sufficient elevation above the intervening trees (observation tower south of Ottumwa, etc.), and at the disposal site. During the late fall and winter the visual effect would be greater because of leaf drop from the deciduous trees growing along the drainages and the reservoir shoreline.

Some visitor experiences during this time frame would be negatively affected, particularly those seeking to observe different species of wildlife. White-tailed deer, upland gamebird, turkey, and waterfowl hunters would also experience a diminished visual perception of open space. Shorebirds could avoid the area during the summer migration. Dust generated from dredging and hauling activities could become noticeable to visitors and local citizens and would require abatement per the air quality sections of this report. Similar visual effects would result at any site selected for sediment disposal, storage, or application. Specific mitigations to be considered for the dredging alternative are:

- Time dredging activities to avoid the peak site visitation by sensitive user groups, shorebirds, and waterfowl, including consideration of high quality viewing and hunting hours, e.g., early morning and late afternoon, to the extent possible.
- Provide dust abatement as necessary, per the air quality section of the SFES.
- Stage, maintain, and service equipment on an upland site outside of lake viewscape.
- Contour dredged spoil piles to reflect local topography.
- Revegetate disturbed temporary haul roads and disposal areas using native vegetation to restore the viewscape.

Phased Pool Storage Reallocation and Proposed Action: Storage Reallocation

Little change to the existing viewscape would result with the slightly larger body of water stored behind the dam for both of these alternatives. However, the pool raise would result in a larger number of trees inundated and persisting as snags for the 8 to 10 years before they topple due to wave action. Shoreline vegetation and aquatic wetlands that become inundated would reestablish at higher elevations along the shoreline within the first two growing seasons. No mitigation measures are proposed to influence the site aesthetic values.

5.7 PRIME OR UNIQUE FARMLAND

Prime or unique farmland would not receive further impacts under the no action alternative or either reallocation alternative (including the proposed action), and mitigation would not be proposed.

Dredge John Redmond Reservoir

Dredging sediments may result in long-term loss of prime or unique farmland, dependent on the method used and the location of the sediment disposal site and the size required per the volume of sediment. Specific mitigations to be considered for the dredging alternative are:

- Dispose sediments on land that does not fit the criteria for prime or unique farmland.

5.8 SOCIOECONOMIC RESOURCES

Socioeconomic resources may receive impacts relative to each alternative, as described below. Social and economic effects related to precipitation events and present managed flows from John Redmond Dam and uncontrolled flows below the dam would continue into the foreseeable future. No beneficial or adverse effects would occur regarding environmental justice or protection of children for any of the alternatives assessed.

No Action Alternative

The principal socioeconomic impact under this alternative would be the inability of the USACE to fulfill contractual obligations to the KWO for water storage and supply. Under present conditions, this loss could not be mitigated, and adequate water would not be available during drought years. The SFES evaluates three alternatives to mitigate this loss of water supply capacity under contract with the state of Kansas.

Dredge John Redmond Reservoir

Dredging sediments would result in additional water storage for the state of Kansas and increased economic activity in the vicinity, beneficial impacts requiring no mitigation. The principle adverse impacts of this alternative include transportation and land-use effects associated with the staging area, haul road, and sediment disposal site. Affects to recreation activities such as hunting could also occur under the dredge alternative. Specific mitigation measures to be considered for the dredge alternative are:

- Implement standard transportation and waste disposal operating procedures, including road safety and control of dust, noise, and vehicle emissions.
- Limit hours and locations of operations during key recreation periods such as hunting season.

Phased Pool Storage Reallocation Alternative and Proposed Action: Storage Reallocation

The mitigation discussion for social and economic resources for both of the pool raise alternatives would be the same and is presented here. Elevating the water level of the conservation pool would flood a boat ramp, parking area, and portions of an access road on the FHNWR. In addition, the perception that raising the conservation pool elevation would result in increased frequency and duration of flooding of land and agricultural activities in the Neosho River floodplain downriver from JRR would occur. Specific mitigation measures to be considered for the two water raise alternatives are:

- Replace or restore flooded facilities.
- Monitor crops adjacent to JRR for any wildlife damage from water raise.
- Create an informational program to inform downriver agricultural interests when large releases are planned at JRR.
- Inform downriver parties and organizations how to receive informational program data.
- Conduct sessions at downriver locations to educate individuals and organizations concerning the USACE SUPER model and its predictive values relative to minimal downriver effects of a 2-ft conservation pool raise.
- Support KDOT planning for SH 130 bridge replacement in approximately 5 years.

5.9 CULTURAL RESOURCES

In compliance with Section 106 of the National Historic Preservation Act and regulations issued by the Advisory Council on Historic Preservation (36 CFR Part 800), federal agencies are required to consult with the Kansas State Historic Preservation Office and the Advisory Council in the event that an undertaking may have an impact on historic or prehistoric sites. As discussed in Section 3.9 of the SFES, a Phase III investigation of the John Redmond shoreline sites was conducted in 2001. Pursuant to this work, these sites were determined not eligible for listing on the NRHP. See attached correspondence in appendix G. Therefore, the determination of effect for the storage reallocation is “no historic properties affected” and Section 106 compliance is completed. Mitigation measures are not required for these sites.

5.10 HAZARDOUS, TOXIC, OR RADIOLOGICAL WASTES

No significant impacts from hazardous, toxic, or radiological wastes would occur, nor would mitigation be proposed for the no action alternative, phased pool storage reallocation, or proposed action. Monitoring of the WCGS and environs for radiological contamination would continue under the authority of the KDHE for sample methodology, laboratory analysis, and response.

Dredge John Redmond Reservoir

Potentially hazardous materials such as petroleum products, coolants, and heavy metals could be introduced by heavy equipment used in the dredging, hauling, and disposal of sediments. Further, dredging activities may release hazardous or toxic materials such as lead and pesticides from sediments resulting in exposures to wildlife and humans. If sufficient quantities of hazardous or toxic materials are present, the dredged sediments may require special storage or treatment prior to hauling and disposal. Specific mitigations to be considered for the dredging alternative are:

- Store all fuel and lubricants out of the floodplain and service vehicles and equipment at a dedicated storage site.
- Prepare an adequate plan of operations, including a spill control plan and a hazardous waste management plan, that outlines disposal procedures under the regulations of 40 CFR, CERCLA 1980 (42 USC 6901), or RCRA (42 USC 6901), as appropriate.
- Sample sediments to determine if disposal is an acceptable outcome of removal. Store sediments containing hazardous materials properly for the identified parameter.
- Ensure personal protection equipment and site safety is adequate for any identified site hazards to dredge and haul personnel and to visitors.

6.0 APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS

Laws and regulations in place and addressed in this SFES are presented in table 6-1.

TABLE 6-1. APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS		
Environmental Law or Regulation	**Description**	**In Compliance?**
National Environmental Policy Act of 1969	Requires the disclosure of the environmental impacts of any major federal action significantly affecting the quality of the human environment.	Yes
AGRICULTURE		
Farmland Protection Policy Act of 1981	Minimizes the extent to which federal programs contribute to the unnecessary conversion of farmland to non-agricultural uses.	Yes
AIR QUALITY		
Clean Air Act (1970), as amended	Provides the principal framework for national, state, and local efforts to protect air quality.	Yes
BIOLOGICAL RESOURCES		
Clean Water Act of 1977	Requires consultation with the USACE for major wetland modifications under Section 404.	Yes
Endangered Species Act of 1973	Requires federal agencies that fund, authorize, or implement actions to avoid jeopardizing the continued existence of federally listed threatened or endangered species, or destroying or adversely affecting their critical habitat.	Yes
Executive Order 11990, *Protection of Wetlands*	Requires that federal agencies provide leadership and take actions to minimize or avoid the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.	Yes
Federal Noxious Weed Act of 1990	Requires the use of integrated management systems to control or contain undesirable plant species and an interdisciplinary approach with the cooperation of other federal and state agencies.	Yes

TABLE 6-1. APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS		
Environmental Law or Regulation	**Description**	**In Compliance?**
Executive Order 13186 (Protect Migratory Birds)	Directs the furtherance of the purposes of the migratory bird conventions and for each Federal agency to develop and implement an MOU with the USFWS to promote the conservation of migratory bird populations.	N/A
U.S. Fish and Wildlife Coordination Act of 1958 (16 USC 661 *et seq*.)	Provides that wildlife conservation shall receive equal consideration and be coordinated with other features of water-resource development programs.	Yes
CULTURAL RESOURCES		
Antiquities Act (1906)	Authorizes the scientific investigation of antiquities on federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.	Yes
American Indian Religious Freedom Act (1978)	Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve American Indian religious cultural rights and practices.	Yes
Archaeological and Historic Preservation Act (1974)	Directs the preservation of historic and archaeological data in federal construction projects.	Yes
Archaeological Resources Protection Act of 1979, as amended	Protects materials of archaeological interest from unauthorized removal or destruction and requires federal managers to develop plans and schedules to locate archaeological resources.	Yes
Executive Order 13007 (*Indian Sacred Sites* (1996))	Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confi-dentiality of sacred sites.	Yes
Native American Graves Protection and Repatriation Act (1990)	Requires federal agencies and museums to inventory, determine ownership, and repatriate cultural items under their control or possession.	Yes
National Historic Preservation Act (1966), as amended	Establishes as policy that federal agencies are to provide preservation of the nation's prehistoric and historic resources, and establishes the National Register of Historic Places.	Yes

TABLE 6-1. APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS		
Environmental Law or Regulation	**Description**	**In Compliance?**
Protection of Historic and Cultural Properties (1986)	Provides an explicit set of procedures for federal agencies to meet obligations under the National Historic Preservation Act, including the inventory of resources and consultation with SHPOs.	Yes
Executive Order 13084 (*Consultation and Coordination with Indian Tribal Governments* (1998))	Requires that each federal agency have an effective process to permit elected officials and other representatives of Indian tribal governments to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.	Yes
Kansas Historic Preservation Act	Sets forth the policy for historic preservation and details procedures to be followed by state agencies in nominating properties to the NRHP and in dealing with undertakings affecting listed properties.	Yes
Kansas Antiquities Act	Prohibits unauthorized individuals, institutions, and corporations from excavating in, removing material from, vandalizing, or defacing any archaeological site or features on lands that are owned or controlled by the state, or any county or municipality.	Yes
Kansas Unmarked Burial Sites Preservation Act	Establishes procedures to be followed in dealing with discoveries of human remains and funerary objects associated with unmarked burial sites in Kansas.	Yes
HAZARDOUS WASTES		
Resource Conservation and Recovery Act	Principal source of regulatory control over the generation, storage, treatment, and disposal of hazardous wastes.	Yes
HYDROLOGY RESOURCES		
Clean Water Act of 1977	Requires consultation with the USACE for major wetland modifications under Section 404.	Yes
Water Quality Act of 1987, as amended	Establishes as policy restoration and maintenance of the chemical, physical and biological integrity of the nation's waters and, where attainable, to achieve a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.	Yes

TABLE 6-1. APPLICABLE ENVIRONMENTAL LAWS AND REGULATIONS		
Environmental Law or Regulation	**Description**	**In Compliance?**
SOCIOECONOMICS		
Executive Order 11988 (*Floodplain Management*)	Requires federal agencies to take action to reduce the risk of flood damage; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. Federal agencies are directed to consider the proximity of their actions to or within floodplains.	Yes
Executive Order 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*)	Directs federal agencies to assess the effects of their actions on minority or low-income communities within their region of influence.	Yes
Executive Order 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*)	Directs federal agencies to identify and assess environmental health risks and safety risks that may disproportionately affect children, and ensure that policies, programs, activities, and standards address disproportionately high environmental health and safety risks to children.	Yes
Farmland Protection Policy Act of 1981	Minimizes the extent to which federal programs contribute to the unnecessary conversion of farmland to non-agricultural uses.	Yes

7.0 ENVIRONMENTAL CONSULTATION AND COORDINATION

Federal, state, and local agencies were consulted prior to and during the preparation of this supplement to the EIS. Agencies were notified of plans for water storage reallocation by mail, by scheduled public meetings, by publication of a notice of intent announcing preparation of a Draft EIS as required by NEPA, and by two public scoping meetings. The agencies contacted are listed below.

7.1 FEDERAL AGENCIES

Department of Agriculture
- Natural Resources Conservation Service

Department of Energy
- Wolf Creek Nuclear Generating Station

Department of the Interior
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey

7.2 STATE AGENCIES

Emporia State University
Kansas Biological Survey
Kansas Department of Health and Environment
Kansas Department of Transportation
Kansas Department of Wildlife and Parks
Kansas State Historic Preservation Office
Kansas State Historical Society
Kansas State University Agricultural Extension
Kansas Water Office

7.3 LOCAL AGENCIES

City of Burlington, Kansas
City of Chetopa, Kansas
Coffey County, Kansas
Lyon County, Kansas
Neosho River Committee

7.4 PROJECT MAILING LIST

W.K. Nielsen
502 Wilson #29
Emporia, KS 66801`

Mike Reed
209 Leavenworth Street
Ottawa, KS 66839

Larry Bess
730 Whildin
Emporia, KS 66801

Ron Casey
111 2nd J-Creek
Hartford, KS 66854

Kevin Wellnitz
2022 Road 140
Neosho Rapids, KS 66864

Terry Emmons
465 2nd Street J-Creek
Hartford, KS 66854

Robert H. Withrow
3083 North Third
Chetopa, KS 67336

Ben Cuadra
917 Pearson Ave.
Waverly, KS 66817

Jane Becker
PO Box 85
Chetopa, KS 67336-0085

Mr. Ralph Kieffer
834 SW Fillmore Street
Topeka, KS 66606

Jeff Jackson
6429 SW Lostine Road
Columbus, KS 66725

James Loncarich
2178 17000 Road
Oswego, KS 67356

Linda Jackson
11510 SW Black Jack Road
Chetopa, KS 67336

Jerry Getman
20062 York Road
Oswego, KS 67356

Irene & David Elmore
516 North Third
Chetopa, KS 67336

Steve Blackledge
3098 North Eighth
Chetopa, KS 67336

Delbert Johnson
20021 Wallace Road
Oswego, KS 67356

Glen Summer
Rt. 2 Box 186
Welch, OK 74369

Henry Bell
9532 SW Star Road
Chetopa, KS 67336

Lloyd McGill
PO Box 121
Chetopa, KS 67336

Jack Dalrymple
54301 East 75 Road
Miami, OK 74354

Bob Earls
8188 SW Star Road
Chetopa, KS 67336

W.P. Zimmerman
Rt. 2 Box 305
Welch, OK 74369

Steve Darnell
PO Box 520
Chetopa, KS 67336

Grace & Roy Fromm
Rt. 2, Box 340
Welch, OK 74369

Mr. & Mrs. Francis Pope
1605 Emmer Road
Hartford, KS 66854

V.O. Morgan
Rt. 2, Box 295
Welch, OK 74369

Richard Casey
230 Main Street
Hartford, KS 66854

Raymond & Bonnie Conrad
6084 SW 120th Street
Chetopa, KS 67336

Emporia State University
1200 Commercial Street
Emporia, KS 66801

Al Newkirk
417 SW
Miami, OK 74354

Ms. Jennie A Chinn
Kansas State Historical Society
6425 SW 6th Avenue
Topeka, KS 66615-1099

Faye Lester
Rt. 2, Box 315
Welch, OK 74369

Art Bond
300 Main Street
Hartford, KS 66854

Ruth Campbell
403 Pecan Street
Chetopa, KS 67336

T.N. Terrell
140 - 2nd Street
Hartford, KS 66854

William Reid
PO Box 247
10331 SW 95th
Chetopa, KS 67336

Larry Stevens
344 Lakeview
Burlington, KS 66839

Ron Wood
PO Box 395
Chetopa, KS 67336

Margaret Wiston
440 - 17th Road
Hartford, KS 66854

Ralph Johnson
Rt. 2 Box 487
Welch, OK 74369

Grover Cleveland
1091 - 19th Rd. NW
Burlington, KS 66839

George McGill
PO Box 704
Chetopa, KS 67336

Carroll E. Rohr
831 Oxen Lane
Leroy, KS 66857

Kenny Reed
PO Box 452
Chetopa, KS 67336

Ken Reznicek
871 - 13th Road
Burlington, KS 66839

Mary Newkirk
PO Box 1023
Miami, OK 74355

George Wellnitz
864 Rd. 150
Neosho Rapids, KS 68864

Senator Tom A. Coburn
100 North Broadway, Suite 1820
Oklahoma City, OK 73102

Kathy & Jim Zell
301 Choctaw
New Strawn, KS 66839

John M. Epler
8770 SW Messer
Columbus, KS 66725

Robert E. Woods
101 Main, J-Creek
Hartford, KS 66854

Ken Foster
1627 – 7000 Road
Edna, KS 67342

Rick & Deborah Wistrom
100 Main, J-Creek
Hartford, KS 66854

Gene Merry
700 Neosho Street
Burlington, KS 66839

Clara Reisbig
702 South 4th Street
Burlington, KS 66839

Larry Wistrom
440 NW
Hartford, KS 66854

Dennis Ruth
662 Quail Lane SE
Leroy, KS 66857

City of Emporia
522 Mechanic Street
Emporia, KS 66801

City of Chanute
101 South Lincoln
Chanute, KS 66720

Roger Reisbig
442 - 10th Road SW
Burlington, KS 66839

Dan Haines
Wolf Creek Nuclear Operations Corp.
1550 Oxen Lane SE
Burlington, KS 66839

City of Burlington
301 Neosho Street
PO Box 207
Burlington, KS 66839

Ron Freund
2444 Iris Road
Lebo, KS 66856

Mr. Robin Jennison, Secretary
Kansas Dept of Wildlife, Parks
And Tourism
512 SE 25th Avenue
Pratt, KS 67124-8174

Mr. Tracy Streeter
Kansas Water Office
901 South Kansas Avenue
Topeka, KS 66612-1249

City of Leroy
City Hall
PO Box 356
Leroy, KS 66857

Joe Rohr
818 Oxen Lane
Leroy, KS 66857

USFWS
Flint Hills Nat'l Wildlife Refuge
PO Box 128
Hartford, KS 66854

Dr. Lloyd Fox
KDWP
PO Box 1525
Emporia, KS 66801-1525

USFWS; Region 6
Regional Director
134 Union Blvd, Suite 400
Lakewood, CO 80228

Mr. Karl Brooks
Regional Administrator
USEPA Region VII
11201 Renner Blvd
Lenexa, KS 66219

City of Council Grove
205 North Union Street
Council Grove, KS 66846

USDA-NRCS
313 Cross Street
Burlington, KS 66839-1190

Burlington – Post Office
1565 Embankment Road SW
Burlington, KS 66839

Coffey County Commissioners
Courthouse
110 South 6th Street
Burlington, KS 66839-1798

USDA – Farm Services Agency
313 Cross Street
Burlington, KS 66839-1190

USDA–Farm Services Agency
1701 Wheeler Street
Emporia, KS 66801

Lyon County Commissioners
430 Commercial
Emporia, KS 66801

National Park Service
Tallgrass Prairie National Preserve
Route 1 Box 14
Strong City, KS 66869

USDA – NRCS
3020 West 18th Avenue
Suite B
Emporia, KS 66801-5140

Honorable Sam Brownback
Governor of Kansas
State Capitol Building, 2nd Floor
Topeka, KS 66612-1590

Honorable Jerry Moran
United States Senator
PO Box 2683
800 SW Jackson Suite 1108
Topeka, KS 66612

Honorable Jerry Moran
United States Senate
Russell Senate Office Building
Room 354
Washington, DC 20510

Honorable Pat Roberts
Frank Carlson Federal Building
444 SE Quincy, Room 392
Topeka, KS 66683

Honorable Pat Roberts
United States Senate
109 Hart Senate Office Bldg.
Washington, DC 20510-1605

Honorable Lynn Jenkins
US House of Representatives
1122 Longworth HOB
Washington, DC 20515

Honorable Tim Huelskamp
119 W. Iron Ave, 4th Floor
Suite A
Salina, KS 67402

Honorable Tim Huelskamp
House of Representatives
126 Cannon HOB
Washington, DC 20515

Honorable Lynn Jenkins
3550 SW 5th St
Topeka, KS 66606

Burlington Chamber of Commerce
110 North 4th Street
Burlington, KS 66839

Emporia Chamber of Commerce
719 Commercial Street
Emporia, KS 66801

Hartford City Hall
Mayor Steve Burris
5 Commercial Street
Hartford, KS 66854

City of Iola
PO Box 308
Iola, KS 66749

Mr. Tim Weston, Archaeologist
Historic Preservation Office
6425 SW 6th Avenue
Topeka, KS 66615-1099

Chairman John Barrett
Citizen Potawatomi Nation
1601 S. Gordon Cooper Drive
Shawnee, OK 74801

Seneca-Cayuga Tribe of Oklahoma
PO Box 1283
Miami, OK 74355

Wichita and Affiliated Tribes of
Oklahoma
PO Box 729
Anadarko, OK 73005

Sac & Fox of the Mississippi
in Iowa
349 Meskwaki Road
Tama, IA 52339-9629

Kaw Nation
Drawer 50
Kaw City, OK 74641

Principle Chief John Red Eagle
Osage Tribe, Oklahoma
PO Box 779
Pawhuska, OK 74056

Prairie Band Potawatomi Nation
Government Center
16821 Q Road
Mayetta, KS 66509-9870

Larry Schweiger, President & CEO
National Wildlife Federation
11100 Wildlife Center Drive
Reston, VA 20190

Carol Borgstrom, Dept. of Energy
Forrestal Building, Room 3E-094
1000 Independence Avenue, SW
Washington, DC 20585-0001

Ed Abrams, DHAC Director
Fed. Energy Regulatory Comm.
888 First Street, NE
Washington, DC 20426

Ms. Susan Metzger, Chief
Planning and Policy
Kansas Water Office
901 South Kansas Avenue
Topeka, KS 66612-1249

Office of the Director
Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, KS 66604-4027

Dir. Div. Environmental Analysis
Office Hydropower Lic., FEC
400 First Street, NW
Washington, DC 20426-0001

Ecology & Conservation Division
Office of Policy & Planning - NOAA
Herbert Hoover Building, #5810
14th & Constitution Avenue, NW
Washington, DC 20230

Dep. Dir. for Env. & Policy Review
U.S. Dept. of Transportation, #10309
1200 New Jersey Avenue SE
Washington, DC 20590-0001

Deidre Smith, Waterways Branch
Oklahoma Department of Transportation
4002 N Mingo Valley Expressway
Tulsa, OK 74116-5002

Kimberly Skillman Robrahn, Chair
Coffey County Commissioners Office
Coffey County Courthouse
110 S. 6th Street
Burlington, KS 66839

John Mitchell, Director
Division of the Environment
1000 SW Jackson, Suite #400
Topeka, KS 66612-1367

Mr. J. D. Strong, Executive Director
Oklahoma Water Resources Board
3800 North Classen Blvd
Oklahoma City, OK 73118

Associate General Counsel
Fed. Emergency Mgmt. Agency
500 C Street, SW
Washington, DC 20472-0001

Office of the Director
Division of Water Resources, KDA
109 SW 9th Street, 2nd Floor
Topeka, KS 66612

Asst. Sec. Natural Resources & Envir.
USDA
14th & Independence Ave., SW
Washington, DC 20250

Dir, Office of Environment and Energy
US Dept of Housing & Urban Development
451 - 7th Street, SW
Washington, DC 20410-0001

Commander
Eighth Coast Guard District
Hale Boggs Fed. Bldg.
500 Poydras St.
New Orleans, LA 70130

Bob Portiss
Port Director
5350 Cimarron Road
Catoosa, OK 74105-3027

Regional Administrator
USEPA Region 7
11201 Renner Blvd
Lenexa, KS 66219

Patrick Zollner, Division Director
Cultural Resources
State Historic Preservation Office
6425 SW 6th Avenue
Topeka, KS 66615-1099

Mr. John Mitchell, Director
Division of Environment
Kansas Dept of Health and Environment
1000 SW Jackson, Suite 400
Topeka, KS 66612-1367On page

Dir. Advisory Council Hist. Pres.
Old Post Office Bldg., #803
1100 Pennsylvania Ave., NW
Washington, DC 2004-2590

NEPA Program Coordinator
FHWA
1200 New Jersey Avenue SE
Washington, DC 20590

Envir. Policy, Special Engineering Standards Division
USDA Rural Electrification Admin.
14th & Independence, SW
Washington, DC 20250

Dir, Ofc. of Environmental Affairs
U.S. Dept of the Interior
1849 C Street, NW, Mail #2462
Washington, DC 20240-0001

President
National Audubon Society
P.O. Box 1932
Manhattan, KS 66502

Mr. Dan Mulhern
Acting Field Supervisor
U.S. Fish & Wildlife Service
Kansas Ecological Services Office
2609 Anderson Avenue
Manhattan, KS 66502

Jennie Chinn
State Historic Preservation Officer
6425 SW 6th Avenue
Topeka, KS 66615-1099

Eric B. Banks, State Conservationist
USDA NRCS
760 South Broadway
Salina, KS 67401

Office of the Director
Kansas Forest Service
2610 Clafin Road
Manhattan, KS 66502-2798

Robert Culbertson
Kansas Department of Wildlife & Parks
207 West Cheyenne
New Strawn, KS 66839

Office of the Director
Kansas Biological Survey
2101 Constant Ave
Lawrence, KS 66047

Office of the Director
State Conservation Commission
109 SW 9th Street, 2A
Topeka, KS 66612-1283

Dr. Dixie L Smith, Chair
Dept. of Biology, Pittsburg State Univ.
1701 South Broadway
Pittsburg, KS 66762-7552

Freda Culver
6266 Quakervale
Riverton, KS 66770-9712

Jerry Fultz
1680 - 18000 Road
Parsons, KS 78357-3719

Steve Commons
PO Box 928
Emporia, KS 66801-0928

Joe Works
870 Hawait Road
Humboldt, KS 66748-9750

Jim Zell
301 Choctaw Street
New Strawn, KS 66839-9801

Pat Sauble
RR1
Cedar Point, KS 66843-9801

Chauncey E. Shepard
2824 Massey Road
McCone, KS 66753-6015

Donald E. Becker
603 South Jefferson Street
Iola, KS 66749

Dennis Youk
519 Locust Street
Marion, KS 66861-1431

Ms. Bobbi Wendt
KWO Neosho Basin Planner
901 S Kansas Ave
Topeka, KS 66612

John & Cindy Epler
8770 SW Messer Road
Columbus, KS 66725

City of Humboldt
P.O. Box 228
Humboldt, KS 66748

V.O. Morgan
Rt. 2, Box 295
Welch, OK 74369

Larry Bork
3820 SW Roy Road
Topeka, KS 66610

Leonard Jirak
Kansas Department of Wildlife & Parks
540 16th Road NW
Hartford, KS 66854

Division of Public Affairs
Bureau of Public Involvement
Kansas Dept. of Transportation
700 SW Harrison Street
Topeka, KS 66603-3754

Jarik & Wilma Mosler
25676 South 608 Road
Grove, OK 74344

De Goodrich
26001 South 605th Road
Grove, OK 74344

City Manager
City of Grove
104 West 3rd
Grove, OK 74344

Lisa Friden, President
Grove Area Chamber of Commerce
9630 US Highway 59
Grove, OK 74344

Tad Jones, Executive Director
Grand Lake Association
9630 Highway 59 North, Suite B
Grove, OK 74344

Delaware County Commissioner
327 S 5th St
Jay, OK 74346

President
Miami Area Chamber of Commerce
111 North Main
Miami, OK 74354

Ottawa County Commissioner
102 East Central Ave #104
Miami, OK 74354

Edward Wyant
Ottawa County District Attorney
102 East Central, Suite 201
Miami, OK 74354

Honorable Kent Ketcher
Mayor of Miami
PO Box 1288
129 5th Ave NW
Miami, OK 74355-1288

Tony Shepard
USDA-ASCS
630 East Steve Owens
Miami, OK 74354

Gary Bogle
Route 1
Strang, OK 74367

Lakemont Shores Property Owners Association, Inc
37609 South 540 Road
Eucha, OK 74342

C.E. Holliday
Lake Center West
100 Lakeland Drive
Pryor, OK 74361

Jim Burroughs
Oklahoma Department of Wildlife Conservation
9097 North 34th Street W
Porter, OK 74454-2743

John Deken, President
Grand Lake Area Chamber of Commerce
PO Box 215
Langley, OK 74350

Lonie Addis
Labette County Commissioner
501 Merchant
PO Box 387
Oswego, KS 67356

Allen County Commissioners
1 North Washington Avenue
Iola, KS 66749-2841

Gordon Conger
RC&D
1250 2000th Street
Iola, KS 66749

Bob Eads
Kansas/Oklahoma Flood Control
PO Box 165
Chetopa, KS 67336

Margaret Fast
Kansas Water Office
901 South Kansas Avenue
Topeka, KS 66612

Dan Sullivan, CEO
Grand River Dam Authority
PO Box 409
226 West Dwain Willis
Vinita, OK 74301-0409

Kansas Dept. of Wildlife and Parks
1500 West 7th Street, Box 777
Chanute, KS 66720-0777

USGS Biological Resources Division
Columbia Environmental Research Ctr.
4200 New Haven Road
Columbia, MO 65201

Edwin Miller
Kansas Department of Wildlife & Parks
Box 945
Independence, KS 67301

Scott Barlow
Kansas Department of Wildlife & Parks
738 Fegan Road
Toronto, KS 66777

Robert Kelly
Twin Bridges State Park
14801 Highway 137 South
Fairland, OK 74343-9741

Mark Howery
Department of Wildlife Conservation
PO Box 53465
Oklahoma City, OK 73105

Bert Vanatta
52421 East 65th Road
Miami, OK 74354

Pete and Jim Howser
Harbours View Marina
N4510
Afton, OK 74331

KAMO Electric Cooperative
500 South KAMO Drive
Vinita, OK 74301

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9.0 ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BEA	U.S. Bureau of Economic Analysis
BEFS	Bureau of Environmental Field Services
B.P.	Before Present
Ca	Calcium
CAA	Clean Air Act
CCP	Comprehensive Conservation Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFS	Cubic Ft Per Second
CNRB	Cottonwood and Neosho River Basins Water Assurance District Number 3
CO	Carbon Monoxide
Co^{60}	Cobalt-60
Cs^{137}	Cesium-137
CY	Calendar Year
DCP	Data Collection Platform
DOA	Department of the Army
DOMSAT	Data Output Message Satellite
DSEIS	Draft SFES
DSFES	Draft SFES
DVA	Deer-Related Vehicle Accidents
e^2M	engineering-environmental Management, Inc.
EAC	Elevation Above Channel
EIS	Environmental Impact Statement
FSFES	Final Supplement to Final Environmental Statement
FEIS	Final Environmental Impact Statement
FFPA	Farmland Protection Policy Act
FHNWR	Flint Hills National Wildlife Refuge
GIS	Geographic Information System
GOES	Geostationary Operational Environmental Satellites
GRDA	Grand River Dam Authority
H^3	Tritium
HCO_3	Carbonate
HPMP	Historic Preservation Management Plan
I^{131}	Radioiodine
JRR	John Redmond Reservoir (Reservoir)
K	Potassium
K.A.R.	Kansas Administrative Regulations
KCPL	Kansas City Power and Light Company
KDHE	Kansas Department of Health & Environment
KDOT	Kansas Department of Transportation
KDWP	Kansas Department of Wildlife & Parks
KG&E	Kansas Gas and Electric
KGS	Kansas Geological Survey
KNHI	Kansas Natural Heritage Inventory
K.S.A.	Kansas Statutes, Anotated
KSHSSR	Kansas State History Society Site Report
KWO	Kansas Water Office
MOU	Memorandum of Understanding
Na	Sodium
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969, as amended
NGVD	National Geodetic Vertical Datum
NMM	Neosho Mucket Mussel
NMT	Neosho Madtom
NO_2	Nitrogen Dioxide
NO_3	Nitrate
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWR	National Wildlife Refuge
NWS	National Weather Service
O_3	Ozone
OAQPS	Office of Air Quality Planning and Standards
OCWA	Otter Creek Wildlife Area
Pb	Lead
Pb^{210}	Lead-210
PCB	Polychlorinated Biphenyl
PM_{10}	Particulate Matter <10 microns
PO_4	Phosphate
RCRA	Resource Conservation and Recovery Act
Rn^{222}	Radon-222
SCS	Soil Conservation Service
SFES	Supplement to the Environmental Statement
SFY	State Fiscal Year
SH	State Highway
SHPO	State Historic Preservation Office
SIC	Standard Industrial Classification
SO_2	Sulfur Dioxide

STORET	Storage and Retrieval of Water Related Data
SUPER	USACE Suite of Computer Programs
TMDL	Total Maximum Daily Load
TOC	Top of Conservation Pool
TPU	Transportation and Public Utilities
U.S.	United States
USACE	U S. Army Corps of Engineers, Tulsa District
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compound
WCGS	Wolf Creek Nuclear Generating Station
WPFO	Western Prairie Fringed Orchid

UNITS OF MEASUREMENT

°C	Degrees Celsius
°F	Degrees Fahrenheit
ac-ft	Acre-ft
cm	Centimeter
cm/s	Centimeters per second
dbh	Diameter Breast Height
ft	Foot/Feet
in	Inch
lbs	Pounds
lbs/year	Pounds per year
lpm	Liters per minute
kg	Kilogram
kg/year	Kilograms per year
km	Kilometer
m^2	Square meters
m^3	Cubic meters
mg/l	Milligrams per liter
mg/m^3	Milligram per cubic meter
MGD	Million gallons per day
MGY	Million gallons per year
mg/kg	Milligrams per kilogram
mm	Millimeter
mrem/yr	Millirem per year
MSL	Mean Sea Level
$\mu g/m^3$	Micrograms per cubic meter
pCi/l	PicoCuries per liter
pCi/kg	PicoCuries per kilogram
pCi/m^3	PicoCuries per cubic meter
ppm	Parts per million
trees/ha	Trees per hectare

10.0 GLOSSARY

Aesthetics	The visual perception of beauty and feeling of well being experienced by a site visitor.
Agriculture	The science or practice of cultivating the soil and producing crops, and in varying degrees the preparation and marketing of the resulting products.
Alkalinity	Soluble mineral salts present in natural water or arid soils.
Alluvium	Clay, silt, sand, gravel, or similar material deposited by running water.
Alternatives	Viable choices or courses of action that achieve the project purpose and need.
Ambient Air Quality	The atmospheric concentration of a specific compound (amount of pollutants in a specified volume of air) at a particular location, determined by the way wind patterns, precipitation patterns, and chemical reactions affect pollutants in the atmosphere.
Ambient Air Quality Standards	Standards established on a state or federal level that define the limits for airborne concentrations of designated criteria pollutants (nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone, lead) to protect public health with an adequate margin of safety (primary standards) and public welfare including plant and animal life, visibility, and materials (secondary standards).
American Indian	Individuals, bands, or tribes who trace their ancestry to indigenous populations of North America prior to Euro-American contacts.
Aquatic Species	Species adapted to life in standing or flowing water.
Archaeology	The scientific study of material evidence such as tools and buildings remaining from past human life and culture.
Attainment Area	An area that meets the National Ambient Air Quality Standards for a criteria pollutant under the Clean Air Act or that meets state air quality standards.
Avifauna	The inclusive term for all bird species.
Baseline (benchmark)	The physical and operational condition of John Redmond Dam, reservoir, and the Neosho River floodplain to near Grand Reservoir in Oklahoma, upon which future conditions are compared. For NEPA purposes the baseline year is 2000.
Bradytictic Breeder	Mussel species that attract potential hosts using a mantle lure.

Candidate Species	Species for which the USFWS has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.
Cobble	Large, rounded rocks found on riverbeds and gravel bars.
Conductivity	A numerical expression of the ability of a water sample to carry an electric current.
Conservation Pool	Stored water used to supply downriver water rights, provide water quality flows, provide wildlife habitat, and support recreation interests.
Contaminant Pathway	Method or route by which a receptor is exposed to contamination.
Contamination	The degradation of naturally occurring water, air, or soil quality either directly or indirectly as a result of human activities.
Council on Environmental Quality	Established by NEPA, consists of three members appointed by the president. CEQ regulations describe the process for implementing NEPA, including preparation of environmental assessments and environmental impact statements, and timing and extent of public partcipation.
Cultural	The nonbiological and socially transmitted system of concepts, institutions, behavior, and materials by which a society adapts to its effective natural and human environment; and similar or related assemblages of approximately the same age from a single locality or district, thought to represent the activities of one social group.
Cultural Resources	Includes any object, site, area, building, structure, or place that is archaeologically or historically significant, or that exhibits traditional cultural value, e.g., properties sacred to American Indians or other ethnic groups. The definition includes assets significant in the architectural, scientific, engineering, economic, agricultural, educational, social, political, military, or cultural annals of the area.
Cumulative Impacts	The combined effects resulting from all programs occurring concurrently at a given location.
Dead Storage	Water pooled below the discharge elevation through a dm.
Detention Ponds	Constructed depressions used to capture flows, dissipate water energy, and contain sediments.
Developed	Land, lot, parcel, or area that has been built upon or where public services have been installed prior to residential, commercial, or industrial construction.
Direct Impact	Effects resulting solely from the proposed action.
Disposal	Transfer of sediments from a lakebed to another site.
Diversity	The number of animal and plant species present within a habitat.

Dredge	Remove or displace sediments by mechanical means to deepen channels or water bodies such as lakes or bays, typically for navigation purposes.
Drought	A long period with no rain.
Ecoregion Province	Ecosystems of regional extent; an area of large size where there is a distinctive association of interconnected biological and environmental features.
Effluent	Waste material discharged into the environment.
Emergent Species	Wetland plant species that grow from standing or flowing water and also from saturated soils.
Endangered Species	Species of animal or plant formally listed by the USFWS as endangered.
Environmental Impact Statement	A detailed informational document required of federal agencies by NEPA for major projects or legislative proposals significantly affecting the environment. A tool for decision making, the EIS describes the positive and negative effects of the undertaking and lists alternative actions.
Environmental Justice	The examination of project-induced disproportionate human health or environmental adverse impacts upon minority and low-income populations. Federal agencies are required to examine environmental justice impacts pursuant to Executive Order 12898.
Exotic Species	Non-native species of animals or plants.
Extirpated	No longer present in previously occupied habitat.
Fallow	Unplanted agricultural land, usually in a rest-rotation cropping plan.
Federal Register	Official publication of government announcements and decisions.
Floodplain	The area adjacent to a river expected to be inundated in a 100-year flood.
Flood Control Pool	Area where floodwater is stored upriver of a dam, to be released in a controlled manner to reduce the peak flow.
Gamma Analysis	A measurement of radiation.
Gravel	Medium-sized particles, intermediate between sand and cobbles.
Gross Beta Analysis	A measurement of radiation from a high-speed electron or positron undergoing decay.
Groundwater	Water in subsurface areas, collected due to porous an permeable geologic formations, that supplies wells and springs.

Habitat	The place or environment where a plant or animal normally grows or lives.
Hazardous Material	A substance or mixture of substances that poses a substantial risk or potential risk to human health or the environment.
Hazardous Waste	A waste or combination of wastes that, because of quantity, concentration, or physical, chemical, or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or may pose a substantial hazard or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.
Herptiles	Species of amphibians and reptiles, inclusive.
Historic Resources	A period after the advent of written history dating to the time of the first Euro-American contact in an area. Also refers to items primarily of Euro-American manufacture.
Hydrology	The properties, circulation, and distribution of water on or below the earth's surface.
Ictalurids	Species of catfish in the family Ictaluridae, includes blue, channel, and flathead catfish, bullheads, and madtoms.
Impacts	An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured using a qualitative and nominally subjective technique.
Integrated Pest Management	An approach to exotic plant species invasions using farm management practices, prescribed burning, chemical application, and biological controls among others.
Introduced Species	Typically non-native species raised or grown for income.
Invasive Species	Nonnative or native species that are aggressive and tend to dominate sites as in a monoculture. These species typically require management controls.
Lead Agency	The federal agency with primary responsibility for preparing an EIS.
Leased Land	Land with a legally binding agreement in place for management, an example being cropland.
Lithic	Of, related to, or being a stone tool.
Loam	A soil that consists of varying proportions of clay, silt, and sand.

Logjam	Area of the Neosho River where tree debris has settled out because of low flow velocity.
Long-term Impacts	Impacts that would occur over an extended period.
Low-elevation Dams	In-channel water diversion structures that are usually less than ten ft high and typically used to direction flows for irrigation or municipal water supply.
Mesic	Moist sites or species adapted to moist sites.
Mitigation	A method or action to reduce or eliminate program impacts.
Native Americans	Individuals, bands, or tribes who trace their ancestry to indigenous populations of North America prior to Euro-American contacts.
Native Vegetation	Indigenous plant life that occurs naturally in an area without agriculture or cultivation applications.
Notice of Intent	A notice, required under NEPA, that is prepared by the federal lead agency and published in the Federal Register, immediately after deciding that an EIS is necessary. The notice of intent briefly describes the proposed action and alternatives, explains the scoping process and the opportunity to participate in scoping meetings, and lists the contact person within the lead agency.
Passerine Species	The group of birds commonly known as songbirds.
pH	An expression of the hydrogen ion concentration, indicating acidity or alkalinity.
Pool Raise	Storing additional water in the conservation pool, allowing water to back to a higher level behind the dam structure.
Potable Water	Water suitable for drinking.
Radionuclides	Isotopes that emit waves or particles.
Raptor	Birds of prey, including eagles, hawks, owls, and falcons.
Reallocation	Adding stored water to the conservation pool, with a small reduction of capacity for flood storage.
Recreation	The pursuit of leisure time for personal refreshment and relaxation.
Recruitment	Add to the population by producing offspring.
Riffles	Turbulent water resulting from a high rate of flow through a shallow area of a river channel with a congregation of larger particles (boulders, gravel) in the substratum.
Riparian	Pertains to the features on the bank of a natural watercourse.
Riverbank Erosion	The sloughing or caving of river bank soils into the water in the course of natural meandering or during flood events.

Runoff	The non-infiltrating water entering a stream or other conveyance channel shortly following a precipitation event.
Scoping	Process for determining the range of issues that should be addressed prior to implementation of a proposed action.
Sediment	Rock or mineral fragments weathered from existing rock. It is transported by wind, water, ice, or gravity and deposited in unconsolidated layers.
Sedimentary Exposures	Rock formed when soft sediment is hardened or lithified.
Shorebirds	The group of wading birds including gulls, stilts, sandpipers, plovers, egrets, and herons, among others.
Short-term Impacts	Impacts that occur over a relatively brief period of timeand are of short duration.
Significance	The importance of a given impact on a specific resource as defined under CEQ regulations.
Silt	Individual mineral particles that range in diameter from the upper limit of clay (0.002 mm) to the lower limit of fine sand (0.05 mm).
Site	The location of past cultural activity; a defined space with more or less continuous archaeological evidence. A specific area.
Soil	A natural, three-dimensional body at the earth's surface. Soil is capable of supporting plants and has properties resulting from climate, living matter, relief, and parent material.
Socioeconomics	Involves a combination of economic and social factors.
Surface Water	All water naturally open to the atmosphere and all wells, springs, or other collectors that are directly influenced by surface water.
Tachytictic Breeder	Mussel species that release larvae generally in the water to find and attach to host fish gills.
Terrestrial	Species that live or grow on land.
Threatened Species	Plant and wildlife classifications that could become endangered in the foreseeable future.
Toxic	Harmful to living organisms.
Turbidity	A measurement of suspended particles or sediment.
Waterfowl	The group of birds including ducks, geese, swans, and coots.
Water Level Management Plan	A determination of water elevations and timing to enhance fish and wildlife habitat within a site.

Water Quality	Physical and chemical condition of water that includes temperature, specific conductance, and pH among others.
Watershed	The entire land area that collects and drains water into a river or River system.
Water Storage	Water pooled behind a dam for beneficial use.
Water Supply Reallocation	Raising the elevation of stored water in the conservation pool while slightly reducing the amount of flood pool storage capacity.
Water Supply Yield Analysis	Determination of storage volume in the conservation pool after subtracting the amount of sediment present.
Wetlands	Areas that are inundated by surface or ground water for a long enough period of time each year to support, and do support under natural conditions, plants and animals that require saturated or seasonally saturated soils.

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11.0 LIST OF PREPARERS AND CONTRIBUTORS

This section contains the list of personnel contributing to SFES production and presents pertinent information concerning the organizations, project responsibilities, and experience level.

U.S. Army Corps of Engineers, Tulsa District
1645 South 101 East Avenue
Tulsa, OK 74128-4609

Janet Holsomback – Project Manager, Water Supply Specialist
B.A. Business Management; 12 years experience

James Randolph.– Project Manager, Fish and Wildlife Biologist
B.S. Biology, M.S. Zoology; 30 years experience

Louis Vogele – Archaeologist
M.A. Anthropology; 16 years experience

Everett Laney – Project Manager, Biologist
M.S. Environmental Science; 26 years experience
B.S. Wildlife Ecology

engineering-environmental Management, Inc.
9563 South Kingston Court, Suite 200
Englewood, CO 80112

Jayne Aaron – Cultural Resources Manager
M.A. Environmental Policy and Management; 17 years of experience
Assistant Project Manager; Aesthetics; Public Involvement

Ann Baldrige – NEPA Specialist
MBA in Finance and Accounting
B.S. Geology; 26 years experience

Brian Davis – GIS Coordinator
B.S. Landscape Architecture and Land Planning; 21 years of experience
GIS Applications

Ronald Freeman – Wildlife Biologist
B.S. Wildlife Management; 27 years of experience
Environmental Analysis, Quality Control

Wanda Gray Lafferty – Technical Editor
Two years undergraduate work; 27 years of experience
Technical Editing and Writing

Brian Hoppy – Vice President
M.N.R. Natural Resources; 11 years of experience
Project Director, Quality Control

Ron Lamb – QA/QC
M.S. Environmental Science/M.A. Political Science/International Economics; 18 years of experience
Quality Control

Jose Merino – Owner
Ph.D. Aquatic Ecology; 31 years of experience
Quality Control

Daniel Niosi – Natural Resources
B.S. Natural Resources Management ; 3 years of experience
Environmental Planning and Analysis

Holly Raab – Archaeologist
Ph.D. Archaeology; 16 years of experience
Archaeology, Cultural Resources

James Rust – Archaeologist
M.A. Archaeology; 16 years of experience
Archaeology, Cultural Resources

James Von Loh – Biologist
M.S. Biology; 24 years of experience
Project Manager, Air Quality, Biological Resources

Craig Vrabel – Geologist
B.S. Geology; 12 years of experience
Geology and Soils Resources, Impact Analysis, Quality Control

Blankenship Consulting LLC
1820 East Cedar Avenue
Denver, CO 80209

George Blankenship – Socioeconomist
M.A. Urban and Regional Planning; 22 years of experience
Socioeconomics

MARTECH-STP
2838 East 10th Street
Tucson, AZ 85716

Michael Osborn – Hydrologist
M.S. Hydrology; 23 years of experience
Hydrology and Water Resources

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FINAL

SUPPLEMENT TO THE
FINAL ENVIRONMENTAL STATEMENT

STORAGE REALLOCATION:
JOHN REDMOND DAM and RESERVOIR, KANSAS

VOLUME II - APPENDICES

United States Army Corps of Engineers; Tulsa District
1645 South 101 East Avenue
Tulsa, OK 74128-4609

February 2013

FINAL

SUPPLEMENT TO THE FINAL ENVIRONMENTAL STATEMENT

VOLUME II - APPENDICES

Prepared for:

Storage Reallocation:
John Redmond Dam and Reservoir, Kansas

U.S. Army Corps of Engineers, Tulsa District
1645 South 101 East Avenue
Tulsa, OK 74128-4609

Prepared by:

engineering-environmental Management, Inc.
9563 South Kingston Court
Englewood, CO 80112

February 2013

VOLUME II

APPENDICES

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APPENDIX A

Public Scoping Comments
Notice of Intent
Distribution Lists

DRAFT

PUBLIC SCOPING PROCESS COMMENTS AND SUMMARY REPORT FROM NOTICE OF INTENT AND SCOPING MEETINGS JOHN REDMOND LAKE, KANSAS

July 2001

United States Army Corps of Engineers; Tulsa District
1645 South 101 East Avenue
Tulsa, Oklahoma 74128-4609

DRAFT

PUBLIC SCOPING PROCESS COMMENTS AND SUMMARY REPORT FROM NOTICE OF INTENT AND SCOPING MEETINGS JOHN REDMOND RESERVOIR LAKE

Prepared For.

Reallocation of Water Supply Storage Project:
John Redmond Lake, Kansas

U.S. Army Corps of Engineers; Tulsa District
1645 South 101 East Avenue
Tulsa, Oklahoma 74128-4609

July 2001

Prepared By:

engineering-environmental Management, Incorporated
1510 West Canal Court, Suite 2000
Littleton, Colorado 80120

EXECUTIVE SUMMARY

Under Contract Number DACA56-00-D-2013, Task Order 0034 (27 April, 2001), the Department of the Army, Corps of Engineers -Tulsa District, tasked engineering-environmental Management, Inc. to conduct Phase I of the Final Environmental Impact Statement Supplement to the John Redmond Lake EIS. The purpose of the supplement is to identify the environmental, cultural, social, and economic aspects of reallocation of flood control storage to water supply storage at John Redmond Lake, Kansas. Task 6.0 of this project provides the results and analysis of public scoping meetings held in March and April 2001 as a stand-alone report for this task, but the information contained herein will also be presented in appropriate sections of the FEIS.

A Notice of Intent to prepare an EIS for Reallocation of Water Supply Storage for John Redmond Lake, Kansas was published in the *Federal Register* on 7 April 2001. Two public scoping meetings were held in conjunction with the notice, the first in Burlington, Kansas (29 March 2001) and the second in Chetopa, Kansas (5 April 2001). Thirty individuals were present in each meeting and represented citizens, county agencies, state agencies, and federal agencies. A synopsis was prepared summarizing the concerns and issues identified by meeting attendees

The Burlington, Kansas comments focused on remediation of the "logjam" formed in the Neosho River, inclusion of a seasonal pool management plan, federally threatened fish habitat concerns, flooding in the Otter Creek Wildlife Management Area, crop damages and harvesting concerns due to flooding, wildlife displacement due to high water, Neosho River bank erosion concerns, construction of up-drainage detention ponds and the Cedar Point Dam, the state highway bridge (K-130) creates a backwater, and an increase in duration and frequency of down-river flooding. The Chetopa, Kansas comments focused on the only function of the reservoir being that of flood control, dredging the reservoir, Neosho River bank erosion concerns, an increase in duration and frequency of down-river flooding, and a recreation focus (waterfowl hunting) versus flood control.

Seventeen written comment forms, letters, and electronic mail resulted in three supporting the proposed water level raise, nine opposed to a water level raise due to loss of flood control storage, three supporting dredging of sediments, one concerned about dam safety with the water level raise, two supporting wildlife management and habitat improvement as a key project focus and two noting that wildlife habitat would be negatively affected, two stating that recreational opportunities would be improved, one opposed to the proposed project because it was to only benefit recreation, and three supporting "logjam" remediation. In addition, a petition with 101 signatures was presented to the Corps requesting removal of the "logjam" located approximately 0.9 miles east of the Jacob Creek boat ramp. Road and property flooding are reasons cited for its removal.

The lists of agencies, organizations, and individuals consulted during environmental impact statement preparation are incomplete in this report. These lists will be continually updated as contacts are made relative to the resource information needs addressed.

TABLE OF CONTENTS

1.0 CONSULTATION AND COORDINATION

1.1 Introduction

This introduction provides a summary of the scoping process, and a list of agencies, organizations, and persons consulted in the preparation of this DSEIS. Comments, correspondence, and notices are contained in Attachment A. The project mailing list is contained in Attachment B. The mailing list was compiled from interested individuals, agencies, and organizations during the project development process. It is current through June 2001. Individuals on the mailing list may not receive a copy of the DSEIS; however, they will receive a letter announcing availability of the DSEIS, and a notice of availability will also be published in local newspapers

2.0 PUBLIC COORDINATION

As required by CEQ regulations for implementing NEPA (40 CFR 1500-1508), the U S. Army Corps of Engineers, Tulsa District, provided for an early and open scoping process to determine issues to be addressed and those considered significant to concerned citizens and organizations. Public involvement opportunities to date include the EIS notification process, including the NOI and the opportunity to comment on the NOI, and interagency and public scoping meetings Sections 2 1 through 2 3 provide more information on the public coordination process Additionally, public hearings will be held on the DSEIS following the requisite comment period

2.1 Notice of Intent

In conformance with the requirements of NEPA (40 CFR 1501.7), a NOI to prepare an EIS for the John Redmond Lake Reallocation Study, Kansas was published in the *Federal Register* on April 7, 2001 (see Attachment A). Alternatives to be evaluated were identified in the NOI as the no action, and another alternative to raise the lake's conservation pool by two feet to accommodate for sediment buildup. Significant issues to be addressed in the EIS were identified as potential impacts to.

- The Flint Hills National Wildlife Refuge;
- Recreation and recreational facilities,
- Structures of the dam;
- Fish and wildlife resources within, above, and below the lake;
- Downstream flows on the Neosho River; and
- Other impacts identified by the public, agencies, and Corps studies.

The scoping period ended on June 1, 2001

2.2 Scoping Meetings

Two public scoping meetings were held in conjunction with the NOI. The first meeting was held on March 29, 2001, in Burlington, KS, and the second meeting was held on April 5, 2001, in Chetopa, KS The purpose of these meetings was to inform the public of the upcoming water supply reallocation study and to allow citizens an opportunity to comment on the proposed two-foot raise in the conservation pool at John Redmond Lake. An advertisement for the scoping meetings was placed in the *Coffey County Republican* newspaper on March 14, 2001. Press releases were sent to 47 newspapers, and radio and TV stations for publication (see Attachment A). Copies of the presentation and handout materials are included in Attachment C.

Thirty individuals representing the public and state and county agencies attended the meeting in Burlington, Kansas. Only two written comments were received at the meeting, but attendees could obtain comment forms to fill out and return by mail.

Thirty individuals representing farmers, pecan growers, the City of Chetopa, and a representative from Congressman Coburn's office also attended the meeting in Chetopa, KS Most attendees were in opposition to any action that would result in a reduction of flood control storage, no matter how slight. No written comments were received at the meeting, but attendees could obtain comment forms to fill out and return by mail.

In addition to the two public scoping meetings, a meeting was held with the Neosho Basin Advisory Committee on March 16, 2000. At this time, the advisory committee has neither approved nor disapproved of the proposed project.

2.3 Summary of Issues Identified During The Scoping Process

Burlington, Kansas Meeting, March 29, 2001. The following is a synopsis of the concerns expressed by attendees of the Burlington, KS meeting:

- Remove the logjam at Jacob Creek.
- Cut a channel around the logjam.
- Logjam creates a higher pool in the upper reaches of the lake
- Removal of the logjam would permit water to enter the conservation pool
- Include seasonal pool management plan in the reallocation study
- Keep riffles at Hartford clean for Madtom habitat.
- Concern for flooding Neosho Madtom habitat
- Operations Division should clean out log jam, as done in early years.
- Logjam is causing increased flooding off Corps property upstream of John Redmond, around flood pool lands, and upstream to Emporia, KS.
- Determine if the increased conservation pool limit Kansas Department of Wildlife and Park's (KDW&P) seasonal pool manipulation plans
- Raising the conservation pool will adversely impact the KDW&P Otter Creek wildlife management area (1,600 acres) and make it flood more frequently.
- More damage to crops due to increased flooding because of conservation pool raise

- Animals are being forced out of their habitat because of higher water levels (i e , increasing crop damage and increasing car/deer accidents)
- Stream bank caving caused from the way the Corps operates John Redmond losing cushion of extra flood control storage.
- Should build detention ponds above John Redmond to trap sediment as was promised before John Redmond was built.
- Build Cedar Point Lake like the Corps was supposed to.
- Increase in conservation pool will increase the duration and frequency of flooding on easement lands.
- K-130 bridge increases backwater effect.
- High pools isolate non-easement lands preventing farmers from harvesting crops

Written comments received are summarized in Table 1 below.

Chetopa, Kansas Meeting, April 5, 2001 The following is a synopsis of the concerns expressed by attendees of the Chetopa, KS meeting

- There has been an increase in stream bank caving on the Neosho River caused by the way the Corps operates John Redmond for flood control.
- The flood pool is already insufficient
- A loss of flood control in John Redmond will increase the duration and frequency flooding lands downstream on the Neosho River
- The only real solution to sedimentation in the lake is dredging the reservoir.
- John Redmond's only purpose is flood control—all other uses are subservient to flood control or are extraneous.
- The only reason the Corps wants to raise the water level is for the duck hunter.

Written comments received are summarized in Table 1 below.

Written Comments. The Corps received seventeen comment forms, letters, and e-mails during the scoping period in response to the NOI or public meetings The content of the comments are similar to the concerns expressed at the public meetings, and include:

- Three generally for the two-foot raise in water level.
- Nine opposed due to loss of flood control storage.
- Three stated that the lake should be dredged.
- One stated that a raise in the water level would make the dam unsafe.
- Two noted that wildlife management and habitat improvement should be a key part of the project.
- Two others noted that habitat would be negatively impacted.
- Two noted that the project would improve recreational opportunities.
- One was opposed to the project because it was being done strictly to benefit recreation.
- Three stated that the logjam needs to be removed.

Table 1 details the written comments received during scoping.

Table 1. Written Scoping Comments

Letter No	Agency/Organization/ Individuals	Comment	Where Discussed in the EIS – Section	Page
1	Kevin Wellnitz Neosho Rapids, KS	Raising the conservation pool would lead to more frequent flooding of longer duration, which would lower property values	3 3 3 8 3 3 8 4 4 3	3-3 to 3-16 4-5 to 4-8 3-65 to 3-68 3-68, 69
		Maintenance below the bridge north of Hartford on K-130 is poor Trees are growing under the bridge obstructing water flow causing water on the west side of K-130	3 8 4 4 8 6	3-68, 69 4-25
2	Robert Withrow Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage	3 3 3 8 3 3 8 4	3-3 to 3-16 3-65 to 3-68 3-68, 69
3	Jane Bicker Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage	3 3 3 8 3 3 8 4	3-3 to 3-16 3-65 to 3-68 3-68, 69
4	Jeff Jackson Columbus, KS	Opposed to raising the conservation pool that would result in loss of flood storage	3 3 3 8 3 3 8 4	3-3 to 3-16 3-65 to 3-68 3-68, 69
5	Linda Jackson Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage	3 3 3 8 3 3 8 4	3-3 to 3-16 3-65 to 3-68 3-68, 69
6	Irene & David Elmore Chetopa, KS	Opposed to raising the conservation pool that would result in loss of flood storage	3 3 3 8 2 3 8 3 3 8 4	3-3 to 3-16 3-60 to 3-65 3-65 to 3-68 3-68, 69
7	Delbert Johnson Oswego, KS	It would be cheaper to dredge the lake than the cost of resulting flood damage	4 8 1	4-18
		A higher water level would make the dam unsafe	1 4 3	1-10, 11
8	Henry Bell Chetopa, KS	Release the water from John Redmond when it begins to rain to prevent additional flooding after a flood	3 3 2 3 3 3	3-6 to 3-9 3-10 to 3-16
		Opposed to raising the pool for hunting and boating	3 4 6 3 8 2	3-47 to 3-50 3-61 to 3-65

Letter No.	Agency/Organization/ Individuals	Comment	Where Discussed in the EIS – Section	Page
9	Jack Dalrymple Miami, OK	The flood pool is already insufficient The Corps has had to make releases in excess of channel capacity Reducing flood storage capacity would further exasperate the situation resulting in a negative impact downstream	3 3 2 3 3 3 3 8 2	3-6 to 3-9 3-10 to 3-16 3-61 to 3-65
		Compensating for sedimentation in the conservation pool sets a dangerous precedent The only solution is dredging	2 3 3 3 4 8 1	2-2 3-3 to 3-16 4-18
10	W P Zimmerman Welch, OK	Any raise in the lake level will decrease flood control Dredge the sediment	2 3 3 3 3 8 3 3 8 4 4 8 1	2-2 3-3 to 3-16 3-65 to 3-68 3-68, 69 4-18
11	W K Nielsen Emporia, KS	Encourage raising the level of the conservation pool.	Comment Noted	
12	No name	Neosho madtom habitat will be flooded	3 4 5	3-43, 44
13	Deborah Wistrom Hartford, KS	Raising the lake level will not stop the existing logjam problem	3 3 2 3 3 6	3-10, 20, 21 3-25
	Leonard Jirak Hartford, KS	Include pool management for fish and wildlife Riffles below Hartford need to be periodically flushed to ensure good habitat for madtom	3 3 3 3 3.6 3 4 4	3-10, 20, 21 3-25, 26 3-39, 40
	Bob Culbertson New Strawn, KS	Manage pool levels with drawdowns for wildlife on a regular basis	2 5 3 3 2 3 4.4 3 4 5 5 1	2-3 3-9 3-38 to 3-40 3-43, 44 5-2
14	Larry Bess Emporia, KS	Fishing has deteriorated over the past several years due to reduction of riffle areas and silting Raising the lake level will result in more silt	3 3 3 4 8 3	3-16 to 3-21 4-21, 22
15	Ron Casey Hartford, KS	The logjam is causing the banks to erode and drop more trees, making the logjam bigger	3 3 3 3 3 6 3 4 4	3-10, 30, 21 3-25 3-39, 40
		The current lake level is not deep enough to boat on	3 8 2 3 8 3	3-63 to 3-65 3-67, 68
16	Terry Emmons Hartford, KS	The lake level should be raised 2 to 3 feet	Comment Noted	
		Clear the logjam to allow easier movement of the fish, and for boating access	3 3 3 3 3 6 3 4 4	3-10, 20, 21 3-25, 26 3-39, 40
17	Ben Cuadra Waverly, KS	Supports the raising of the pool to increase boating access	3 8 2 3 8 3	3-63 to 3-65 3-67, 68

The USACE, Tulsa District, has also received (2001, specific date unknown) a petition signed by 101 individuals from Jacob Creek, Burlington, Emporia, Hartford, and Neosho Rapids, KS. The petition requests the removal of a logjam 0.9 miles east of the Jacob Creek (Strawn) boat ramp. The petitioners state that the logjam is causing road and property flooding The petition is included as Attachment D

All of the above concerns have been noted and are addressed in the DSEIS.

3.0 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS CONSULTED

3.1 Federal Agencies

Department of Agriculture
- Natural Resources Conservation Service

Department of Energy
- Wolf Creek Nuclear Generating Station

Department of the Interior
- U S Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey

3.2 State Agencies

Emporia State University
Kansas Biological Survey
Kansas Department of Health and Environment
Kansas Department of Transportation
Kansas Department of Wildlife & Parks
Kansas State Historic Preservation Office
Kansas State Historical Society
Kansas State University Agricultural Extension
Kansas Water Office

3.3 Local Agencies

City of Burlington, Kansas
City of Chetopa, Kansas
Coffey County, Kansas
Lyon County, Kansas
Neosho River Committee

ATTACHMENTS

A. Comments, Correspondence, and Notices

B. Project Mailing List

C. Scoping Meeting Presentation and Handouts

D Log Jam Petition

ATTACHMENT A: COMMENTS, CORRESPONDENCE, AND NOTICES

[Federal Register: April 7, 2000 (Volume 65, Number 68)]
[Notices]
[Page 18316-18317]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr07ap00-73]

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Intent To Prepare an Environmental Impact Statement (EIS) for the John Redmond Lake Reallocation Study, Kansas

AGENCY: U.S. Army Corps of Engineers, Department of Defense.

ACTION: Notice of intent.

SUMMARY: The purpose of the EIS is to address alternatives and impacts pertaining to reallocation of water storage at John Redmond Lake, Kansas.

FOR FURTHER INFORMATION CONTACT: Questions or comments concerning the proposed action should be addressed to Mr. David L. Combs, Chief, Environmental Analysis and Compliance Branch, 1645 South 101st East Avenue, Tulsa, Oklahoma 74128-4629, telephone 918-669-7660, e-mail: David L. Combs@usace.army.mil.

[[Page 18317]]

SUPPLEMENTARY INFORMATION: John Redmond Lake was authorized by the Flood Control Act approved May 17, 1950, Public Law 81-516a; Project Document HD 442, 80th Congress, 2d Session. Public Law 85-327, dated February 15, 1958, changed the project name from Strawn Dam to John Redmond Dam and Reservoir. It is located on the Grand (Neosho) River at river mile 343.7, about 3 miles northwest of Burlington in Coffey County, Kansas. Project purposes include flood control, water supply, water quality, and recreation. Closure of the embankment was completed in September 1963 and the project was completed for full flood control operation in September 1964.

In 1975, the state of Kansas and the Federal government entered into a water supply agreement for an estimated 34,900 acre-feet of storage remaining after 50 years of sedimentation. After the agreement was signed, it was determined that sediment was entering the lake unevenly from what had been predicted. Over time, sedimentation in the lake has changed the amount of storage the lake has for flood control, water supply and other purposes. Storage available for water supply purposes in the lake has been depleted by sediment distribution such that the water supply agreement obligations are being infringed upon.

Most of the sediment deposited in the lake pool has been below elevation 1039.0 (top of conservation pool), National Geodetic Vertical Datum (NGVD). Based on the Corps sediment surveys for 1964-1993, it was predicted that adequate storage would be available below elevation 1068.0 feet NGVD (top of flood control pool) at the end of the economic life of the project (Year 2014) to meet all authorized project purposes. However, the top of the conservation pool should ultimately be established at a higher elevation to reapportion equitably the

storage between the conservation and flood control pools.

When a lake is designed, each pool (flood control, conservation, sediment) is designed to capture a proportionate amount of sediment. In the case of John Redmond, the sediment load has been as predicted; however, the sediment is accumulating in the conservation pool while the flood control pool has experienced less than expected sedimentation losses.

The reallocation study and EIS will focus on ways to accommodate for the uneven distribution of sediment within the lake and evaluate a number of alternatives. Alternatives presently identified include the no action plan, which follows the current operational practices and another alternative to raise the lake's conservation pool to accommodate for sediment buildup. This alternative includes a 2-foot pool rise with the intentions of raising the conservation pool to elevation 1040.0 feet NGVD and using a phased pool raise of the remaining one-foot, in one-half foot pool increments.

The EIS will evaluate the effects of alternatives on the authorized project purposes and other identified concerns. Significant issues to be addressed in the EIS include: (1) potential impacts to the Flint Hills National Wildlife Refuge; (2) impacts on recreation and recreation facilities; (3) impacts on structure of the dam; (4) impacts on fish and wildlife resources within and also above and below the lake; (5) impacts on downstream flows on the Neosho River; and (6) other impacts identified by the public, agencies, or Corps studies.

Scoping meetings for the project are planned to be conducted in March and April 2000. News releases informing the public and local, state, and Federal agencies of the proposed action will be published in local newspapers. Comments received as a result of this notice and the news releases will be used to assist the Tulsa District in identifying potential impacts to the quality of the human or natural environment. Affected local, state, or Federal agencies, affected Indian tribes, and other interested private organizations and parties may participate in the Scoping process by forwarding written comments to the above noted address or attending Scoping meetings.

The draft EIS (DEIS) is expected to be available for public review and comment by September 2001. Any comments and suggestions should be forwarded to the above noted address no later than June 1, 2000, to be considered in the DEIS.

Dated: March 27, 2000.
Leonardo V. Flor,
Colonel, U.S. Army District Engineer.
[FR Doc. **00-8674 Filed** 4-6-**00**; 8:45 am]
BILLING CODE 3710-39-M

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US Army Corps of Engineers®

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed You may also take this form with you and return it to the address below

Tulsa COE

I have concerns about your plan to raise Conservation pool at John Redmond Lake.

We own property near Neosho Rapids KS. ①

Raising the conservation pool translates to more Frequent flooding of Longer duration, therefore Lower Land Values.

Also the maintenance below the bridge N. of hartford on K-130 is Very Poor. Currently, trees are allowed to grow under the bridge restricting Water Flow It is Common to ② experience higher Water levels on the West side of the road K-Dot should be required to maintain an open Waterway!

Optional Information:

Name: Kevin Wellnitz Affiliation:

Address: 2022 Rd 140 City: Neosho Rapids State: KS

Zip: 66864 Phone: 316-342-9431 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

(2)

US Army Corps of Engineers.

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

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Addressing the flooding situation in Labette and Cherokee Counties! I am opposed to the raising of the conservation pool at John Redmond, or anything else that would result in loss of flood storage. I am a land owner and pecan grower in Labette and Cherokee Counties.

Optional Information:

Name: Robert H. Nilkow Affiliation:
Address: 3083 N. 3rd City: Chetopa State: KS
Zip: 67336 Phone: 316-236-7559 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

US Army Corps of Engineers.

(3)

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below.

We oppose raising the Conservation pool at John Redmond Dam or anything else that might result in loss of flood storage!

Optional Information:

Name: Jack Becker Affiliation: Elmore-Becker Farms, Inc. Farm #1
Address: P.O. Box 85 City: Chetopa State: Ks.
Zip: 67336-0085 Phone: 316-236-7785 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

US Army Corps of Engineers.

(4)

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below.

I oppose the conservation pool at John Redmond Dam being raised to result in storing up flood waters

Jeff Jackson

Optional Information:

Name: Jeff Jackson Affiliation: FARMER
Address: 6429 SW Lostine Rd City: Columbus State: KS
Zip: 66725 Phone: 316-597-2549 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

US Army Corps of Engineers

(3)

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below.

I oppose raising the conservation pool at John Redmond Dam as a means of storing up water that results in flooding our farms.

Linda Jackson

Optional Information:

Name: Linda Jackson Affiliation: Own farm along Neosho River
Address: 11510 SW Black Jack Rd City: Chetopa State: KS
Zip: 67336 Phone: 316-597-2651 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

US Army Corps of Engineers.

(6)

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

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WE WERE TOLD THE JOHN REDMOND DAM WAS MADE TO HELP FARMERS FROM HAVING THEIR LAND FLOODED. NOW WE HEAR DUCK HUNTERS, AND PLEASURE TIME PEOPLE WANT THE DAM WATER LEVEL WHERE IT DOESN'T HELP THE FARMER.

I OPPOSE RAISING THE CONSERVATION POOL AT JOHN REDMOND OR ANYTHING ELSE THAT MIGHT RESULT IN LOSS OF FLOOD STORAGE OF WATER AT THE DAM !!

Optional Information:

Name: IRENE + DAVID ELMORE Affiliation: landowner
Address: 516 NO 3 RD City: CHETOPA, KANSAS State: KS
Zip: 67336 Phone 316-236-7997 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

US Army Corps of Engineers

(7)

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

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I do not understand why certain groups wish to change the intent of the lake for flood control. Is it because there is more money provided by other intrest groups, which influence the out come? Remember what the lake was designed & built for. As to reduction in storage at the John Redmond, due to sediment, why can't the Corps dredge the sediment. That process would be cheaper (1) than the flood destruction that has occured. Seems to me a higher lake level would make the Dam less safe (2)

Optional Information:

Name: Delbert Johnson Affiliation: Farm Owner affected by Neosho
Address: 20021 Wallace Rd City: Oswego State: KS
Zip: 67356 Phone: 316 795-2487 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

(8)

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John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

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I am Henry Bell and I live and own ground east of Chetopa 4½ miles. I have 672 acres in the bottom. I am flooded many times. Our local rain comes and goes in 3 or 4 days - when we have already water over our crops then the John Redmond is opened up we are in trouble I have seen it rise 3 inches a hour below my house wondering when it would get in my house it has come within one foot. please let that water start coming out of J.R. when its raining up there. Flood on Flood is bad. I am not for raising water pool for town people to hunt and (1)

(2)

Optional Information:

Name: Henry Bell Affiliation: Farmer

Address: 9532 SW Star Rd City: Chetopa KS State: KS

Zip: 67336 Phone: 316 5972688 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

and boat in. When my Crops are under water this is hard to ~~[illegible]~~ continue farming. The water has been over my ground and crops many time 12 to 14 days - Grand Lake needs to let water out when it begins to rain, not use my ground for a holding pool - my pecans are lost my time by holding water level too high -

My Dad helped raise money to start J R Dam for the purpose of controling floods, not for City folks to hunt and run boats on at my Crops expense. pasture cant be used for 6 wks because its dirty. Hay has dirt in it when I bale. I lose thousands of Dollars about every Year on account of poor management of water

Something has 2 be done

Henry Bell
9532 SW Star Rd
Chetopa, Ks 67336

US Army Corps of Engineers.

(9)

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

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I would like to thank you for the opportunity to comment on the John Redmond Reservoir Reallocation issue. I would be opposed to any action that would result in a net reduction of flood control storage, no matter how slight. The flood pool is already insufficient. In the past the Corps has had to make releases in excess of channel capacity. Any degradation of flood storage capacity would further exacerbate that situation and result in negative impact down stream. (1)

The aging lakes in our system are silting rapidly. One fear of mine is that stealing more of the flood pool to compensate for loss due to sedimentation in the conservation pool would set dangerous precedence. The only real solution to lakes filling with siltation is dredging (2)

Optional Information:

Name: Jack Dalrymple Affiliation: _____
Address: 54301 E. 75 RD. City: Miami State: OK
Zip: 74354 Phone: 918- 540-1870 E-mail: jackdccg@rectec.net

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Holsomback@swt02.swt.usace.army.mil

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John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below

Any rise in the lake level will decrease flood control. I suggest dredging out the semint + increase flood control.

Optional Information:

Name: W. Zimmerman Affiliation:
Address: RR2 Box 205 City: Welch State: Okla
Zip: 74369 Phone: 918-787-3213 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

MAR. 24

(11)

DEAR MRS. HOLSOMBACK

I'M WRITING THIS LETTER AS A RESPONSE TO AN ARTICLE IN THE EMPORIA KS. GAZZETTE, WHICH I HAVE ENCLOSED.

I STRONGLY URGE THE CORPS TO RAISE THE CONSERVATION POOL OF JOHN REDMOND RESERVOIR.

THANK YOU FOR THE OPPORTUNITY TO BE HEARD.

RESPECTFULLY
W. K. NIELSEN
EMPORIA KS.

W.K. NIELSEN
502 WILSON # 29
EMPORIA KS 66801

U.S. ARMY CORPS OF ENGINEERS
ATTN CESWT-EC-H MRS JAN HOLSOMBACK
1645 S. 101 ST AVE, TULSA OKLA.
74128-4629

74128/4629

Redmond study

The U.S. Army Corps of Engineers will hold two public workshops as part of the planning process related to water-storage issues at John Redmond Reservoir near Burlington. In the 27 years since the lake was built, sedimentation has reduced the amount of water the lake can hold for flood control. The Corps of Engineers must decide whether to leave things as they are or raise the conservation pool level in the lake.

At 6:30 p.m. August 30, a workshop will be held at the Coffey County Courthouse in Burlington. At 6:30 p.m. April 5, it will be held at Chetopa School in Chetopa.

Comments and questions can be sent to the [illegible] of Engineers, [illegible] District, Attn: CESWT-EC-H, Mrs. Jan Holsomback, 1645 S. 101st Ave., Tulsa, OK 74128-4629. The phone number is (918) 669-7080. [illegible] address is Janet.Holsomback@[illegible].mil.

Items for Region [illegible] to The Emporia Gazette, [illegible] Emporia, KS [illegible] news2@valu-line.com or faxed to 342-8108.

US Army Corps of Engineers

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

(12)

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address Feel free to use the back of this form or add pages if needed You may also take this form with you and return it to the address below

What about T&E Species? Neosho mallow habitat will be flooded.

Optional Information:

Name:_____ Affiliation:_____

Address:_____ City:_____ State:____

Zip:_____ Phone: ___-_____ E-mail:_____

Point of Contact

Ms Jan Holsomback,
U.S Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail. Janet.Hosomback@swt02 swt.usace.army mil

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John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below.

LOG JAM - JACOB CREEK
Cut channel
Why not get rid of log jam behind take at the end of the lake at Neosho Eagle Creek where water can adequately flow to John Redmond Raising ~~the~~ lake level will at stop problem - not exist. Network Television (1)
Make sure to include good management for fish and wildlife.
Sites Below Neosho will need to be [illegible] to insure good [illegible] habitat. (2)
Manage pool level with drawdowns for wildlife to a regular basis. Bob Gilliston (3)

Point of Contact

Questions, comments, and suggestions the John Redmond Reallocation Study can be directed to:

Ms Jan Holsomback,
U.S Army Corps of Engineers, Tulsa District
ATTN. CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone 918-669-7089

Randolph, James C SWT

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From: Combs, David L SWT
Sent: Wednesday, March 22, 2000 9:17 AM
To: Randolph, James C SWT
Subject: FW: John Redmond Resivior

Jim,

Do you make hard copies of these for the file?

David

---Original Message---
From: Holsomback, Janet SWT
Sent: Wednesday, March 22, 2000 7 15 AM
To: Combs, David L SWT, Randolph, James C SWT, Croston, James SWT, Rossman, Edwin J SWT, Padgham, Glen SWT, Fry, James M SWT, Banks, Billy E SWT
Cc: Bell, Ronald W SWT, Sanders, Donald J SWT
Subject: FW John Redmond Resivior

Comment from an interested party to be taken into consideration Jan

---Original Message---
From: LARRY BESS [SMTP drdak1@hotmail com]
Sent: Tuesday, March 21, 2000 9 28 PM
To: Holsomback, Janet
Subject: John Redmond Resivior

My name is Larry Bess. I grew up in Hartford KS My family moved there in 1965, just around the time that John Redmond Resivior was opened. I have many fond memories of the Neosho River and the lake itself. A very large majority of my life and learning experience came from the river and the Flint Hills Wildlife area. My rather large family shared these experiences with me.

Growing up, I remember the river and its many riffles and rocky areas Access to the river in the Hartford area was very easy as the banks of the river sloped gently and the silt was not a problem However, since you folks have begun raising the level of the lake over the past several years, there are now very few riffle areas left The fishing has deteriorated to the point where catching any thing is a surprise I practice catch and release every time. There are few fish to release. My children have not had the opportunities that I was given as there is so much mud and the river banks are very steep. The only access to the river now is by boat. And that has become a very dangerous proposition. Please consider these facts before you raise the level of the lake again. It will only serve to raise the level of the silt more. There must be some solution to this problem other than raising the lake levels.
Thank you,

Larry Bess
730 Whildin
Emporia KS, 66801

US Army Corps of Engineers

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

(15)

The Corps of Engineers is interested in addressing your concerns and questions regarding this study The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your question, comment, or suggestion on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below.

My concerns is the log jam is holding to much water behind it causing water to leave the banks to early and to go places it shouldn't go. It also causes the banks to wash away and drop more trees into the water making the jam bigger. The lake isn't deep enough to boat on at lake level.

Optional Information:

Name: Ron Casey Affiliation:
Address: 111 2nd (P.O.) City: Hartford State: KS.
Zip: 66854 Phone: 316-364-2031 E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

US Army Corps of Engineers.

John Redmond Lake Reallocation Study

Question, Comments, or Suggestions

16

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I feel the lake level should be raised 2-3 feet to compensate for the silting in. (1)

I would also like to see the log jam cleared in the upper end of the lake to allow water to flow every and allow fish to move in and out from the river (2) This would also open up the lake to river access.

Optional Information:

Name: Terry Emmons Affiliation: citizen
Address: 465 2nd St J-Creek City: Hartford State: KS
Zip: 66854 Phone: - E-mail:

Point of Contact

Ms Jan Holsomback,
U.S. Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-HM
1645 S. 101st East Ave.
Tulsa, OK 74128-4629
Phone: 918-669-7089 Fax: 918-669-7546
e-mail: Janet.Hosomback@swt02.swt.usace.army.mil

CESWT-PE-E

17 April 2000

17

TELEPHONE MEMORANDUM

SUBJECT. John Redmond Reallocation Pool Raise

As part of the public comment process, Mr Ben Cuadra of Waverly, Kansas called me on 17 April 2000 to provide comment on the proposed pool raise to augment water supply of the lake. Mr Cuadra stated that he was a fisherman who was interested in access to the river at the upper portion of John Redman reservoir. At the present time the river is typically not accessible because of shallow water Mr Cuadra wanted to express his support for the pool raise and the project

Mr Cuadra's address is as follows.

Ben Cuadra
Waverly, Kansas 66817
(785) 733-8254

David L. Combs
Ch, Environmental Analysis and Compliance Br

Randolph, James C SWT

From: Steve Adams [stevea@wp.state.ks us]
Sent: Wednesday, March 22, 2000 11:27 AM
To: Randolph, James C SWT
Cc: Combs, David L SWT
Subject: Re: John Redmond Lake Reallocation Study

Jim;

Thanks for the reply I will distribute the notice to our staff and try to make sure we have someone in attendance Please let me know if you need any information or assistance from us.

Steve

---- Original Message ----
From. "Randolph, James C SWT" <James C.Randolph@swt02.swt.usace army mil>
To: <stevea@wp.state ks us>
Cc: "Combs, David L SWT" <David L Combs@swt02 swt usace army mil>
Sent: Wednesday, March 22, 2000 11 13 AM
Subject: John Redmond Lake Reallocation Study

> Steve
>
> Dave Combs asked me to respond to your request
>
> We are just initiating the study and have not been working with anyone at
> Widlife and Parks that I am aware of.
>
> We have been working with Dewey Caster of the USFWS office in Manhattan to
> determine thier needs for impact evaluation on fish and wildlife
resources
> and Fish and Wildlife Coordination Act funding He may have contacted
> someone in your office, but I am not sure
>
> Please let me know your POC so that we can furnish them planning data as
it
> becomes available We look forward to seeing you or your representative
at
> the public meetings. If you need to speak with me please feel free to
call
> at 918-669-4396.
>
> JIM RANDOLPH

STATE OF KANSAS

Bill Graves, Governor

KANSAS WATER OFFICE
Al LeDoux
Director

901 S. Kansas Ave.
Topeka, Kansas 66612-1249

785-296-3185
FAX 785-296-0878
TTY 785-296-6604

October 10, 2000

Colonel Leonardo Flor
District Engineer
U.S. Corps of Engineers
Post Office Box 61
Tulsa, OK 74121-0061

Dear Colonel Flor.

Attached is the revised proposed lake level management plan for John Redmond Lake. As you may recall, I forwarded similar plans for other lakes in your district with a letter dated July 26, 2000. At that time, I withheld submittal of the proposed John Redmond plan until such time some additional issues could be resolved.

Over the past 10 years there has been a great deal of discussion among state and federal agencies, as well as local individuals and groups, about the best way to implement such a plan. The Kansas Water Office serves a dual role in these issues in coordinating the State position and protecting water supplies dedicated to users under contract with the State of Kansas. My office has always been concerned with all aspects of water supply, flood control and wildlife habitat associated with John Redmond Lake. I believe that this proposal represents the best alternative to meeting all of these needs.

At the end of July, my staff met with members of the Kansas Department of Wildlife and Parks, the U.S. Fish and Wildlife Service and Corps of Engineers staff from both the project and the Tulsa office. After much discussion all parties agreed upon the attached plan. As of the date of this letter, the Kansas Department of Wildlife and Parks is also holding a public meeting on this matter. The Kansas Water Office is also participating in this meeting. Any significant comments will be forwarded to your office as soon as possible.

I ask that you implement this plan as quickly as possible, if we receive any precipitation, so that the fall waterfowl benefits derived from this plan may be achieved. If you have any questions, please feel free to give Earl Lewis, a member of my staff, a call at (785) 296-3185.

Thank you in advance for your consideration of this proposed plan.

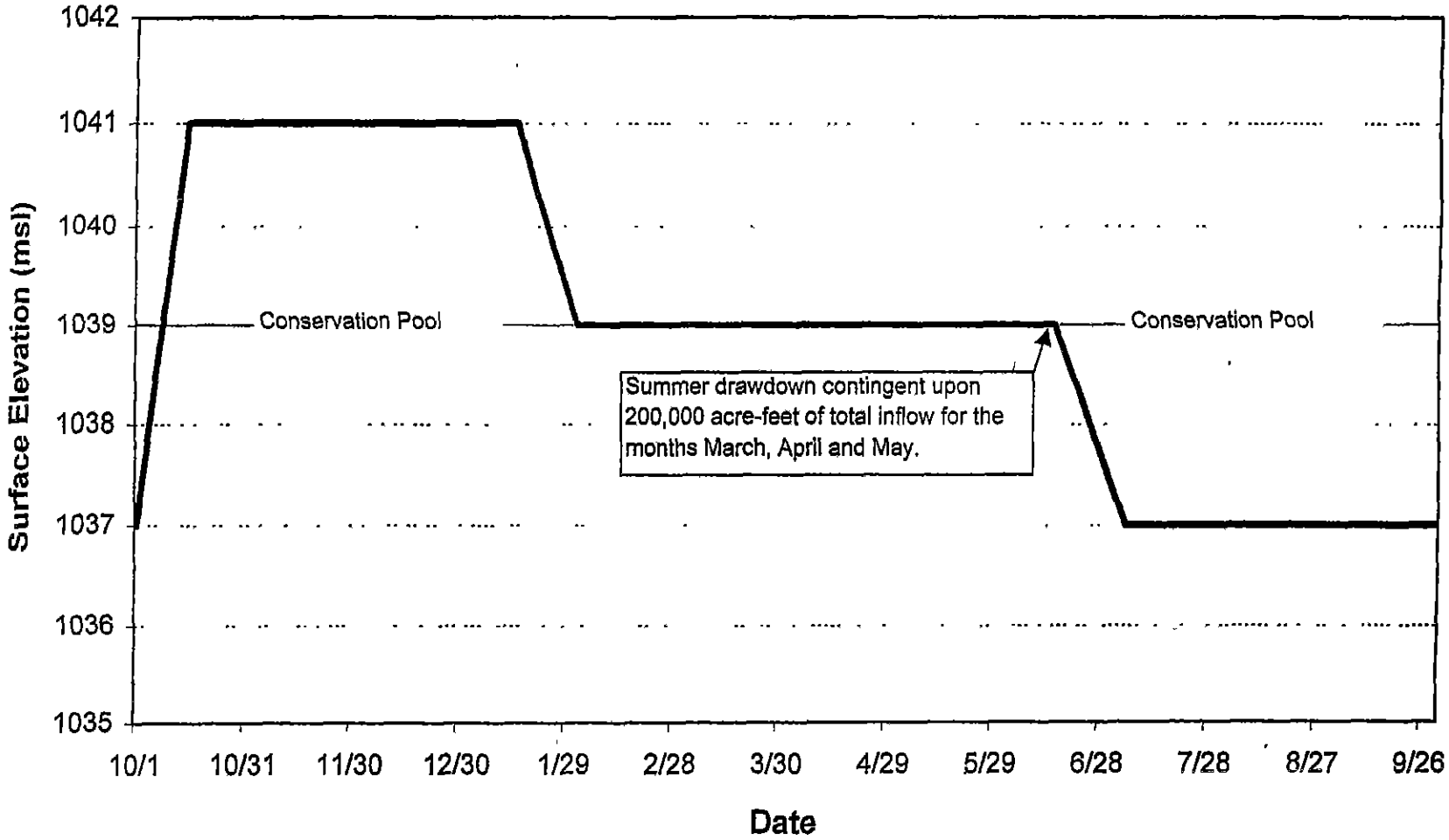
Respectfully,

Al LeDoux
Director

Enclosures

c/enclosures: Richard Oldham, Corps of Engineers, Kansas City
Ronald W. Bell, Corps of Engineers, Tulsa
Dan Mulhern, U.S. Fish and Wildlife Service, Manhattan
Jerre Gamble, U.S. Fish and Wildlife Service, Hartford
Marvin Swanda, Bureau of Reclamation, McCook
Robert Barbee, Kansas Department of Wildlife and Parks, Pratt
John Bond, Kansas Department of Wildlife and Parks, Topeka
Steve Adams, Kansas Department of Wildlife and Parks, Topeka
Leonard Jirak, Kansas Department of Wildlife and Parks, Hartford
Terry Duvall, Kansas Water Office
Clark Duffy, Kansas Water Office

John Redmond Reservoir
Proposed Water Level Management Plan
October 1, 2000 thru September 30, 2005



John Redmond Reservoir
Proposed Water Level Management Plan
October 1, 2000 thru September 30, 2005

Recommendations: (as inflows allow)

1. October 1 to October 15 – Allow lake level to rise to elevation 1041.0 by October 15 if inflows are available. This will provided flooded vegetation for migrating waterfowl and to support waterfowl hunting.

2. October 15 to January 15 – Hold lake level at elevation 1041.0 unless excessive ice conditions persist that threaten structures.

3. January 15 to February 1 – Reduce lake level to normal pool of 1039.0 to reduce ice damage to existing vegetation and operational structures.

4. February 1 to June 15 – Hold lake level at elevation 1039.0

5. June 1 to June 15 – Kansas Water Office will determine if there has been a total of 200,000 acre-feet of inflow into John Redmond Reservoir.

6. June 15 to July 5 – If inflow target has been met, reduce lake level to elevation 1037.0 to allow growth of native vegetation and expose mudflats. The vegetation will provide habitat for the shorebirds throughout the summer, reduce shoreline erosion, improve water clarity/quality, and create habitat for fall migrating waterfowl.

7. July 5 to September 30 – If inflow target has been met, hold lake level at elevation 1037.

US Army Corps of Engineers ®
Tulsa District

DRAFT NEWS RELEASE

For Immediate Release

To Editors, News Directors, and Assignment Editors

Synopsis: John Redmond Lake Reallocation Study will be presented at public workshops in Burlington and Chetopa, Kansas.

News Release No 2000-4
March 15, 2000

Corps to Host Workshops On John Redmond Reservoir Reallocation Study

TULSA, Okla. – The U S Army Corps of Engineers will host two public workshops as part of the planning process related to water storage issues at John Redmond Reservoir, Kansas The workshops are to inform the public and solicit comments regarding alternatives for the reallocation of water storage at John Redmond Reservoir

John Redmond is located in Coffey County, Kansas, on the Neosho River Since 1963, when the lake began storing water, sedimentation has reduced the amount of water the lake can hold for flood control, water supply, and other purposes. The Reallocation Study will focus on ways to accommodate the change Alternatives include:

- No action
- Raising the lake's conservation pool to accommodate for sediment buildup

The Corps study will include consideration of environmental impacts that may occur as a result of each alternative The environmental impact evaluation is done in compliance with the National Environmental Policy Act.

The workshops will be held at two locations. The workshops will be in open-house format, with no set or formal presentation Interested persons may arrive anytime between 6 30 p m and 9:00 p m , visit the information tables, discuss the study with Corps personnel, and make comments

Burlington, Kansas, Workshop -- Wednesday, March 29
Coffey County Courthouse
110 South 6th Street, Burlington, KS 66839
Phone 316-364-2191

Chetopa, Kansas, Workshop -- Wednesday, April 5
Chetopa School
430 Elm, Chetopa, KS
Phone· 316-236-7244

Comments and questions can be forwarded to
U.S Army Corps of Engineers, Tulsa District
ATTN: CESWT-EC-H, Ms Jan Holsomback
1645 S 101st East Avenue
Tulsa, OK 74128-4629
Phone· 918-669-7089
Email Janet Holsomback@usace army mil

-- 30 --

Editor
Chanute Tribune
P.O. Box 559
Chanute KS 66720

Editor
Erie Record
P.O. Box 159
Erie KS 66733

News Director
KKOY-AM & FM Radio
Box 788
Chanute KS 66720

Assignment Editor
KAKE-TV (CH 10)
P.O. Box 10
Wichita KS 67201

News Director
KFDI-FM Radio
4220 N. Old Lawrence Road
Wichita KS 67219

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KICT-FM Radio
734 N. Maize Road
Wichita KS 67212

Assignment Editor
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320 West 21st Street
Wichita KS 67203

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2815 E 37th St N
Wichita KS 67219

News Director
KZSN-AM & FM Radio
5610 East 29th Street N.
Wichita KS 67220

Bruce Janssen, Editor
Outdoor Kansas
P.O. Box 820
Wichita KS 67201

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Wichita KS 67208

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P.O. Box 820
Wichita KS 67201

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1005 S.W. 19th Street
Topeka KS 66604-1103

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KMAJ AM & FM Radio
P.O. Box 4407
Topeka KS 66604

Assignment Editor
KSNT-TV (CH 27)
6835 NW Hwy 24
Topeka KS 66618

Assignment Editor
KTKA-TV
P.O. Box 2229
Topeka KS 66601

Editor
Baxter Springs Citizen
P.O. Box 290
Baxter Springs KS 66713-0290

Editor
Galena Sentinel-Times
320 Main
Galena KS 66739

Editor
Chetopa Advance
P.O. Box 207
Chetopa KS 67336

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Editor
Emporia Gazette
P.O. Drawer C
Emporia KS 66801

News Director
KVOE-AM Radio
P.O. Box 968
Emporia KS 66801

Editor
Cherryvale Chronicle
115 N. Labette, P.O. Box 156
Cherryvale KS 67335

Editor
Independence News
210 W. Main
Independence KS 67301

News Director
KGGF Radio
P.O. Box 1087
Coffeyville KS 67337

Editor
Columbus Daily Advocate
P.O. Box 231
Columbus KS 66725

Editor
Altamont Journal & Edna Sun
P.O. Box 405
Altamont KS 67330

Editor
Farm Talk
P.O. Box 601
Parsons KS 67357

Editor
Oswego News
P.O. Box 269
Oswego KS 67356

Editor
Parsons Sun
P O. Box 836
Parsons KS 67357

News Director
KFFX-FM Radio
1420 Cote Drive
Emporia KS 66801

Editor
Caney Chronicle
P.O. Box 186
Caney KS 67333

Editor
Coffeyville Journal
P.O. Box 849
Coffeyville KS 67337

Editor
Independence Daily Reporter
P.O. Box 869
Independence KS 67301

News Director
KIND-AM & FM Radio
Drawer A
Independence KS 67301

News Director
KTPK-FM Radio
3003 SW Van Buren Street
Topeka KS 66611-2224

Assignment Editor
KTWU-TV (CH 11 - PBS)
1700 SW College Avenue
Topeka KS 66621

Editor
Topeka Capital Journal
616 Jefferson Street
Topeka KS 66607

News Director
WIBW AM & FM Radio
P.O. Box 119
Topeka KS 66601

Editor
Neodesha Sun-Register
P.O. Box 356
Neodesha KS 66757

Editor
Wilson County Citizen
P.O. Box 330
Fredonia KS 66736

Editor
Yates Center News
P.O. Box 285
Yates Center KS 66783

ATTACHMENT B: PROJECT MAILING LIST

W K Nielsen
502 Wilson #29
Emporia, KS 66801`

Mike Reed
209 Leavenworth Street
Ottawa, KS 66839

Larry Bess
730 Whildin
Emporia, KS 66801

Ron Casey
111 2nd J-Creek
Hartford, KS 66854

Kevin Wellnitz
2022 Road 140
Neosho Rapids, KS 66864

Terry Emmons
465 2nd Street J-Creek
Hartford, KS 66854

Robert H Withrow
3083 North Third
Chetopa, KS 67336

Ben Cuadra
Waverly, KS 66817

Jane Becker
P O Box 85
Chetopa, KS 67336-0085

Darrell Baumhf
405 South Tenth
Chetopa, KS 67336

Jeff Jackson
6429 SW Lostine Road
Columbus, KS 66725

James Loncarich
2178 17000 Road
Oswego, KS 67356

Linda Jackson
11510 SW Black Jack Road
Chetopa, KS 67336

Jerry Getman
20062 York Road
Oswego, KS 67356

Irene & David Elmore
516 North Third
Chetopa, KS 67336

Steve Blackledge
3098 North Eighth
Chetopa, KS 67336

Delbert Johnson
20021 Wallace Road
Oswego, KS 67356

Glen Summer
Rt. 2 Box 186
Welch, OK 74369

Henry Bell
9532 SW Star Road
Chetopa, KS 67336

Lloyd McGill
P O Box 121
Chetopa, KS 67336

Jack Dalrymple
54301 E 75 Road
Miami, OK 74354

Bob Earls
8188 SW Star Road
Chetopa, KS 67336

W P Zimmerman
Rt 2 Box 305
Welch, OK 74369

Steve Darnell
P O Box 520
Chetopa, KS 67336

Grace & Roy Fromm
Rt 2, Box 340
Welch, OK 74369

Mr & Mrs Francis Pope
1605 Emmer Road
Hartford, KS 66854

V O Morgan
Rt 2, Box 295
Welch, OK 74369

Richard Casey
230 Main Street
Hartford, KS 66854

Raymond & Bonnie Conrad
6084 SW 120th Street
Chetopa, KS 67336

Emporia State University
1200 Commercial Street
Emporia, KS 66801

Al Newkirk
417 SW
Miami, OK 74354

Kansas State Historical Society
6425 SW 6th Avenue
Topeka, KS 66615-1099

Faye Lester
Rt 2, Box 315
Welch, OK 74369

Art Bond
300 Main Street
Hartford, KS 66854

Ruth Campbell
403 Pecan Street
Chetopa, KS 67336

T N Terrell
140 - 2nd Street
Hartford, KS 66854

William Reid
P O Box 247
10331 SW 95th
Chetopa, KS 67336

Larry Stevens
344 Lakeview
Burlington, KS 66839

Ron Wood
P O Box 395
Chetopa, KS 67336

Margaret Wiston
440 - 17th Road
Hartford, KS 66854

Ralph Johnson
Rt 2 Box 487
Welch, OK 74369

Grover Cleveland
1091 - 19th Rd NW
Burlington, KS 66839

George McGill
P.O Box 704
Chetopa, KS 67336

Carroll E Rohr
831 Oxen Lane
Leroy, KS 66857

Kenny Reed
P.O Box 452
Chetopa, KS 67336

Ken Reznicek
871 - 13th Road
Burlington, KS 66839

Mary Newkirk
P O Box 1023
Miami, OK 74355

George Wellnitz
864 Rd 150
Neosho Rapids, KS 68864

Jerry Morris for
U S Rep Tom A. Coburn
215 State Street, Suite 815
Muskogee, OK 74401

Kathy & Jim Zell
301 Choctaw
New Strawn, KS 66839

John M Epler
8770 SW Messer
Columbus, KS 66725

Robert E Woods
101 Main, J-Creek
Hartford, KS 66854

Ken Foster
1627 – 7000 Road
Edna, KS 67342

Rick & Deborah Wistrom
100 Main, J-Creek
Hartford, KS 66854

Gene Merry
700 Neosho Street
Burlington, KS 66839

Clara Reisbig
702 South 4th Street
Burlington, KS 66839

Larry Wistrom
440 NW
Hartford, KS 66854

Dennis Ruth
662 Quail Lane SE
Leroy, KS 66857

City of Emporia
522 Mechanic Street
Emporia, KS 66801

City of Chanute
101 South Lincoln
Chanute, KS 66720

Roger Reisbig
442 - 10th Road SW
Burlington, KS 66839

Dan Haines
Wolf Creek Nuclear Operations Corp
2640 Reaper Street
Waverly, KS 66871

City of Burlington
301 Neosho Street
P O Box 207
Burlington, KS 66839

Ron Freund
2444 Iris Road
Lebo, KS 66856

Chris Hase
KDW&P
512 SE 25th Avenue
Pratt, KS 67124-8174

Al LeDoux
Kansas Water Office
901 South Kansas Avenue
Topeka, KS 66612-1249

City of Leroy
City Hall
P O Box 356
Leroy, KS 66857

Joe Rohr
818 Oxen Lane
Leroy, KS 66857

USFWS
Flint Hills Nat'l Wildlife Refuge
P.O Box 128
Hartford, KS 66854

Dr Lloyd Fox
KDW&P
P O Box 1525
Emporia, KS 66801-1525

USFWS, Region 6
Regional Director
134 Union Boulevard, Ste. 350
Lakewood, CO 80228

USEPA, Region 8
Regional Director
999-18th Street, Ste 300
Denver, CO 80202-2466

USGS
Biological Resources Division
4512 McMurry Avenue
Fort Collins, CO 80525

USDA-NRCS
313 Crossing Street
Burlington, KS 66839

Burlington – Post Office
1565 Embankment Road SW
Burlington, KS 66839

Coffey County Commissioners
Courthouse
Burlington, KS 66839

USDA – Farm Services Agency
313 Cross Street
Burlington, KS 66839

USDA–Farm Services Agency
2501 West 18th Street
Emporia, KS 66801

Lyon County Commissioners
Emporia, KS 66801

National Park Service
Tallgrass Prairie National Preserve
Route 1 Box 14
Strong City, KS 66869

USDA – NRCS
2501 West 18th Avenue
Emporia, KS 66801

Honorable Sam Brownback
United States Senate
303 Hart Senate Office Building
Washington, DC 20510

Honorable Sam Brownback
United States Senator
612 South Kansas Avenue
Topeka, KS 66603

Honorable Jerry Moran
House of Representatives
1519 Longworth House Bldg
Washington, DC 20515

Honorable Bill Graves
Governor of Kansas
State Capitol Building, 2nd Floor
Topeka, KS 66612

State Representative Peggy Long
P.O. Box 546
Madison, KS 66860

Honorable Pat Roberts
United States Senate
302 Hart Senate Office Bldg
Washington, DC 20510

Honorable Pat Roberts
Frank Carlson Federal Building
444 SE Quincy, Room 392
Topeka, KS 66683

Honorable Jim Ryun
House of Representatives
330 Cannon House Office Building
Washington, DC 20515

Honorable Jim Ryun
Representative in Congress
800 SW Jackson, Suite 100
Topeka, KS 66612

Burlington Chamber of Commerce
P O Box 423
Burlington, KS 66839

Emporia Chamber of Commerce
719 Commercial Street
P O Box 703
Emporia, KS 66801

Hartford City Hall
Mayor Steve Burris
5 Commercial Street
Hartford, KS 66854

City of Iola
P O. Box 308
Iola, KS 66749

Mr. William Banks, Archaeologist
Historic Preservation Office
6425 SW 6th Avenue
Topeka, KS 66615-1099

Citizen Potawatomi Nation
1901 S Gordon Cooper Drive
Shawnee, OK 74801

Seneca-Cayuga Tribe of Oklahoma
P O. Box 1283
Miami, OK 74355

Wichita and Affiliated Tribes of
Oklahoma
P O Box 729
Anadarko, OK 73005

Sac & Fox of the Mississippi
in Iowa
349 Meskwaki Road
Tama, IA 52339

Kaw Nation
Drawer 50
Kaw City, OK 74641

Osage Nation
P O. Box 53
627 Grandview Avenue
Pawhuska, OK 74056

Prairie Band Potawatomi
Nation
14880 K Road
Mayetta, KS 666509

Sheila Bjorlo
National Wildlife Federation
1412 - 16th Street, NW
Washington, DC 20036

Carol Borgstrom, Dept. of Energy
Forrestal Building, Room 4G-085
1000 Independence Avenue, SW
Washington, DC 20585-0001

Eddie R Crouse, Associate Chief
East Branch Project Review
Fed Energy Regulatory Comm
Washington, DC 20426

Scott Faber
Director of Floodplain Programs
801 Pennsylvania Ave, SE, Ste 400
Washington, DC 20003

Richard Sanderson, Director
Office Fed Activities (2252), EPA
401 M Street SW
Washington, DC 20460-0001

Dir Advisory Council Hist Pres
Old Post Office Bldg , #803
1100 Pennsylvania Ave , NW
Washington, DC 2004-2590

Dir Div Environmental Analysis
Office Hydropower Lic., FEC
400 First Street, NW
Washington, DC 20426-0001

Associate General Counsel
Fed Emergency Mgmt Agency
500 C Street, SW, Room 840
Washington, DC 20472-0001

Dir Office of Env. Policy (HEV-1)
FHWA, Nassif Bldg, Room 3222
400 Seventh Street, SW
Washington, DC 20590-0001

Dir, Office Energy & Environmental
Impact
Federal Maritime Commission
1100 L Street, NW
Washington, DC 20573-0001

Asst Sec Natural Resources & Envir
USDA / Admin Bldg , Room 242-W
14th & Independence Ave., SW
Washington, DC 20250-0001

Envir Policy, Special Engineering
Standards Division
USDA Rural Electrification Admin
14th Street and Independence, SW
Washington, DC 20250-0001

Ecology & Conservation Division
Office of Policy & Planning - NOAA
Herbert Hoover Building, #H-6111
14th & Constitution Avenue, NW
Washington, DC 20230-0001

Dir, Office of Environment and Energy
US Dept of Housing & Urban
Development
Room 7154, HUD Building
451 - 7th Street, SW
Washington, DC 20410-0001

Dir, Ofc of Environmental Affairs
U S Dept of the Interior
1849 C Street, NW, Mail #23240
Washington, DC 20240-0001

Dep Dir for Env & Policy Review
U S Dept of Transportation, #10309
Nassif Bldg , 400 - 7th Street, SW
Washington, DC 20590-0001

Commander
Eighth Coast Guard District
Hale Boggs Fed Bldg - 500 Camp St
New Orleans, LA 70130-3313

Ron Klatske
National Audubon Society
210 South Wind Avenue
Manhattan, KS 66502

Glen Cheathum, Waterways Branch
Oklahoma Department of Transportation
P O Box 660
Tulsa, OK 74104-0660

Bob Portiss
Port Director
5330 Cimarron Road
Catoosa, OK 74105-1650

William Gill
U S Fish & Wildlife Service
Kansas State Office
315 Houston, Suite E
Manhattan, KS 66502

Steve Williams
Kansas Department of Wildlife & Parks
900 SW Jackson Street, Ste. 502
Topeka, KS 66612

Dennis Grams
Regional Administrator, USEPA
726 Minnesota Avenue
Kansas City, KS 66101

Dr Ramon Powers
State Historic Preservation Officer
6425 SW 6th Avenue
Topeka, KS 66615-1099

Ron Hammerschmidt, Director
Division of the Environment
Landon State Office Bldg , Rm 901
Topeka, KS 66612-1290

Richard Pankratz, Director
State Historic Preservation Office
6425 SW 6th Avenue
Topeka, KS 66615-1099

James Habiger
USDA NRCS
760 South Broadway
Salina, KS 67401

Office of the Director
Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, KS 66604-4027

Office of the Director
KDA, Division of Water Resources
901 South Kansas Avenue, 2nd Floor
Topeka, KS 44412-1283

Office of the Director
Kansas Forest Service
2610 Clafin Road
Manhattan, KS 66502-2798

Office of the Director
Kansas Water Office
109 SW 9th, Suite 300
Topeka, KS 66612-1249

Office of the Director
Kansas Biological Survey
2041 Constant Ave , Campus West
Lawrence, KS 66044-2906

Office of the Director
State Conservation Commission
109 SW 9th, Suite 500
Topeka, KS 66615-1099

James R Triplett, Chairperson
Dept of Biology, Pittsburg State Univ
1701 Broadway Street
Pittsburg, KS 66762-5889

Freda Culver
6266 Quakervale
Riverton, KS 66770-9712

Jerry Fultz
1680 - 18000 Road
Parsons, KS 78357-3719

Steve Commons
P.O Box 928
Emporia, KS 66801-0928

Joe Works
870 Hawait Road
Humboldt, KS 66748-9750

Jim Zell
301 Choctaw Street
New Strawn, KS 66839-9801

Pat Sauble
RR1
Cedar Point, KS 66843-9801

Chauncey E Shepard
2824 Massey Road
McCone, KS 66753-6015

Donald E Becker
603 South Jefferson Street
Iola, KS 66749

Dennis Youk
519 Locust Street
Marion, KS 66861-1431

Steve Planner
Basin Planner
109 SW 9th Street, Suite 300
Topeka, KS 66612-1249

John & Cindy Epler
8770 SW Messer Road
Columbus, KS 66725

City of Humboldt
Humboldt, KS 66748

Jack Dalrymple
54301 East 75 Road
Miami, OK 74354

V O Morgan
Rt 2, Box 295
Welch, OK 74369

Larry Bork
3820 SW Roy Road
Topeka, KS 66610

Kansas Dept of Health & Environment
Signature State Office Building
1000 SW Jackson
Topeka, KS 66612

Kansas Dept. of Transportation
915 Harrison, Room 754
Docking State Office Building
Topeka, KS 6612-1568

Jarik & Wilma Mosier
25676 South 608 Road
Grove, OK 74344

De Goodrich
26001 South 605th Road
Grove, OK 74344

Richard Ball
Grove City Council
Box 1268
Grove, OK 74434

Paula Hall-Collins
Executive Director, Grove Chamber
104 B West 3rd Street
Grove, OK 74344

Jan Norman, Executive Director
Grand Lake Association
Route 2, Box 40
Grove, OK 74344

Bruce Poindexter
Delaware County Commissioner
Jay Courthouse
Jay, OK 74346

Larry Gatewood
Chamber of Commerce
9974 South 592nd Road
Miami, OK 74354

James Graves
Ottawa County Commissioner
508 South Francis
Pitcher, OK 74360

Ben Loring
Ottawa District Attorney
102 East Central, Suite 301
Miami, OK 74354

Honorable Louis (Red) Mathia
Mayor of Miami
P.O Box 1288
Miami, OK 74355-1288

Tony Shepard
USDA-ASCS
630 East Steve Owens
Miami, OK 74354

Gary Bogle
Route 1
Strang, OK 74367

Don Brewer
Lakemont Shores Property Owners
RR1, Box 892
Eucha, OK 74342

C.E Holliday
Lake Center West
100 Lakeland Drive
Pryor, OK 74361

Rudy Olson
108 North Georgetown Road
Fort Gibson, OK 74434

Julia Teska, President
South Grand Lake Chamber
P O Box 820
Langley, OK 74350

Lonie Addis
Labette County Commissioner
640 Iowa Street
Oswego, KS 67356

Allen County Commission
1 North Washington
Iola, KS 66749

Gordon Conger
RC&D
Route 3
Iola, KS 66749

Bob Eads
Kansas/Oklahoma Flood Control
P O Box 165
Chetopa, KS 67336

Margaret Fast
Kansas Water Office
109 SW 9th Street, Suite 300
Topeka, KS 66612

Ron Coker
Grand River Dam Authority
P O Box 409
Vinita, OK 74301-0409

Larry Tiemann, Supervisor
Kansas Dept of Wildlife and Parks
1500 West 7th Street, Box 777
Chanute, KS 66720

USGS Biological Resources Division
Columbia Environmental Research Ctr
4200 E New Haven Road
Columbia, MO 65201-9634

Edwin Miller
Kansas Department of Wildlife & Parks
Box 945
Independence, KS 67301

Scott Barlow
Kansas Department of Wildlife & Parks
738 Fegan Road
Toronto, KS 66777

Terry Heatherly
Twin Bridges State Park
14801 South Highway 137
Fairland, OK 74343-9741

Ron Suttles
Department of Wildlife Conservation
P O Box 53465
Oklahoma City, OK 73105

Bert Vanatta
52421 East 65th Road
Miami, OK 74354

Pete and Jim Howser
Harbours View Marina
Route 2, Box 149
Afton, OK 74331

Leonard Jirak
Kansas Department of Wildlife & Parks
540 16th Road NW
Hartford, KS 66854

Jim Smith
Department of Wildlife Conservation
Route 1, Box 75-B
Porter, OK 74454

Gary Voight
KAMO Electric Cooperative
900 South Wilson
Vinita, OK 74301

Gene Merry, Chairman
Coffey County Commissioners Office
Coffey County Courthouse
Burlington, KS 66839

Robert Culbertson
Kansas Department of Wildlife & Parks
207 NW West Cheyenne
New Strawn, KS 66839

Honorable Pat Roberts
United States Senator
4200 Somerset, Suite 152
Prairie Village, KS 66208

City of Council Grove
313 West Main Street
Council Grove, KS 66846

Honorable Todd Tiahrt
House of Representatives
428 Cannon House Office Building
Washington, DC 20515

Honorable Todd Tiahrt
Representative in Congress
155 North Market, Suite 400
Wichita, KS 67202

Honorable Jerry Moran
Representative in Congress
1200 Main Street, Suite 402
Hays, KS 67601

ATTACHMENT C: SCOPING MEETING PRESENTATION AND HANDOUTS

US Army Corps of Engineers®

John Redmond Reallocation Study
Overview
March 2000

Background

In 1975, the State of Kansas and the Federal Government entered into a water supply agreement for an estimated 34,900 acre-feet of storage remaining after 50 years of sedimentation. After the agreement was signed, it was determined that sediment was entering the reservoir unevenly from what had been predicted.

Storage available for water supply purposes in the lake has been depleted by the sediment distribution such that water supply agreement obligations are being infringed upon. Most of the sediment deposited in the lake pool has been below elevation 1039.0 feet (top of conservation pool) National Geodetic Vertical Datum (NGVD). Based on Corps sediment surveys for 1964-1993, it was predicted that adequate storage would be available below elevation1068.0 feet NGVD (top of flood control pool) at the end of the economic life of the project (Year 2014) to meet all authorized project purposes However, the top of the conservation pool should ultimately be established at a higher elevation to equitably reapportion the storage between the conservation and the flood control pools.

When a reservoir is designed, each pool (flood control, conservation, sediment) is designed to capture a proportionate amount of sediment In the case, of John Redmond the sediment load has been as predicted; however, the sediment is accumulating in the conservation pool while the flood control pool has experienced less than expected sedimentation losses.

Alternatives

This study will evaluate a number of alternatives. The alternatives include the no action plan, which follows current operational practices. Other alternatives include a 2-foot rise with the intentions of raising the conservation pool to elevation 1040.0 feet NGVD and using a phased in pool raise of the remaining 1 foot, in one-half foot increments, if needed. Part of the National environmental Policy Act scoping process is to solicit suggestions, comments, and questions about any alternatives for operating the lake. Comments can be directed to the point of contact listed at the end of this document

Effects on Flood Control

Under the alternative of raising the conservation pool, current flood control storage will be reduced to the amount that was originally anticipated to be available at this point in the project life The extra flood control storage that has been of benefit in three occasions since May 1993 will no longer be available.

Under current conditions, the Neosho River has experienced frequent flooding on the reach from John Redmond to Pensacola Dam in Oklahoma. Most of the flooding is in the lower reach of the river due to uncontrolled runoff, however, the perception may be that reduced flood control

storage at John Redmond is to blame should any future floods occur.

In the lake itself, the frequency and duration of higher pool elevations will increase. More frequent closing of roads and public used areas would be expected.

Effects on Water Supply

A recent Kansas Water Office water supply yield analysis indicated that the disproportionate sediment deposition has reduced the water supply capacity at design life by 25 % (approximately 6.5 million gallons per day). The water supply agreement with the Kansas Water Office allows for pool adjustment in one-half foot increments. In order to make an equitable redistribution between the flood control and conservation pools, the top of the conservation pool needs to be raised 1 foot immediately to elevation 1040.0 feet NGVD Sediment deposition predictions have indicated that additional equitable redistribution will need to be made. The Federal Government has a water supply agreement with the Kansas Water Office for all water supply storage in John Redmond. The Kansas Water Office has water supply contracts with the Wolf Creek Nuclear Generating Plant and members of the Neosho Basin Assurance District.

Areas for Consideration

The Corps of Engineers will evaluate the effects of alternatives on flood control and water supply Other areas to be part of the evaluation will include

- Impacts to the Flint Hills National Wildlife Refuge located in the upper reaches of the lake
- Impacts to recreation and recreation facilities
- Impacts to the dam structure
- Impacts to fish and wildlife resource within, below, and above the lake
- Downstream flows on the Neosho River
- Other impacts identified by the public, agencies, or Corps studies

Point of Contact

All environmental considerations will be addressed according to the National Environmental Policy Act. Agencies and the public are encouraged to make comments, ask questions, or make suggestions regarding the John Redmond Reallocation Study. The point of contact is:

Ms Jan Holsomback
U S Army Corps of Engineers, Tulsa District
ATTN CESWT-EC-HM
1645 S. 101st East Ave
Tulsa, OK 74128-4629 Phone· 918-669-7089

WELCOME TO TONIGHT'S WORKSHOP

U. S. Army Corps of Engineers, Tulsa District

John Redmond Lake, Kansas Reallocation Study

Public Information Workshop

Public Involvement

Questions and Comments

- Your Views Are Important
- Comment or Question Forms Available Here, or ..
- Take a Sheet Home and Complete It at Your Convenience
- Postage-paid Envelopes Available at This Table

Mailing List

- List to Keep People Informed; IT WILL NOT be Used For Any Other Purpose
- Sign-in Sheet at Welcome Table will be Used for the Mailing List
- If You Do Not Want to be Included on the Mailing List, Please Indicate Your Preference

More Information?

- The Study Document Will Be Available at Local Public Libraries
- Study Summary Available Here Tonight; Complete Study Available at Cost (Complete Request Form Here)
- Call or Write Anytime! (See Any Representative Here)
- See Web Site. www.swt.usace.army.mil

Scoping Process

- Required by National Environmental Policy Act; Participation With Other Agencies and The Public
- Purpose: Solicit Comments and Questions on Project Alternatives and Impacts
- Official Period Begins March 29, 2000
- Conducted Throughout the Documentation Process (The Workshops Are the First Step)

Public Notices

- Federal, State, Local Agencies and Public Notified of Scoping Period
- Notices made for:
  - Comments on Draft Documents
  - Investigation Findings
  - Record of Decision (if any)

THANK YOU!!!

Your participation is essential!

OVERVIEW

Study Background

- In 1975, the State of Kansas and the Federal Government Entered Into a Water Supply Agreement
  - 34,900 Acre-feet of Storage

Study Background

- Sediment Entered the Reservoir Unevenly
- Storage Available for Water Supply Purposes in the Lake Has Been Depleted by the Sediment

Study Background

- The Sediment Load Has Been As Predicted,
  - However, the Sediment Is Accumulating in the Conservation Pool
  - While the Flood Control Pool Has Experienced Less Than Expected Sedimentation Losses.

Alternatives

- No Action Plan
  - Current Operation
- Raise Conservation Pool
  - Raise Pool 1 foot Initially (1039-1040 0)
  - Raise Pool in 1/2-Foot Increments Thereafter-if Needed (1040 5-1041 0)

Workshop Purpose

- Serves as part of Scoping Process under the National Environmental Policy Act (Identification of Project Impacts)
- Encourages Public Involvement Two-Way Communication
- Overall Purpose
  - Listening and Informing

Alternatives

- Other Alternatives to be Identified During Scoping Process
- Evaluated in Terms of
  - Meeting Water Supply Contracts
  - Environmental Criteria
  - Social Acceptability

Location and Benefits

- Neosho River Basin
  - A Tributary of the Arkansas River River
  - Central Kansas
- Project Benefit/Impact Areas
  - Upstream Recreation and Wildlife Areas
  - Water Supply
  - Downstream Flood Control
  - Water Quality

Water Supply Contract With State of Kansas

- Signed in 1975
- Estimated to Contain 34,900 Acre-feet After Adjustment for Sediment Deposits
- Project Economic Life Ends in 2014
- Contract Amended in 1978 to Allow for an Equitable Redistribution of Sediment Reserve Storage

Reallocated Water Quality Storage Contract with the State of Kansas

- Reallocated Water Quality Storage to Water Supply Storage
- Contract Signed in 1996
- Estimated to Contain 10,000 Acre-feet After Adjustment for Sediment Deposits
- Project Economic Life Ends in 2014

% of Conservation Pool Lost to Sedimentation

Sediment Survey Yr	Conservation Total (Ac-Ft)	Percent Reduction	Cumulative Reduction
1964	82,120	0	0
1974	71 805	13	13
1983	64 210	8	21
1991	60 620	5	26
1993	57,840	4	30
2000	?	?	?

Present Conditions 1993 John Redmond Storage

- Flood Control Storage-1039 0-1068 0 NGVD
  - 565,300 Acre-feet
- Conservation Storage-1020 0-1039 0 NGVD
  - 57,840 Acre-feet Total Conservation Pool
  - 11,760 Acre-feet Water Quality Storage Reallocated to Water Supply
  - 32,300 Acre-feet Authorized Water Supply
  - 13,780 Acre-feet Authorized Remaining Water Quality

Predicted Future Conditions 2014 John Redmond Storage

- Flood Control Storage-1039 0-1068 0 NGVD
  - 565,300 Acre-feet
- Conservation Storage-1020 0-1039 0 NGVD
  - 49,160 Total Acre-feet
  - 10,000 Acre-feet Reallocated Water Quality to Water Supply
  - 27,450 Acre-feet Authorized Water Supply
  - 11,710 Acre-feet Remaining Authorized Water Quality

John Redmond Reservoir Pool Raise Study

- Funds received 1st Quarter Fiscal Year 2000 (October 1999)
- Study will consist:
  - Public Meetings
  - Aerial Mapping
  - Hydrographic Sediment Survey
  - Hydrology and Hydraulics Analysis
  - Flood Control Analysis

John Redmond Reservoir Pool Raise Study - Continued

- Socioeconomic Analysis
- NEPA Documentation
- HTRW Evaluation
- Geotechnical Analysis
- Real Estate Flowage Easements
- Cultural Resources
- Biological Assessment
- U S Fish & Wildlife Coordination

Affected Environment

John Redmond Reservoir Pool Raise Study - Schedule

- Study Schedule
  - Preliminary Work Began November 1999
  - Contracts for Aerial Mapping & Cultural Resources Awarded March 2000
  - U.S Fish & Wildlife Coordination Process Began January 2000
  - Flood Analysis/Hydrology Analysis Begins Fiscal Year 2001

John Redmond Reservoir

- On Neosho River in Coffey County, Kansas
  - 3 Miles Northwest of Burlington
- Earthfill Embankment With a Concrete Spillway
  - 21,790 Feet Long
  - 86 5 Feet Above Streambed
- Full Flood Control Operation in September 1964
- All Construction Completed in December 1965

John Redmond Storage

- Flood Control Storage
  - 1039 0-1068 0 Foot Elevation
  - 565,346 Acre-feet
  - Top of Flood Control Surface Area = 31,700 Acres
- Conservation Storage
  - 1020.0-1039.0 Foot Elevation
  - 34,900 Acre-feet Water Supply (24.5 Million Gallons Per Day)
  - 27,600 Acre-feet Water Quality
  - Top of Conservation Surface Area = 9,400 Acres

Environmental Elements

- Soils, Climate, Water, Air Quality
- Water and Land Resources
- Flora and Fauna (Plants and Animals)
- Threatened and Endangered Species
- Sensitive Lands and Water Resources
- Socioeconomic/Social Resources
- Cultural Resources

Upstream and Downstream Areas

- Reservoirs Lands
  - Otter Creek Game Management Area
  - Flint Hills National Wildlife Refuge
  - Nine Corps of Engineers Recreation Areas
- Downstream Areas
  - Flood Control for 312,000 Acres Farm Land
  - Flood Damages Prevented = $281, 541,000

Environmental Impacts

Potential In-Pool Impacts

- Flint Hills National Wildlife Management Area (Upstream)
- Otter Creek Wildlife Management Area
- Recreation Use on John Redmond
- Cultural/Archeological Sites
- Fish and Wildlife Habitat Losses

Potential Downstream Impacts

- Flood Control Storage
  - Less Flood Protection
- Threatened and Endangered Species
  - Mad Tom Fish Which Lives Below the Dam
- Downstream Flow on the Neosho River
  - Possible Stream Bank Erosion

Potential Impacts

- Others Impacts Found During Scoping Process
  - Environmental Studies
  - Federal, State, and Local Agency Input
  - Input from the Public about Impacts

National Environmental Policy Act Scoping Process

- Identifying Environmental Impacts/Issues
- Includes
  - Participation of Federal, State, Local Agencies, Native American Tribes, Interested Parties
  - Determining The Significant Impacts/Issues
  - Identify Non-significant Issues Or Those Issues Covered By Prior Review

National Environmental Policy Act

- Scoping
- Identify Changes With and Without Project
- Identify Significant Impacts
- Include Public Comment and Response
- Agency Review
- Document Impacts

Hydrology and Hydraulics

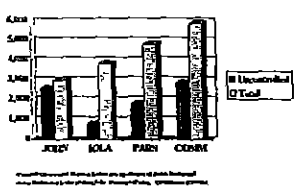
Neosho River - Controlled vs. Uncontrolled Drainage Areas

- John Redmond Lake Has a Total of 3,015 Square Miles of Drainage Area, 2,569 Square Miles Are Uncontrolled
- Commerce Gage (Near KS Border) Has an Uncontrolled Drainage Area of 2,861 Square Miles (More Than John Redmond) and a Total Drainage Area of 5,876 Square Miles

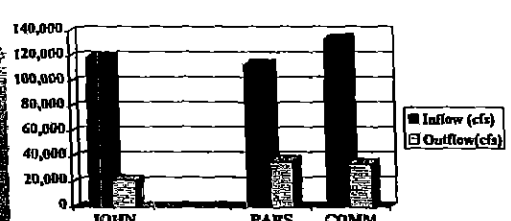
JOHN REDMOND STORAGES BEFORE AND AFTER A REALLOCATION

- 2-ft Rise Reduces Flood Storage by 3 5 %
- 1-ft Rise Reduces Flood Storage by 1 7 %
- Present Flood Pool 1039 0-1068 0
- Flood Storage Now 565,300 Acre-ft (3 52")
- Flood Storage 1-ft. 555,600 Acre-ft (3 45")
- Flood Storage 2-ft 545,700 Acre-ft (3.40")

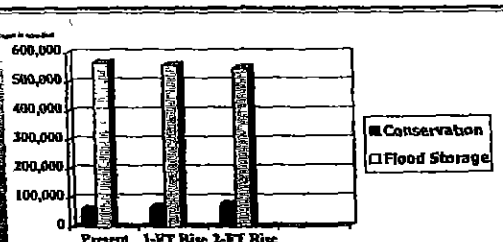
CONTROLLED VS. UNCONTROLLED DRAINAGE AREAS AT KEY POINTS (SQUARE MILES)



Flood of November 1998 Peak Flows



Flood Storage Reductions



Close

- Much of Basin Remains Uncontrolled.
- Reduction in Flood Storage Is Small (1.7 - 3.4 %) With 1-2 Foot Reallocation
- Most Downstream Flooding Is the Result of Uncontrolled Runoff Below John Redmond Due to 84 Hour Travel Time to KS/OK Border From Time of Redmond Release

ATTACHMENT D: LOG JAM PETITION

THIS IS A PETITION REQUESTING THE REMOVAL OF A LOG JAM .9 OF A MILE EAST OF THE STRAWN BOAT RAMP, WHICH IS NOW JACOB'S CREEK BOAT RAMP.

THE LOG JAM IS ENDANGERING AND RUINING PROPERTIES AND FARM LAND. THE LOG JAM IS BACKING WATER FROM THE BOAT RAMP, ALL THE WAY BACK TO EMPORIA. THIS IS CAUSING EXTREMELY HIGH WATER IN THE JACOB'S CREEK COMMUNITY, LOCATED SOUTH OF THE BOAT RAMP (WEST FROM WHERE THE COMMUNITY OF OLD STRAWN WAS LOCATED, WHICH WAS FLOODED OUT TO PUT IN JOHN REDMOND DAM AND RESERVOIR IN ORDER TO KEEP BURLINGTON AND LOWER LEVEL TOWNS FROM FLOODING).

THIS LOG JAM IS CAUSING MANY ROADS, LAND AND HOMES TO FLOOD OUT. IN HARTFORD, THIS HAS CAUSED FARMERS TO LOSE MANY CROPS TO FLOODING AS WELL AS LIMITING THEIR ACCESS TO THEIR LAND TO PLANT OR HARVEST CROPS.

IN NEOSHO RAPIDS SOME HOMES HAD TO BE EVACUATED THAT HAD NEVER BEEN EVACUATED FOR FLOODING BEFORE.

ALSO DUE TO THE WATER BACKUP MANY SCHOOL BUSES ARE HAVING TO REROUTE BECAUSE OF FLOODED ROADS, OFTEN SEVERAL MILES. THIS ALSO CREATES A PROBLEM FOR THE FIRE DEPARTMENT AND FIRST RESPONDERS.

IN 1981 THE LOG JAM WAS APPROXIMATELY 2 ½ TO 3 MILES FROM THE BOAT RAMP THE CORPS OF ENGINEERS CLAIM THEY CANNOT DO ANYTHING ABOUT THIS PROBLEM. THEY LOWER JOHN REDMOND LAKE 6 ', WHICH IS ADJACENT TO THE NEOSHO RIVER WHICH IS SUPPOSE TO GIVE US ACCESS TO THE RESERVOIR . THIS SHOULD GIVE THE CORPS AN OPPORTUNITY TO GET EQUIPMENT IN TO GET RID OF THE LOG JAM, BUT THEY DO NOT WANT TO DEAL WITH THIS LOG JAM AND HAVE TO WORRY WITH LOGS GOING THROUGH THE GATES AT THE DAM

THE CORPS CLAIMS THIS WAS NOT BUILT FOR RECREATION BUT TO PREVENT FLOODING, NOW THE LOG JAM IS CREATING FLOODING BY BACKING THE WATER UP BEFORE IT GETS TO THE DAM.

BY REQUEST OF LEONARD JIRAK (FISH BIOLOGIST) THEY ARE LOWERING THE LAKE 6 TO 12 FEET SO THE UNDERGROWTH CAN GROW TO BENEFIT THE DUCK HUNTERS. THEY HAVE ALSO PUT IN ROUGH ROCK PLACES FOR DUCK HUNTERS TO PUT BOATS IN

WE ARE GETTING AERIAL PICTURES AND COUNTY MAPS TO PIN POINT THESE AREAS AND FACTS.

NAME	ADDRESS
Margaret Wistrom	Jacobs Creek
Gary O. Wistrom	Jacobs Creek
Mark Pursley	JACOBS CREEK
Karen Pursley	JACOBS CREEK
Connie Dryden	Hartford
Gertrude Bonney	Jacobs Creek
Wayne H. Bonney	Jacobs Creek
Barbara Cummings	Jacobs Creek
Carol Harris	Jacobs Creek
Mark Harris	Jacobs Creek
Thomas N Terrell	Jacobs Creek
Juanita Peckels	JACOBS CREEK
Bob Peckels	JACOBS CREEK
Arthur Bonney	Jacobs Creek
Sharon Terrell	Jacob Creek
Dean Edwards	Jacob Creek
Louisa Edwards	Jacobs Creek
Dorothy LaFleety	Jacob Creek
Lois Stuffelbeam	Jacob Creek
Lorraine Engeita	Jacobs Creek
Richard L. Casey	Jacobs Creek
Cristy Casey	Jacobs Creek
James L Conner	Jacobs Creek
Delma Wistrom	Jacobs Creek
Ruth A. Wistrom	Jacobs Creek
Robert Wood	Jacobs Creek

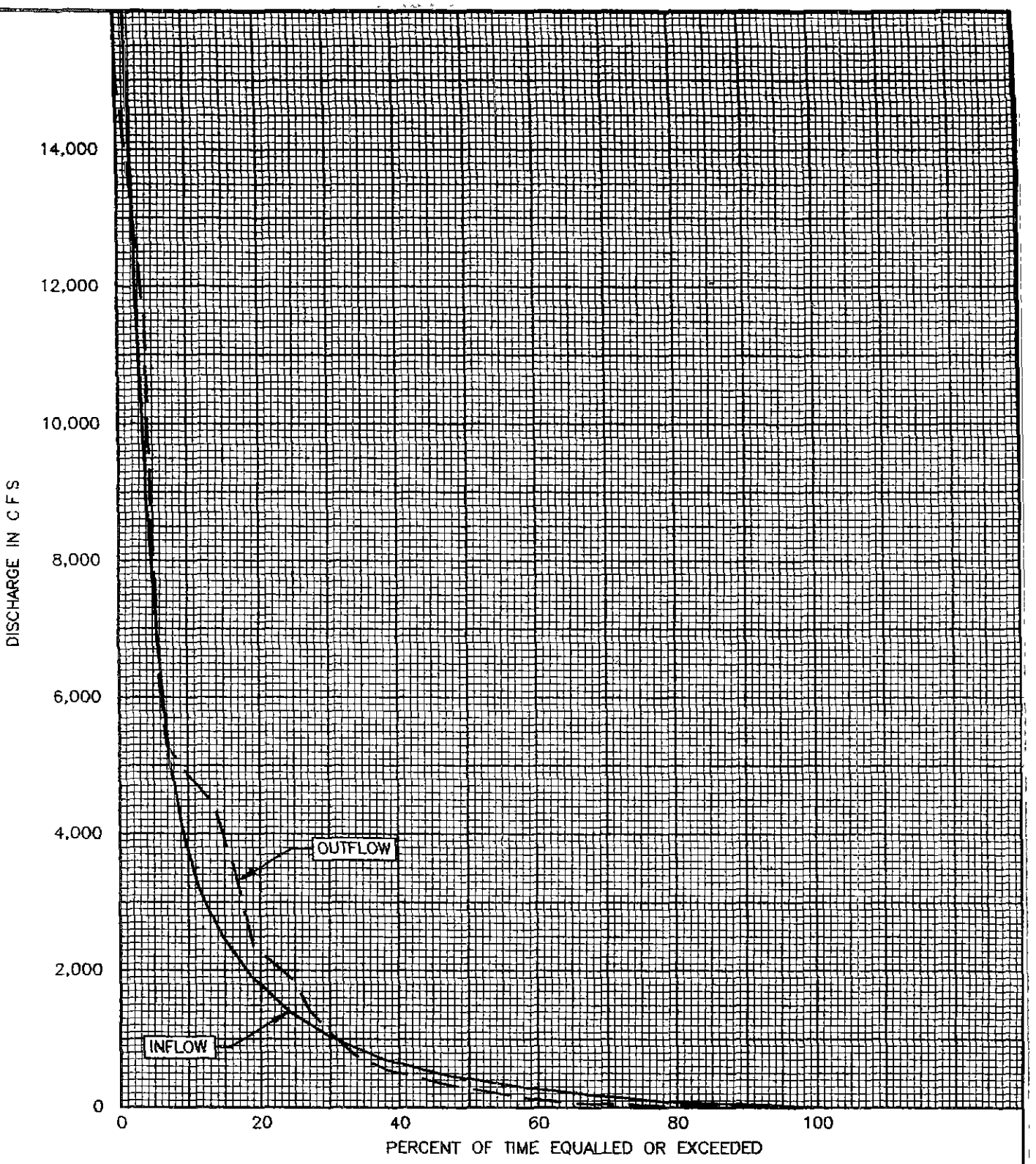
NAME	ADDRESS
Fred Woods	Jacobs Creek
Ruth Woods	JACOBS CREEK
Melvin E. Lagthan	Jacobs creek
Barbara Lagthan	Jacobs Creek
Ronald Hinkle	Jacobs Creek
Betty Hinkle	Jacobs Creek
Margaret Sterling	Jacob Creek
Daniel D. Langley	Jacobs Creek
Maria L. Langley	JACOBS CREEK
John Langley	Jacobs Creek
Leroy E. McPherson	Jacobs Creek
Sharon M. Black	Jacobs Creek
Jackie Eddings	Jacobs Creek
[illegible]	Jacobs Creek
Christy Johnson	Jacobs Creek
Angie Smith	Burlington
Ashley Curtis	Jacobs crick
Jarris Alexander	J. Creek
Gloria Lane	J. Creek
Jenny Emmons	J-Creek
[illegible] Emmons	Gridley
Mary Emmons	Jacobs Creek
John W. Denney	Jacobs Creek
Rachel Denney	Jacobs Creek
Ray Lorenz	Emporia KS
[illegible]	Burlington, Ks.

NAME	ADDRESS
Rufus Farmer	B'TON KS. 66839
Florence Jackson	Jacobs Creek
Bill Gosney	Burlington Ks ([redacted])
Paula Gosney	Burlington Ks
Harry L Stephens	Emporia, KS
Rosemary L Cysiewitz	Neosho Rapids Ks
William J Cysiewitz	NEOSHO RAPIDS KS
Nancy E Rollins	Burlington Kansas
Joy L Kingston	Burlington, Kansas
Carmen Burris	Hartford Kansas
Susan Burris	Hartford Kansas
Frank Naylor	Hartford Ks
Jim Naylor	Hartford KS
Ross Sturgis	Hartford Kansas
Ann Beckman	Hartford Ks
Jerry Kam	Emporia, Ks
Robert Sells	Ottawa, KS
Rita Sells	Ottawa, Ks
Mike Reed	Ottawa KS
Cheryl Reed	Ottawa, Ks.
Richard L Lyman Jr	Hartford Ks Jacobs Creek
Jerri J Lyman	Hartford KS Jacobs Creek
Merrill Harris	Jacobs Creek
Marian E Lyman	Jacobs Creek
Robert Farrell	Jacobs Creek

NAME	ADDRESS
Betty J. Tucker	Box 215 Hartford, KS 66854
Robert Tucker	Box 215 Hartford KS 66854
Linda L. Foster	304 W. Maple Hartford, KS 66854
William L. Foster	304 W Maple Hartford, KS 66854
Kelsie Peterson	208 W Maple, Hartford, Ks
William K. Peterson	208 W Maple Hartford KS
[illegible]	214 mill ST. Hartford
Carla M. Hagan	105 Merchant Hartford, KS 66854
Colleen Grieder	212 W Exchange Hartford, Ks
Glen Grieder	
David W Bess	2104 Co Rd 105 Hartford K.S.
Edward L Bess	422 E Maple Hartford Ks 66854
Calvin Yeager	212 Exchange Neosho Falls 66864 Kans
Debra K Bess	2104 Co Rd Hartford KS
Vicky J Bess	422 E Maple Hartford Ks
[illegible] N. [illegible]	400 Exchange Neosho Falls
Tom Sullivan	1695 Angus Rd NW Hartford KS
Chris Bartel	1461 Rd 20 Madison KS 66860
[illegible]	1611 Emporia Rd N.W. Hartford, KS 66854
[illegible]	" " " "
Larry Germann	520 Broad Hartford Ks
Joseph J Wing	291 Rd Y Hartford KS
Kenneth Harmon	1989 R190 Hartford KS
Esther Johnson	320 Commercial Hartford Ks

APPENDIX B

Hydrology and Water Resources



NOTE
BASED ON PERIOD OF RECORD
JAN. 1940 THRU DEC. 1993 FROM
SUPER RUN A94X03

NOTE
INFLOW CURVE
APPROACHES ZERO AT 65,000 CFS
OUTFLOW CURVE
APPROACHES ZERO AT 17,000 CFS

ARKANSAS RIVER WATERSHED — NEOSHO RIVER, KANSAS

JOHN REDMOND RESERVOIR

Figure B-1

FLOW DURATION CURVE

DEPARTMENT OF THE ARMY, TULSA DISTRICT, CORPS OF ENGINEERS 1994
DRAWN BY: S&G
CHECKED BY S.M.S.

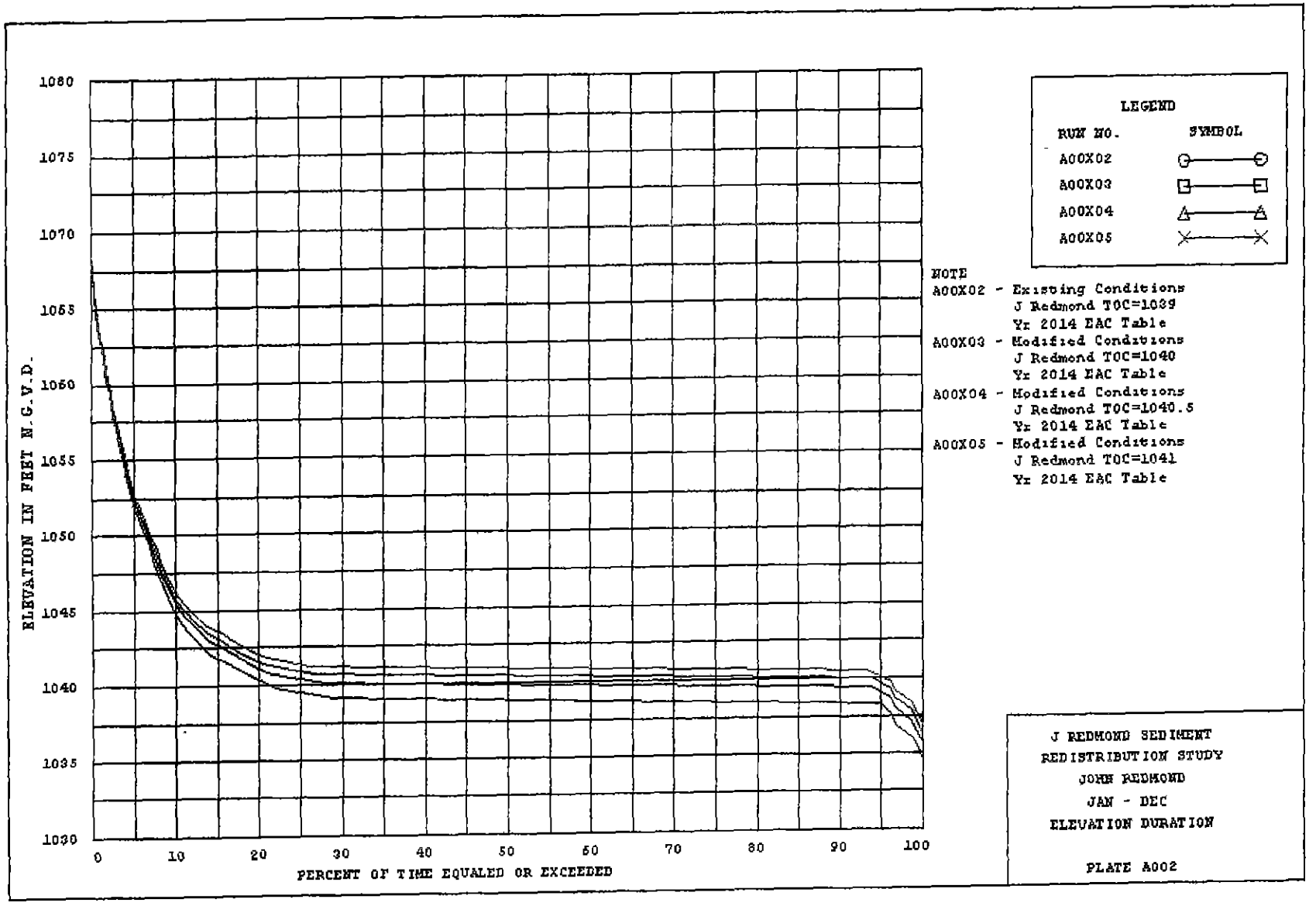


Figure B-2. Elevation Duration – Percent of Time Equaled or Exceeded vs Elevation at JRL for Year 2014
(Source. USACE SUPER 2000, Plate A002)

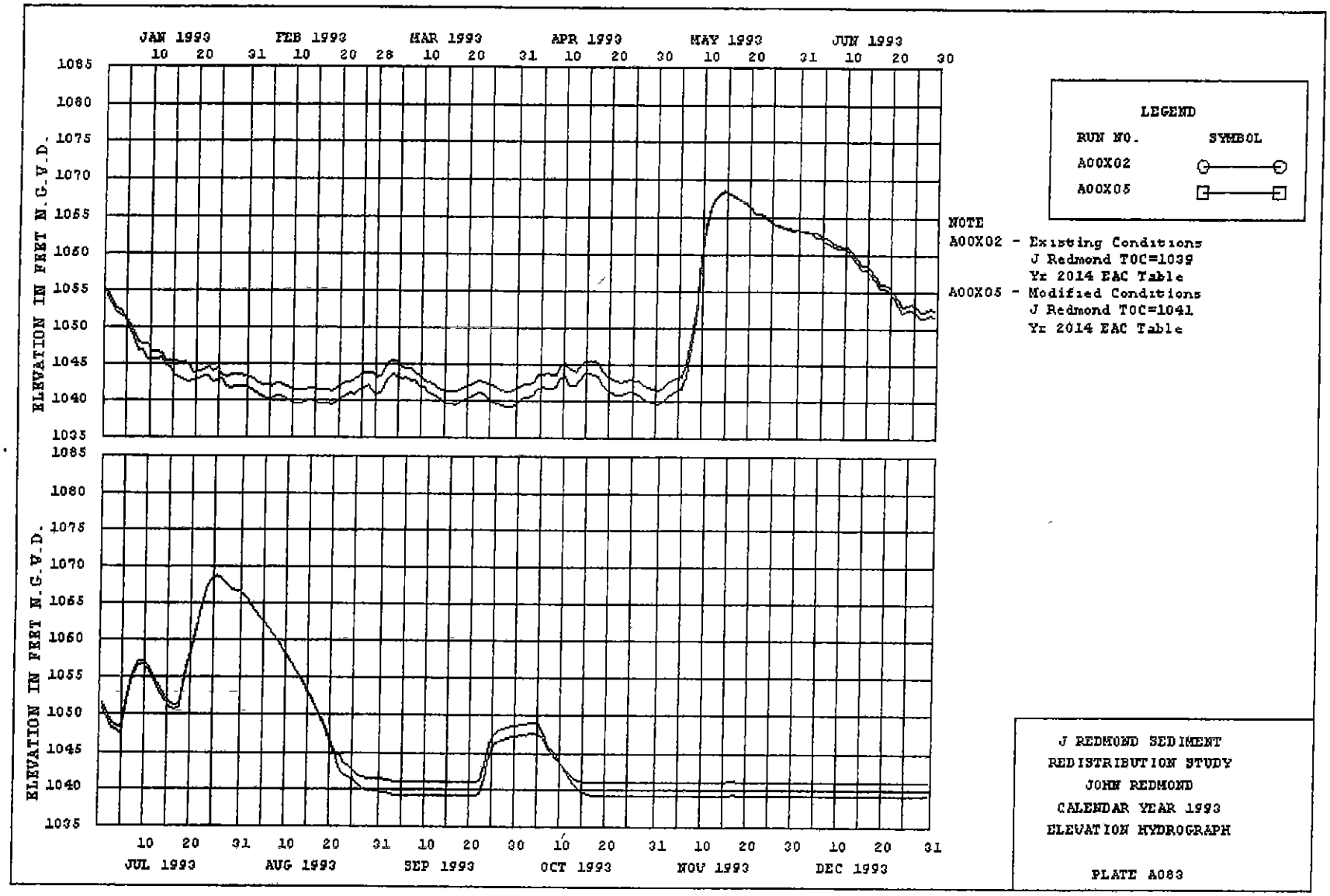


Figure B-3. Time vs. Elevation at John Redmond Lake at Year 2014
(Source USACE SUPER 2000, Plate A083)

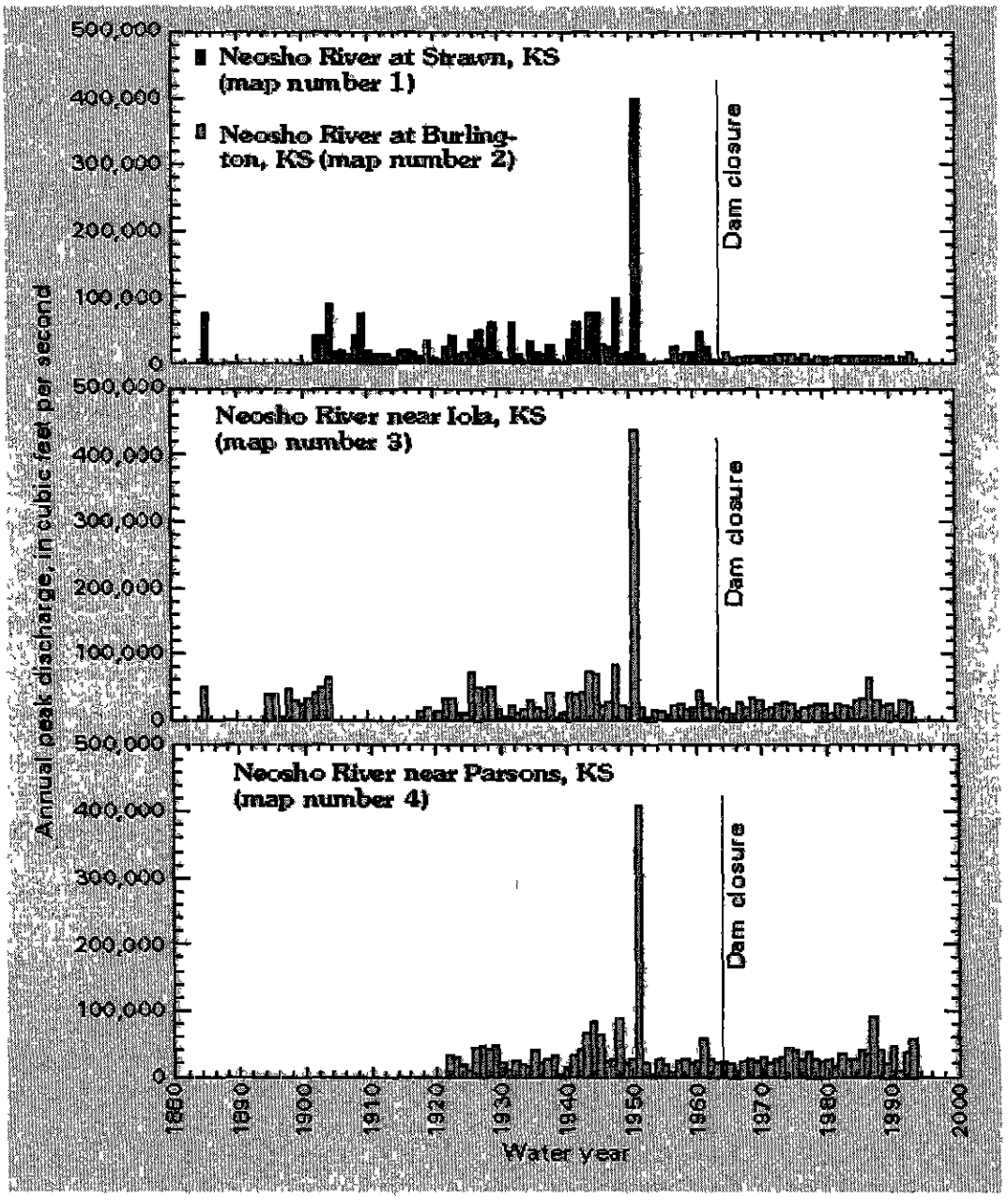


Figure B-4. Annual Peak Discharge for U.S Geological Survey Streamflow-Gaging Station Downstream from John Redmond Dam (Source· USACE SUPER 2000)

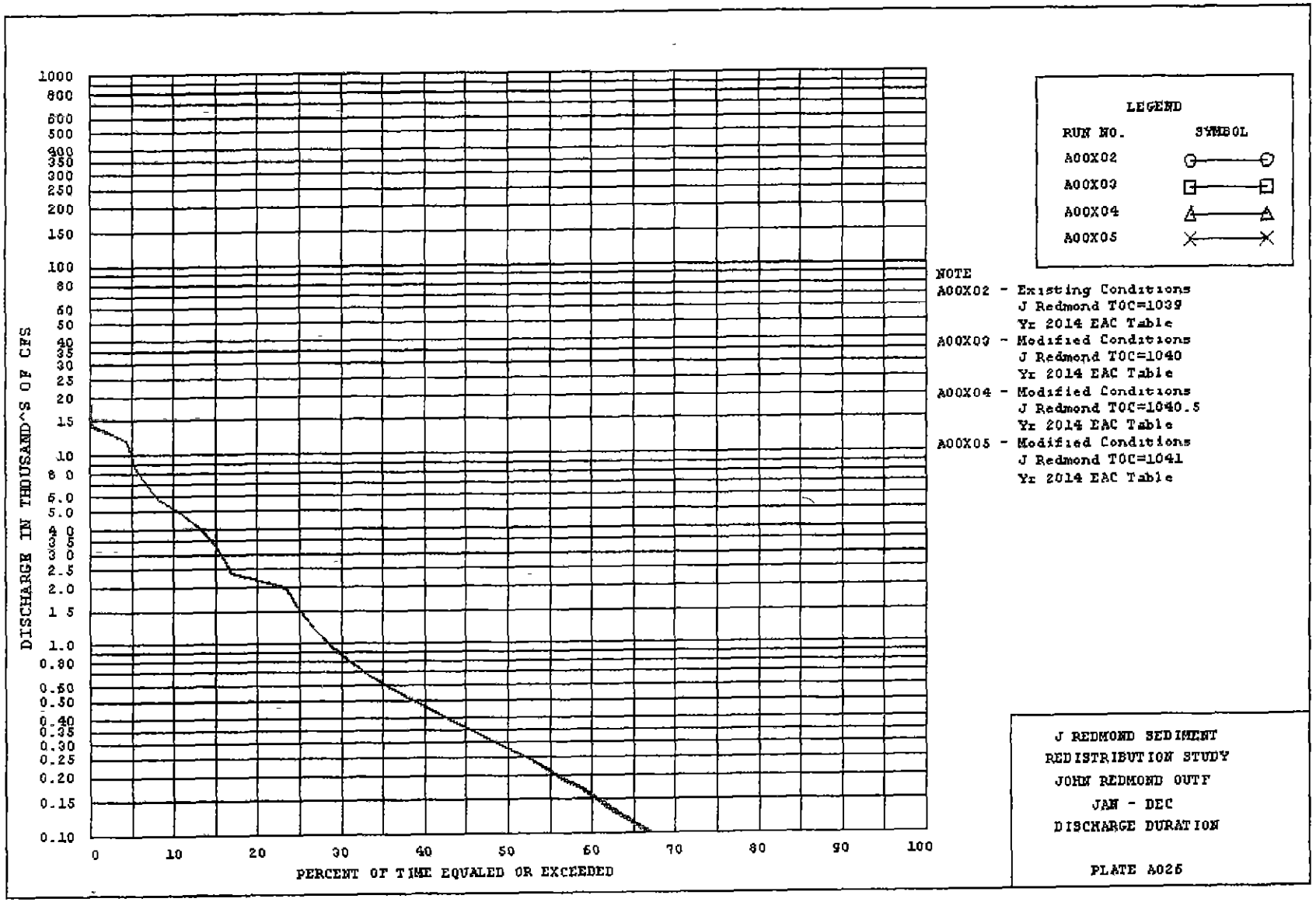


Figure B-5. Discharge Duration – Percent of Time Equaled or Exceeded vs Discharge at John Redmond Outflow for Year 2014 (Source: USACE SUPER 2000, Plate A026)

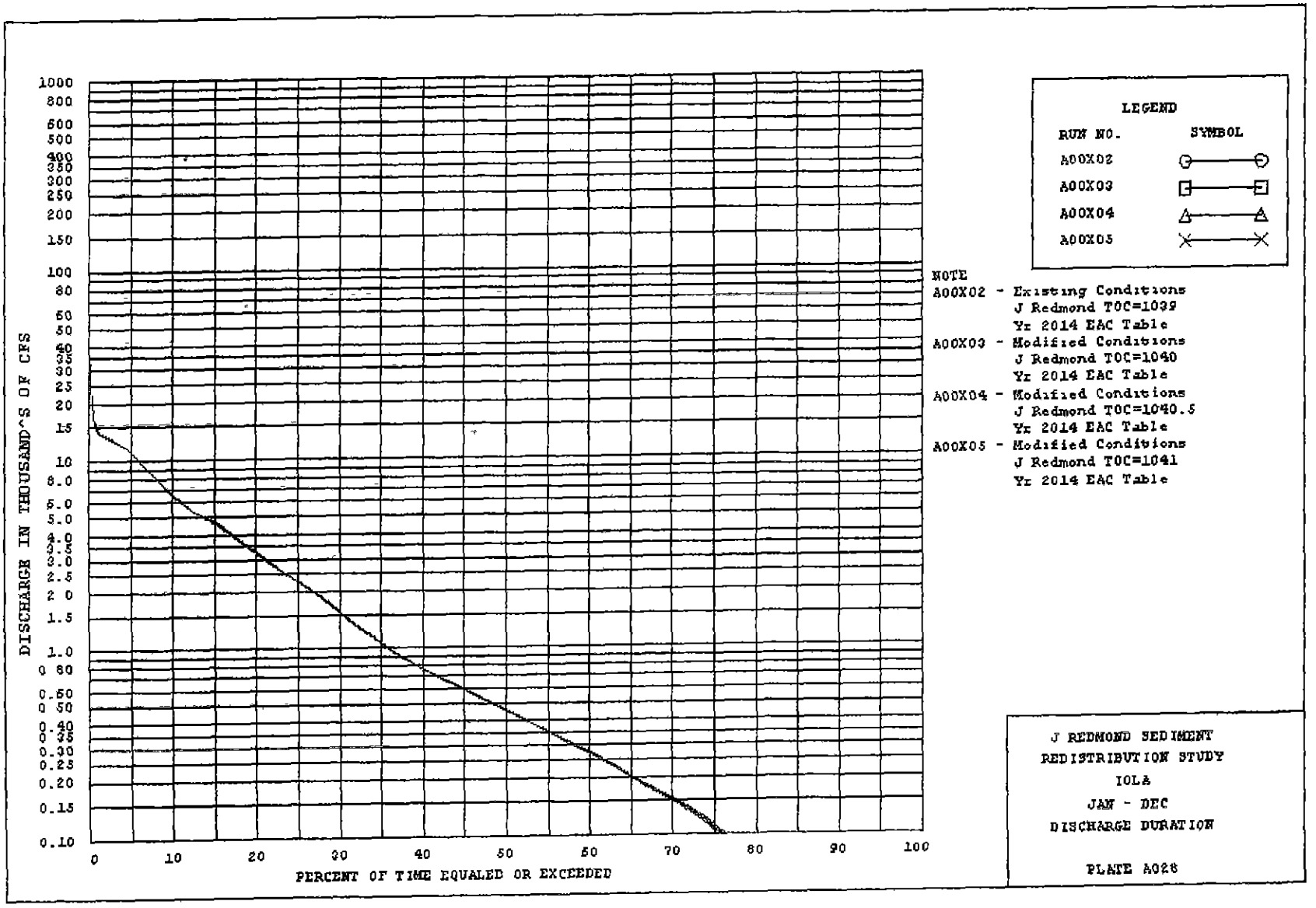


Figure B-6. Discharge Duration – Percent of Time Equaled or Exceeded vs Discharge at Iola Outflow for Year 2014
(Source. USACE SUPER 2000, Plate A028)

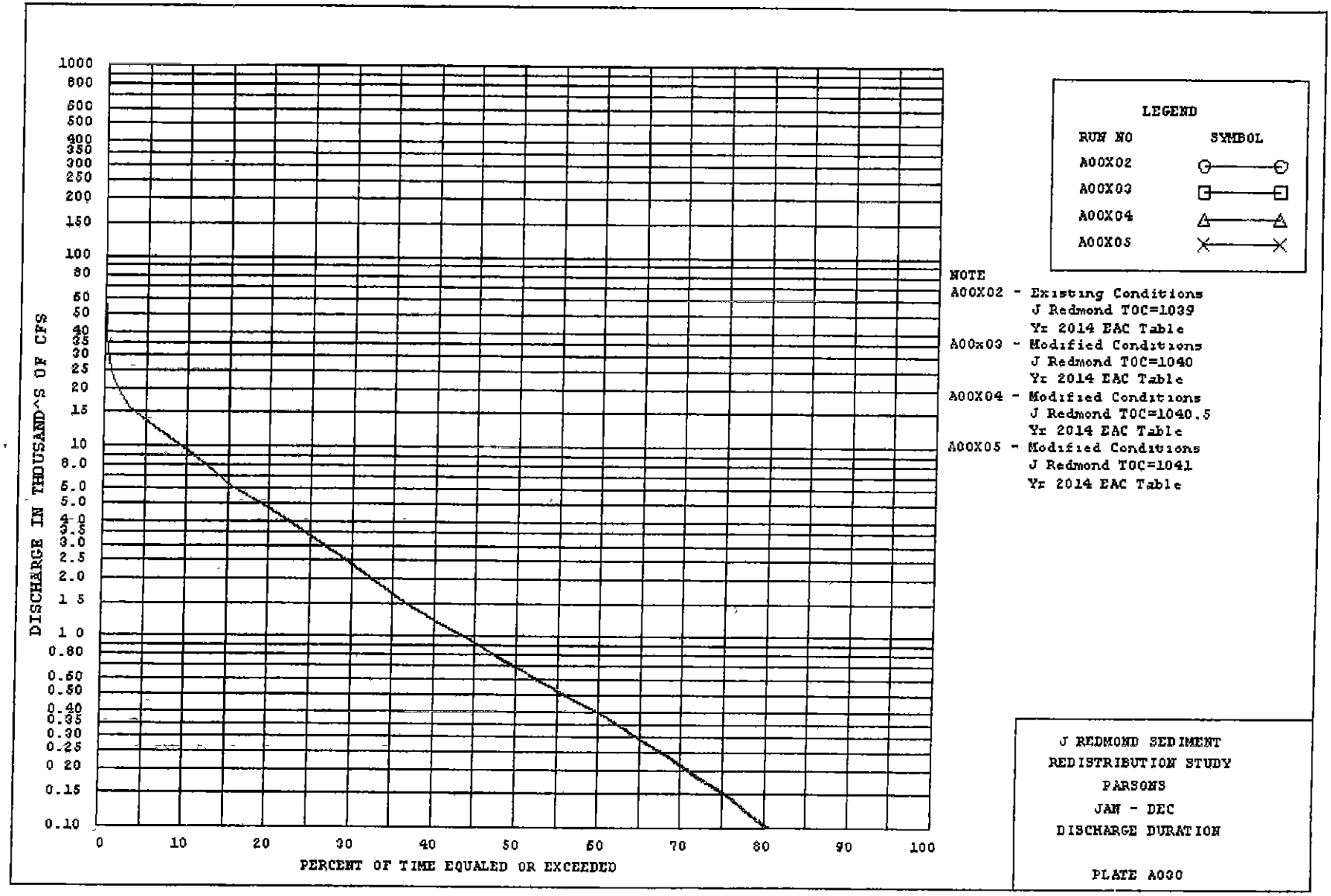


Figure B-7. Discharge Duration – Percent of Time Equaled or Exceeded vs Discharge at Parsons Outflow for Year 2014 (Source USACE SUPER 2000, Plate A030)

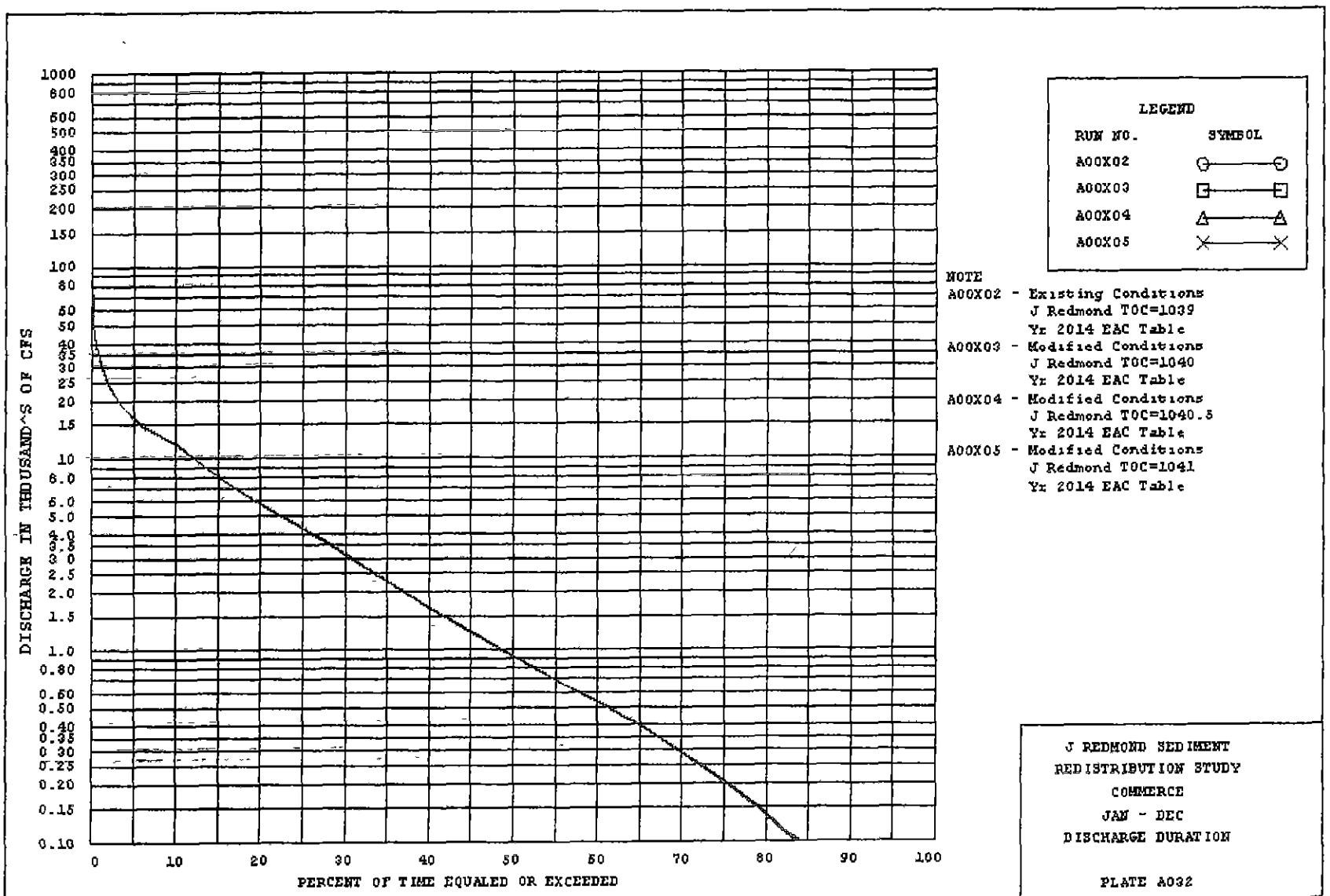


Figure B-8. Discharge Duration – Percent of Time Equaled or Exceeded vs Discharge at Commerce Outflow for Year 2014 (Source: USACE SUPER 2000, Plate A032)

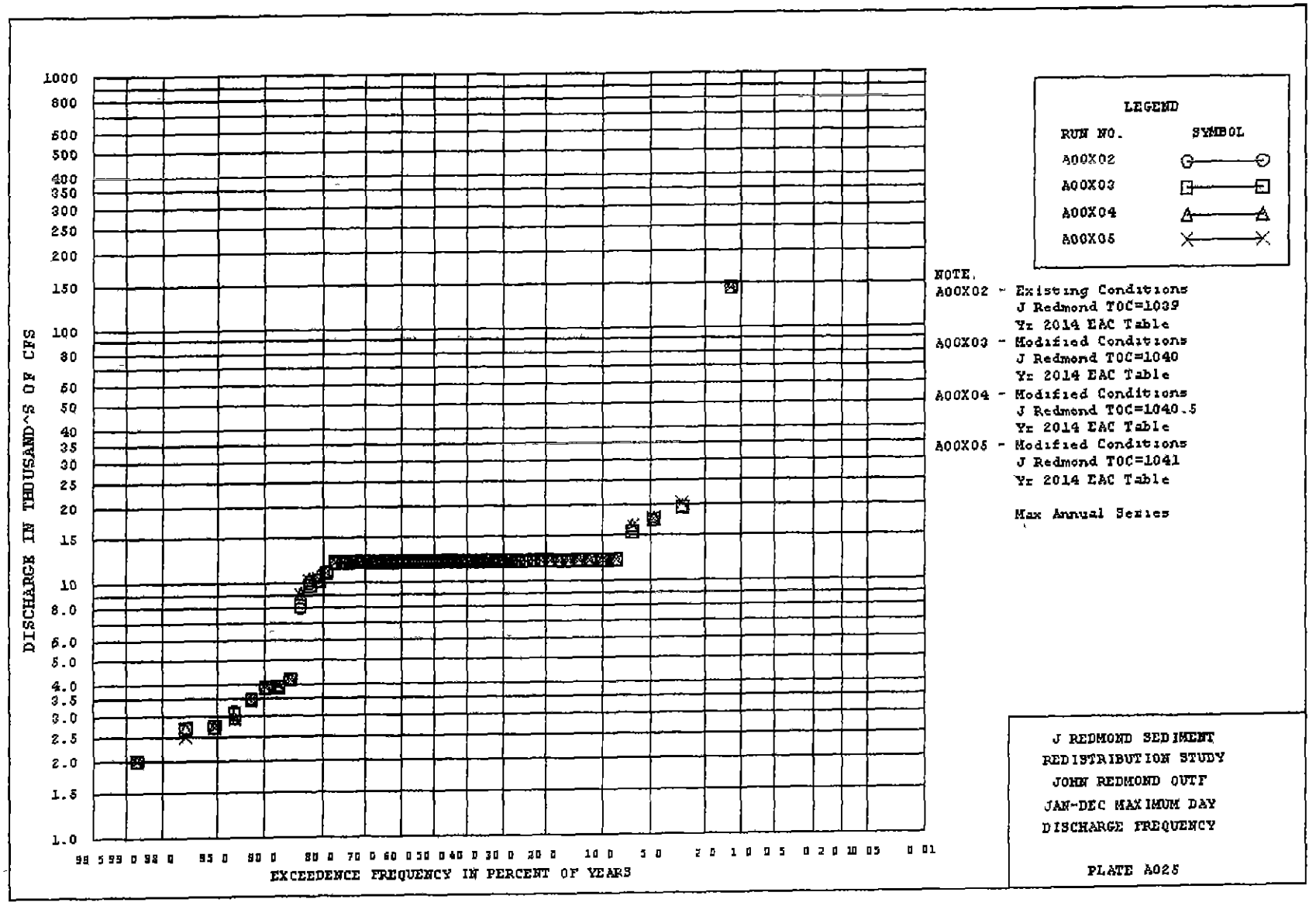


Figure B-9. Maximum Daily Flow Frequency – Exceedance Frequency in Percent of Years vs Discharge at John Redmond Outflow for Year 2014 (Source USACE SUPER 2000, Plate A025)

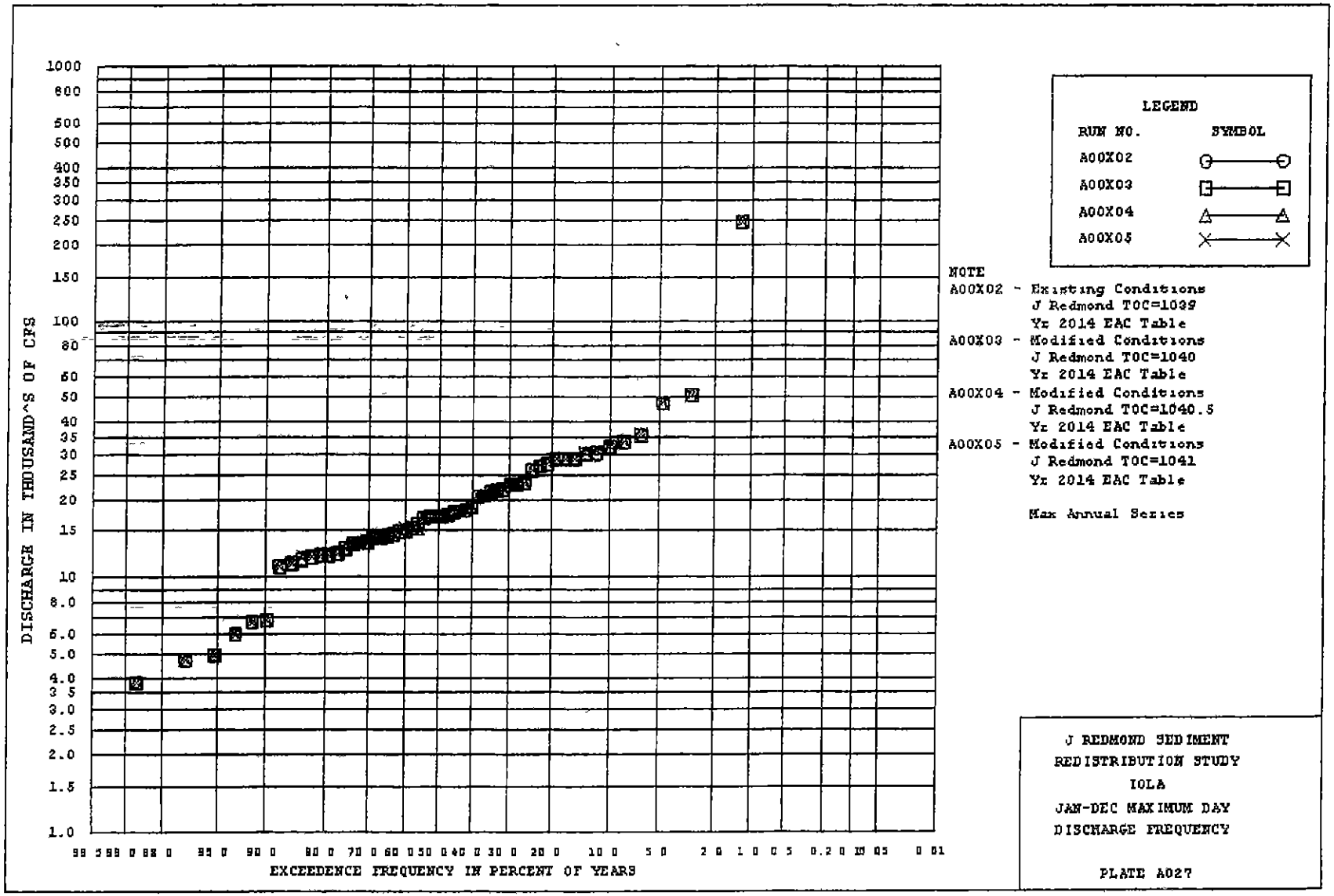


Figure B-10. Maximum Daily Flow Frequency – Exceedance Frequency in Percent of Years vs Discharge at Iola Outflow for Year 2014 (Source: USACE SUPER 2000, Plate A027)

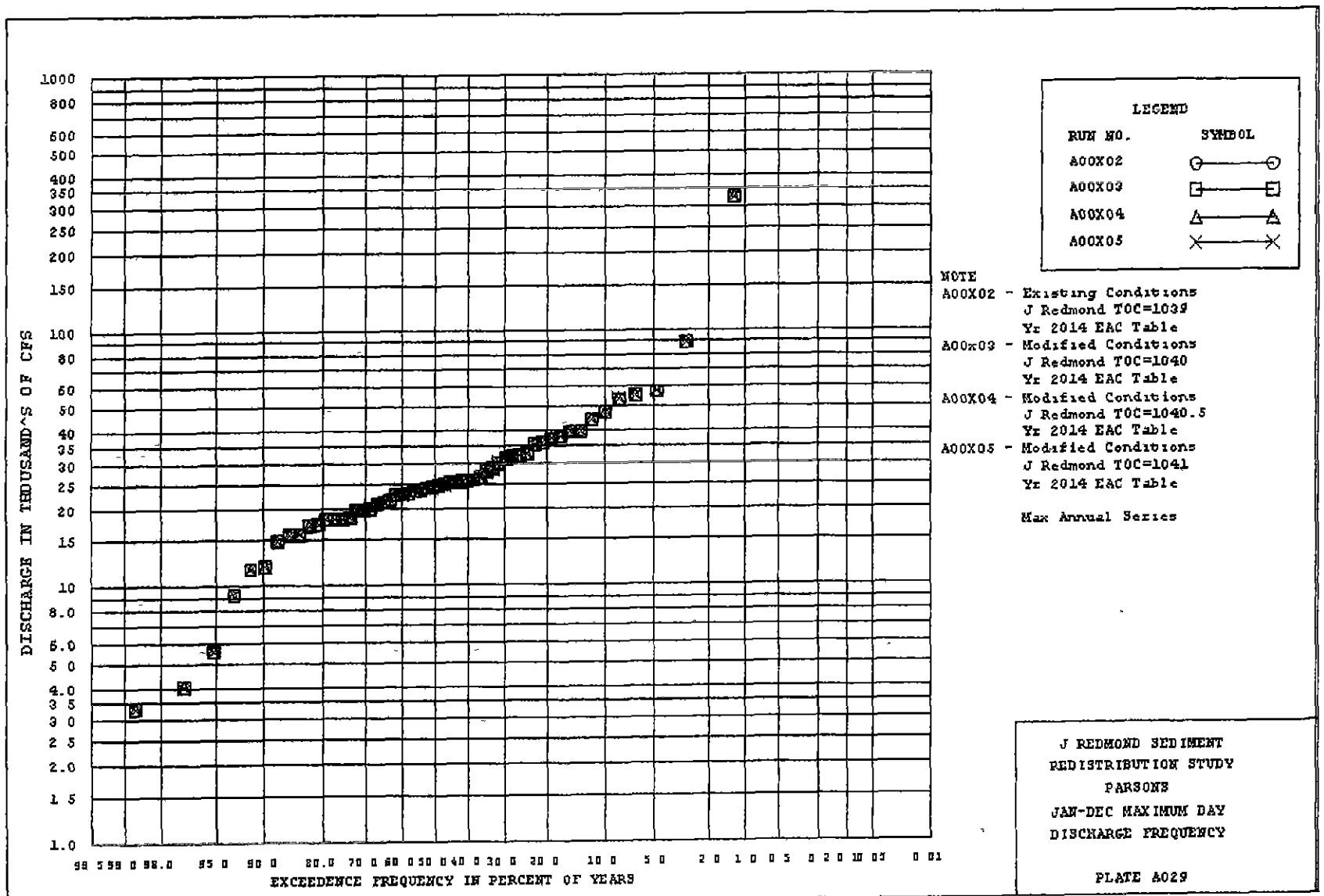


Figure B-11. Maximum Daily Flow Frequency – Exceedance Frequency in Percent of Years vs. Discharge at Parsons Outflow for Year 2014 (Source USACE SUPER 2000, Plate A029)

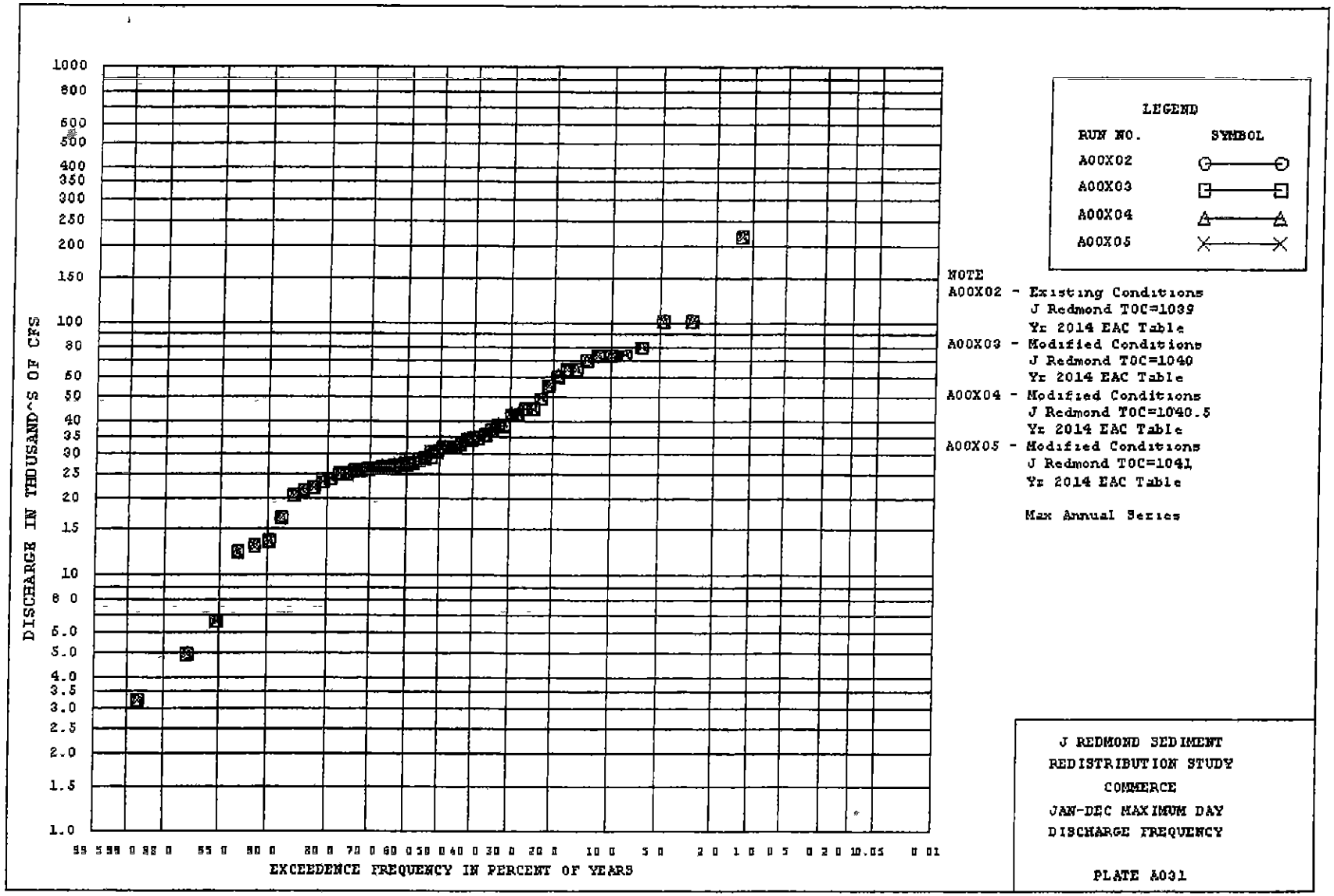


Figure B-12. Maximum Daily Flow Frequency – Exceedance Frequency in Percent of Years vs. Discharge at Commerce Outflow for Year 2014 (Source USACE SUPER 2000, Plate A031)

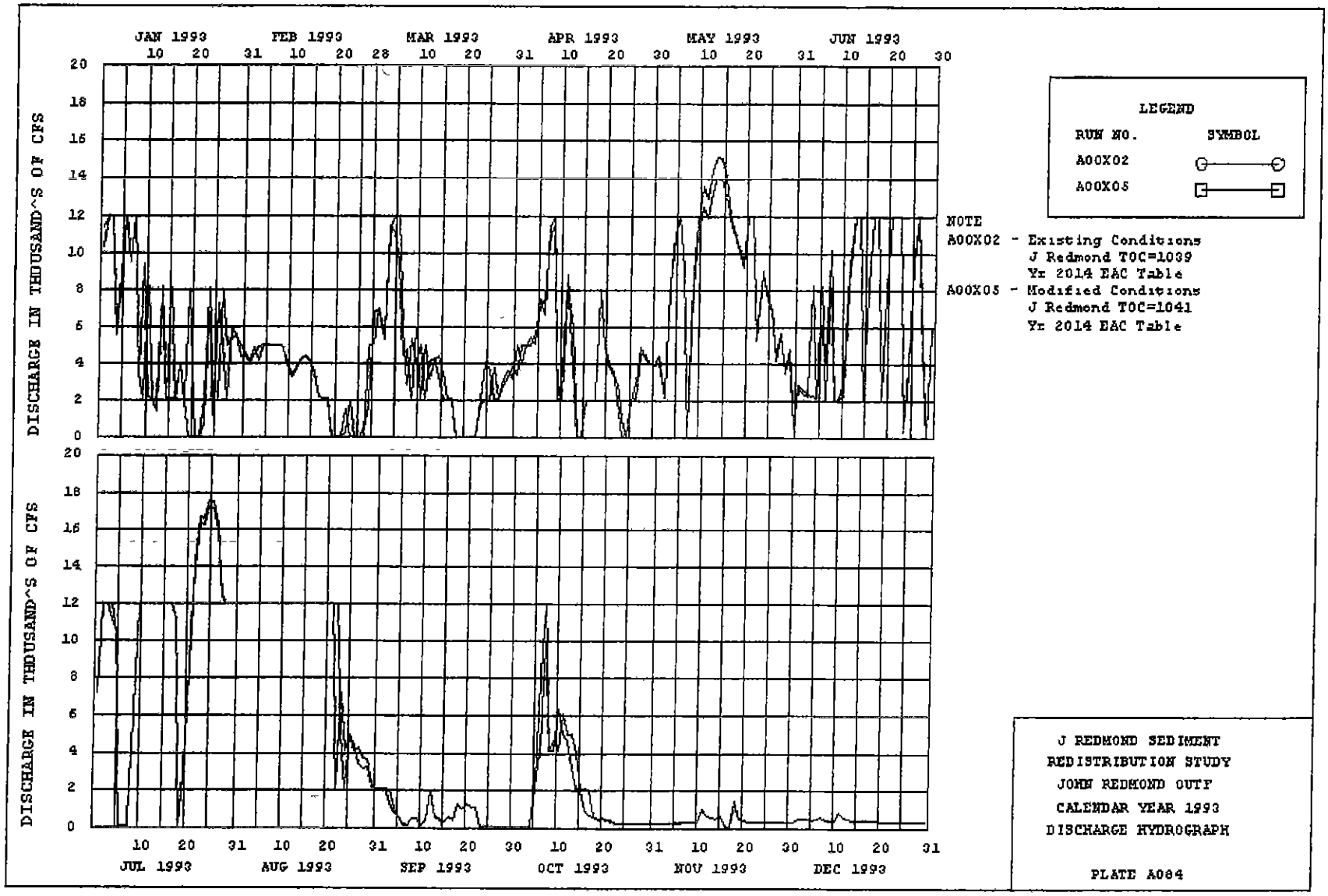


Figure B-13. Discharge Hydrograph of Simulated Flow Year Like 1993 for Year 2014 – Time vs Discharge at John Redmond Outflow (Source USACE SUPER 2000, Plate A084)

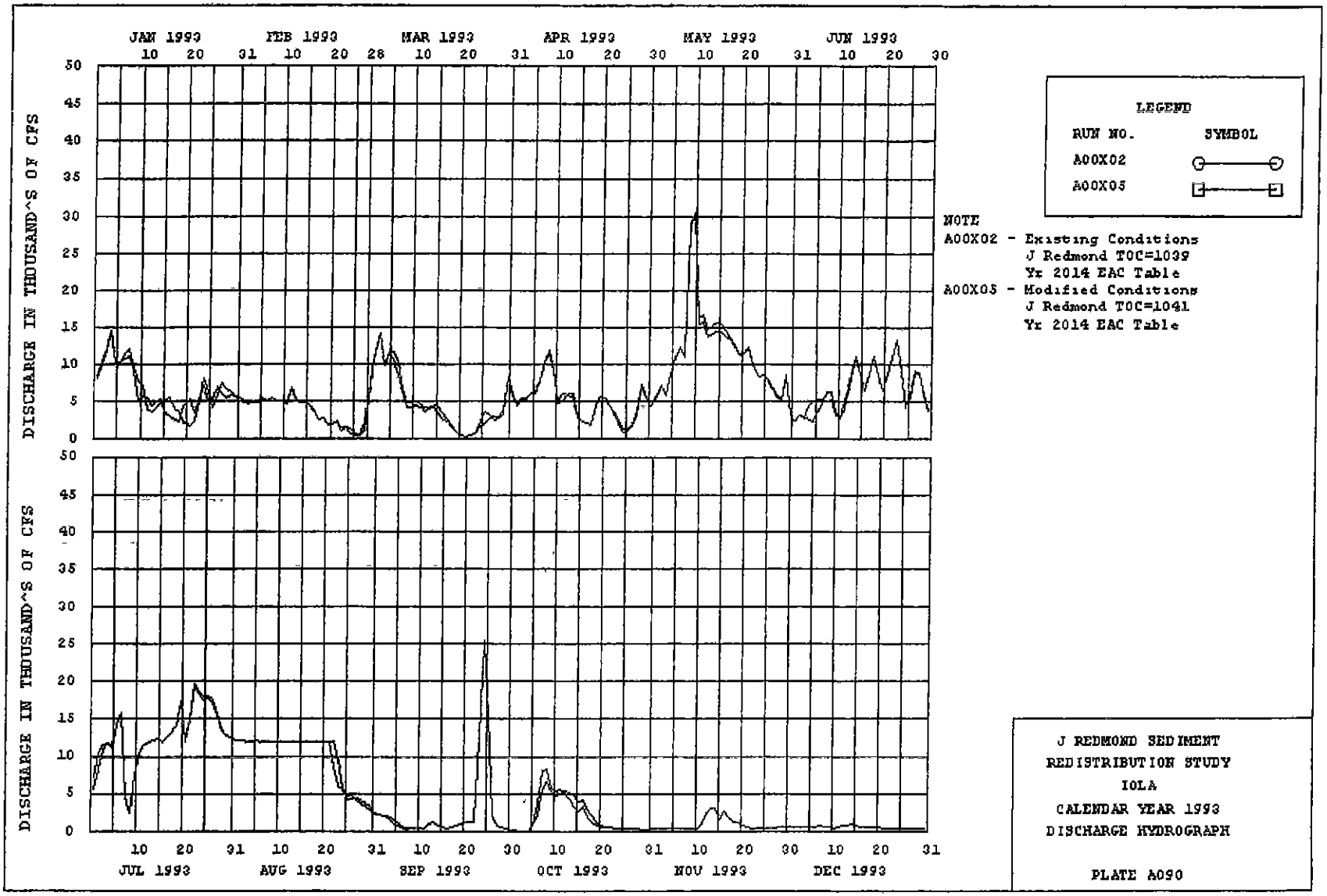


Figure B-14. Discharge Hydrograph of Simulated Flow Year Like 1993 for Year 2014 – Time vs Discharge at Iola Outflow (Source: USACE SUPER 2000, Plate A090)

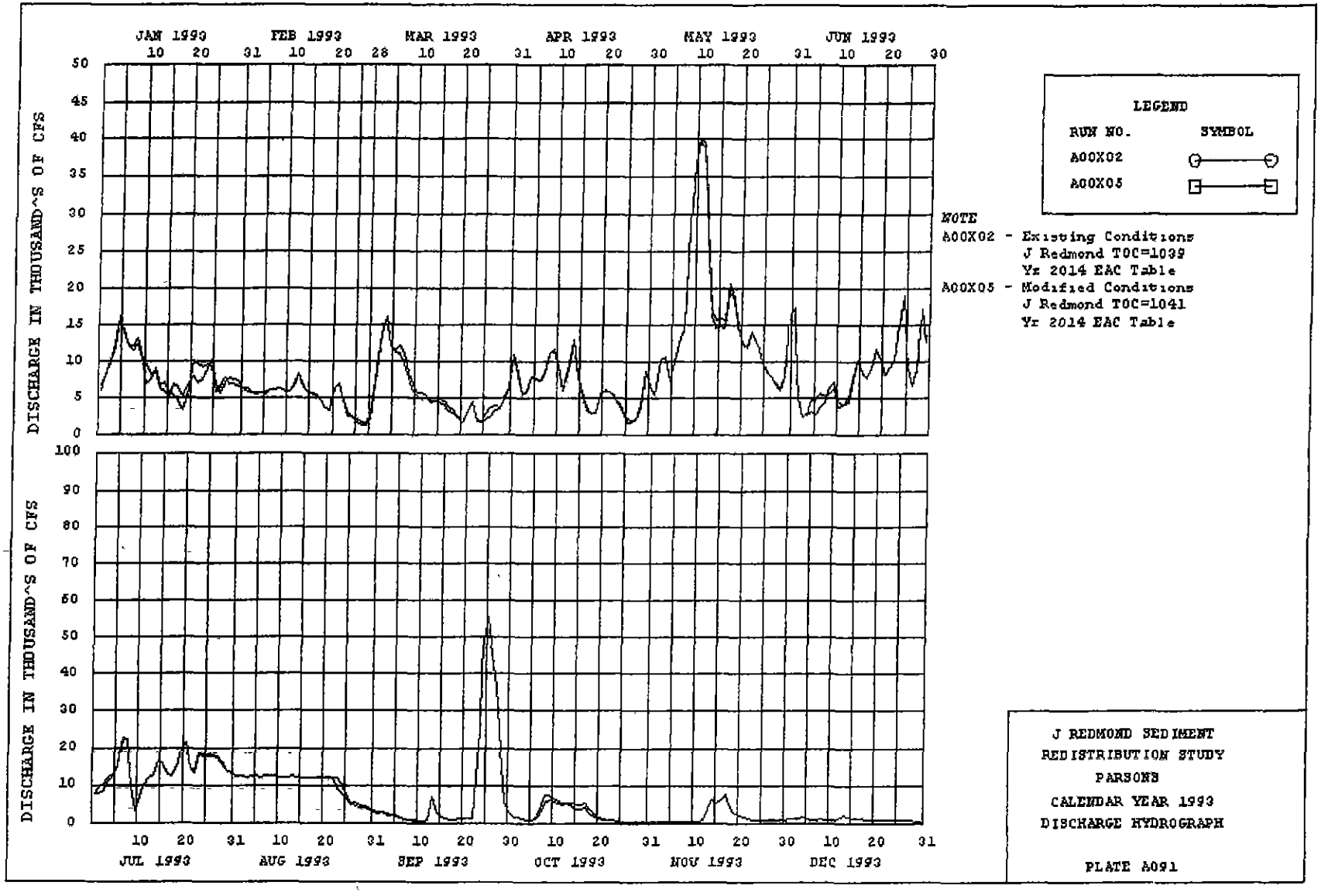


Figure B-15. Discharge Hydrograph of Simulated Flow Year Like 1993 for Year 2014 – Time vs. Discharge at Parsons Outflow (Source: USACE SUPER 2000, Plate A091)

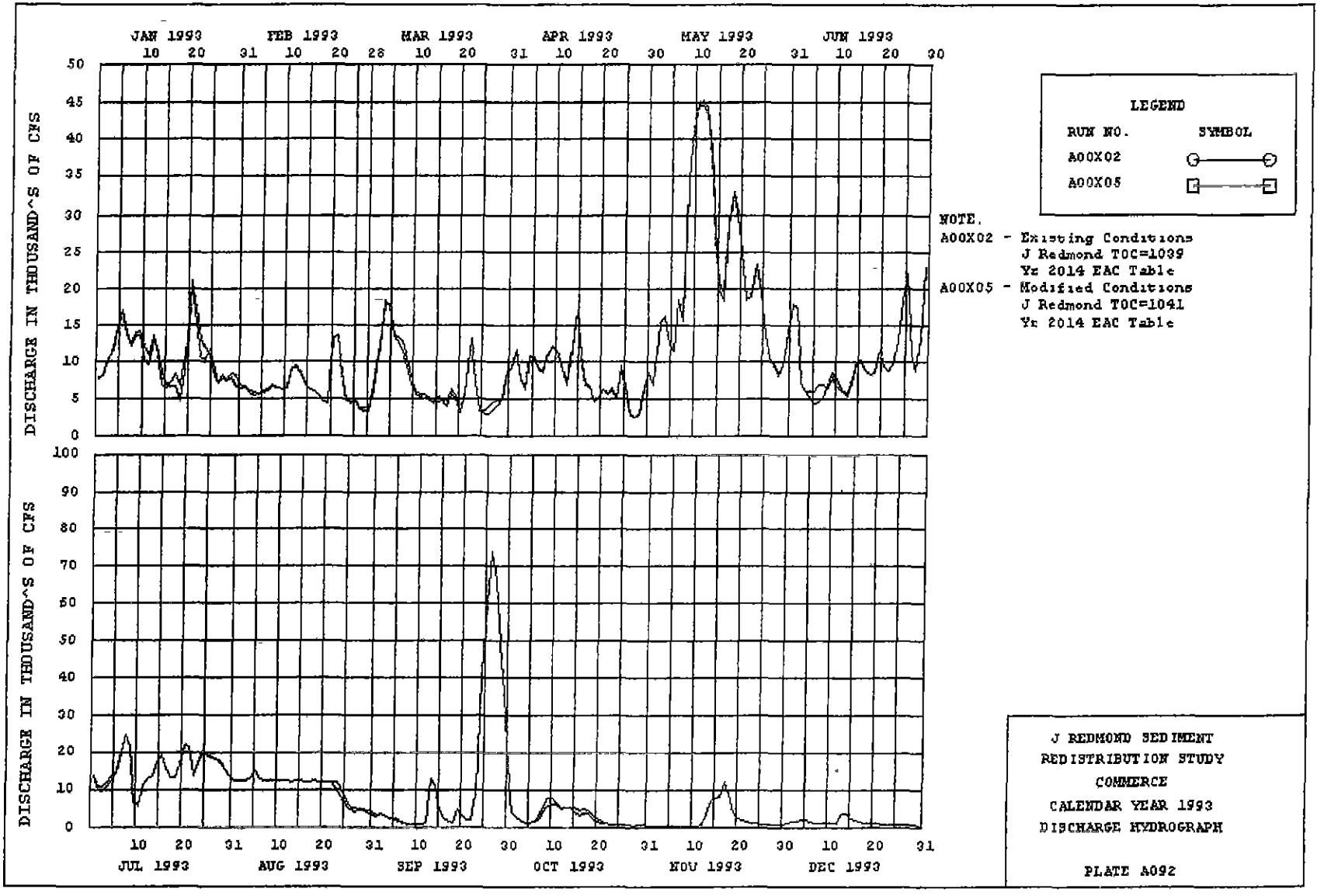


Figure B-16. Discharge Hydrograph of Simulated Flow Year Like 1993 for Year 2014 – Time vs Discharge at Commerce Outflow (Source. USACE SUPER 2000, Plate A092)

Water Quality Samples for Kansas

USGS 07182510 NEOSHO R AT BURLINGTON, KS

Available data for this site Water-Quality Discrete samples GO

Coffey County, Kansas
Hydrologic Unit Code 11070204
Latitude 38°11'40", Longitude 95° 44'10" NAD27
Drainage area 3,042.00 square miles
Contributing drainage area 3,042 00 square miles
Gage datum 983 56 feet above sea level NGVD29

Output formats

- Parameter Group data summary
- Inventory of available water-quality data
- Inventory of water-quality data with retrieval
- Tab-separated ASCII file, serial order
- Tab-separated ASCII file, wide order
- Reselect output format

Parameter group summary of available data

Parameter Group	First Date	Last Date	Number of Samples	Number of Values
Total (all data)	1944-05-05	2000-09-21	434	4572
Information	1961-07-25	2000-09-21	333	476
Biological	1992-08-10	1992-08-10	1	2
Nutrients	1961-10-20	1975-07-21	111	255
Major Inorganics	1961-10-20	1975-07-21	111	1312
Minor and Trace Inorganics	1961-10-20	1975-07-21	111	231
Physical Property	1944-05-05	2000-09-21	434	1969
Sediment	1944-05-05	1992-08-10	195	216

Water Quality Samples for Kansas

USGS 07183000 NEOSHO R NR IOLA, KS

Available data for this site Water-Quality· Discrete samples GO

Allen County, Kansas Hydrologic Unit Code 11070204 Latitude 37°53'27", Longitude 95° 25'50" NAD27 Drainage area 3,818 00 square miles Contributing drainage area 3,818.00 square miles Gage datum 914.77 feet above sea level NGVD29	**Output formats** Parameter Group data summary Inventory of available water-quality data Inventory of water-quality data with retrieval Tab-separated ASCII file, serial order Tab-separated ASCII file, wide order Reselect output format

Parameter group summary of available data

Parameter Group	First Date	Last Date	Number of Samples	Number of Values
Total (all data)	1940-05-20	2000-08-23	211	1151
Information	1940-05-20	2000-08-23	176	304
Physical Property	1940-05-20	2000-08-23	211	723
Sediment	1940-05-20	1961-05-24	51	124

Questions about data gs-w-ks_NWISWeb_Data_Inquiries@usgs.gov
Feedback on this websitegs-w-ks_NWISWeb_Maintainer@usgs.gov

Return to top of page

Water Quality Samples for Kansas: Sample Data
http://water.usgs.gov/ks/nwis/qwdata?

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USGS Water Resources of Kansas
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1.57 0 98

Water Quality Samples for Kansas

USGS 07183500 NEOSHO R NR PARSONS, KS

Available data for this site Water-Quality Discrete samples GO

	Output formats
Labette County, Kansas Hydrologic Unit Code 11070205 Latitude 37°20'24", Longitude 95° 06'35" NAD27 Drainage area 4,905.00 square miles Contributing drainage area 4,905 00 square miles Gage datum 810.25 feet above sea level NGVD29	Parameter Group data summary Inventory of available water-quality data Inventory of water-quality data with retrieval Tab-separated ASCII file, serial order Tab-separated ASCII file, wide order Reselect output format

Parameter group summary of available data

Parameter Group	First Date	Last Date	Number of Samples	Number of Values
Total (all data)	1958-03-12	2000-08-17	543	14572
Information	1974-10-01	2000-08-17	182	454
Biological	1979-03-28	2000-08-17	118	464
Nutrients	1961-10-20	1994-08-03	288	1512
Organics	1979-03-28	1981-09-22	29	37
Major Inorganics	1961-10-20	1994-08-03	415	4380
Minor and Trace Inorganics	1961-10-20	1994-08-03	246	1706
Physical Property	1958-03-12	2000-08-17	543	5316
Radiochemicals	1981-02-24	1984-12-19	9	9
Sediment	1958-03-12	2000-08-17	155	337

Water Quality Samples for Oklahoma

USGS 07185000 Neosho River near Commerce, OK

Available data for this site Water-Quality Discrete samples GO

	Output formats
Ottawa County, Oklahoma Hydrologic Unit Code 11070206 Latitude 36°55'43", Longitude 94° 57'26" NAD27 Drainage area 5,876 square miles Contributing drainage area 5,876 square miles Gage datum 748 97 feet above sea level NGVD29	Parameter Group data summary Inventory of available water-quality data Inventory of water-quality data with retrieval Tab-separated ASCII file, serial order Tab-separated ASCII file, wide order Reselect output format

Parameter group summary of available data

Parameter Group	First Date	Last Date	Number of Samples	Number of Values
Total (all data)	1944-06-02	1989-05-24	842	14331
Information	1944-06-02	1989-05-24	173	246
Nutrients	1944-08-27	1980-09-24	575	1255
Organics	1966-01-31	1980-09-24	12	12
Major Inorganics	1944-08-27	1989-05-24	666	5222
Minor and Trace Inorganics	1947-11-01	1989-05-24	146	738
Physical Property	1944-06-02	1989-05-24	786	6239
Sediment	1944-06-02	1989-05-24	116	157

APPENDIX C

Biological Resources

KANSAS BI-MONTHLY WATERFOWL SURVEY
SURVEY TECHNIQUES AND METHODS OF DATA HANDLING

Since the Kansas Department of Wildlife and Parks (formerly the Kansas Forestry, Fish and Game Commission) began conducting waterfowl surveys in 1959, a number of survey schedules have been used Initially, surveys were conducted weekly, usually beginning in August or September and continuing through April or May The weekly counts were reduced to one count every two weeks by administrative order in September, 1974 as a cost saving measure In August, 1978 the number of counts were further reduced, and since then have been conducted twice monthly, September through March (14 counts)

Most surveys were conducted from various vantage points on the ground around water bodies utilized by waterfowl On some larger impoundments such as Tuttle Creek and Milford Reservoirs, aircraft were used during some years to reduce the time required top conduct the survey and improve the coverage of the area involved The number of areas surveyed has varied from a low of 19 in 1976-77 to a high of 39 during recent years

In order to put the data into a form where all years could be presented in a comparable manner on the same table or graph, counts conducted 1970 to present were divided into those made during day 1 through day 15 (1st half of month) and day 16 through end of month (2nd half of month), for months September through March Where more than one count occurred in a one-half month time period, the counts were averaged, and that average represents the count for that area for that time period

Data for years 1970 through 2000 have been entered on computer and are easily accessed

Marvin Kraft
Waterfowl Program Coordinator
Kansas Department of Wildlife and Parks
P O Box 1525
Emporia, KS 66801

Jim
Although the Tables are titled as being for the Flint Hills NWR, the counts do include all of John Redmond Res.
MDK

Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR
Data are included for. Bald Eagle
All periods in the header are included

Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	Total	% SW*
1970				1	3	3									7	4%
1971									4				1		5	1%
1972							2		14	7	10	20	8		61	10%
1974				1											1	0%
1975					1		3	4	20	1		27			56	8%
1976					1		23	25		25	33				107	17%
1977					1	1	1	12	18	25	14	12	14	41	139	23%
1978								24		9	9	8	17	4	71	14%
1979							7	10	36		1	8	22	1	85	15%
1980								4	26	20			20	2	72	13%
1981						1	5	5	24	14	13	6	19		87	11%
1982						11	9	22	17	26	35	36	5	10	171	31%
1983				2	2	6	6			17	45	25	10	3	116	15%
1984					2	6	6	18	12	28	28	29	10	3	142	18%
1985							9	17		33	22	17	23	1	122	19%
1986					1	13	24	2	28	25	33	30	7		163	24%
1987					1	2	8	4		12	30	104	6		167	22%
1988					6	6	6	20	54	50	3	5	120	10	280	25%
1989					3	1	4	7	12	19	5	16			67	8%
1990					1	2	4	9		22	26	8	8		80	10%
1991					16	15	32	27		50	30	14	2		186	16%
1992				3	4	8	14	13		12	30	10	24	5	123	11%
1993					3	4	4	8	25	28	53				125	12%
1994					2	4	5	12		4	3	2	1		33	3%
1995					1	1	2	3	8	4	3	1		2	25	2%
1996					2	4	2	18	17	9	19	13	1		85	6%
1997					1	3	2	1	10	10	7	2			36	2%
1998							6	3	4	6	4	6	3	4	36	2%
1999				1	2	2	3	11	16	11	12	6			64	4%
2000								4		8	7	29	15	2	65	3%
Grand Total				**8**		**93**		**283**		**475**		**434**		**88**		
					53		**187**		**345**		**475**		**336**		**2,777**	

Usage Notes A 'year' is the period 7/1 to 6/30 The earliest of the calender years is shown * (% SW) % of Statewide is based on species and periods listed

Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR

Data are included for Bald Eagle, Golden Eagle, Osprey, Unknown Eagles

All periods in the header are included

Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	Total	% SW*
1970				1	3	6		4							14	4%
1971									4				1		5	1%
1972							3		14	7	10	23	8		65	8%
1974				1											1	0%
1975					1		4	6	20	1		27			59	8%
1976					1		23	25		25	33				107	16%
1977					2	1	1	16	18	25	14	12	14	41	144	20%
1978								24		9	9	8	17	4	71	13%
1979							7	10	36		1	8	22	1	85	14%
1980								4	26	20			20	2	72	12%
1981						1	5	5	24	14	13	6	19		87	11%
1982						11	9	22	17	26	35	36	5	10	171	29%
1983				2	2	6	6			17	45	25	10	3	116	14%
1984					2	6	6	18	12	28	28	29	10	3	142	17%
1985							9	17		33	22	17	23	1	122	18%
1986					1	13	24	2	28	25	33	30	7		163	23%
1987					1	2	8	4		12	30	104	9		170	21%
1988					8	6	6	20	56	50	3	5	120	11	285	25%
1989					3	1	4	7	12	19	5	16			67	8%
1990					1	2	4	9		22	26	8	8		80	10%
1991					16	15	32	27		50	30	14	2		186	16%
1992				3	4	8	14	13		12	30	10	24	5	123	11%
1993					3	4	4	8	25	28	53				125	12%
1994					2	4	5	12		4	3	2	1		33	3%
1995					1	1	2	3	8	4	3	1		2	25	1%
1996					2	4	2	18	17	9	19	13	1		85	5%
1997					1	3	2	1	10	10	7	2			36	2%
1998							7	3	4	9	4	6	3	4	40	2%
1999				1	2	2	3	11	16	11	12	6			64	4%
2000								4		8	7	29	15	2	65	3%
Grand Total				**8**		**96**		**293**		**478**		**437**		**89**		
					56		**190**		**347**		**475**		**339**		**2,808**	

Usage Notes A 'year' is the period 7/1 to 6/30 The earliest of the calender years is shown * (% SW) % of Statewide is based on species and periods listed

Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR

Data are included for Blue-winged Teal, Bufflehead, Canvasback, Cinnamon Teal, Common Goldeneye, Fulvous Whistling-Duck, Gadwall, Green-winged Teal, Mallard, Northern Pintail, Northern Shoveler, Redhead, Ring-necked Duck, Ruddy Duck, Scaup (Lesser), Wigeon, Wood Duck

All periods in the header are included

Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	**Total**	% SW*
1970		8458	10137	17539	10788	58700		19425		19745	3945	22970	22163		**193870**	3%
1971					85075	18400	24200	31800	54000	22503			4005	910	**244893**	2%
1972			375	955	9165	20690	30755	29008	37080	13137	9219	11920	14486	22667	**199457**	2%
1973	65				33528	23250	15045	35750	90	5460	1605	2506	3404	7605	**128308**	2%
1974				3070											**3070**	0%
1975	58	105	375	4312	8250	11250	14250	12003	32500	5000	7025	9050	5089	1130	**110397**	3%
1976	225	400	5900	11200	18901	11050	3400	51000		2050	10000			30800	**144926**	3%
1977	2425	4350	5250	9050	55500	48700	51700	43700	24350	5000	36020	11590	33690	6380	**337705**	7%
1978	500	5650	4800	2050	5800	26600	33400	40200		15300	40750	35350	11875	6620	**228895**	7%
1979	1275	702	2150	1120	16465	17250	15660	42201	20000	20000	20260	8526	662	4900	**171171**	5%
1980	1141	607	2	525	8012	14801	15470	20204	23450	12000	25000		2040	1768	**125020**	4%
1981	76	74	457	4144	5700	3625	7232	15600	22006	28700	35434	12537	10768	6141	**154514**	4%
1982	126	83	379	361	4886	42935	40038	25445	33444	4930	10200	2337	400	1372	**166936**	7%
1983	385	260	1616	6374	19560	40945	57580	7350	17020	21100	18186	4439	1579	13202	**209596**	9%
1984		955	2249	21345	24977	26225	3483	29846	3128	4519	3517	2516	17274	6190	**146224**	7%
1985	52	2186	153	30000	23500	17856	262	587	770	1728	441	7460	1145	2497	**88637**	6%
1986	468	518	5500	13757	44614	11608	1069	20110	11359	1020	3713	728	11607	592	**126663**	5%
1987	870	870	400	550	8799	17050	20475	11364	2257	19388	15807	13864	3197	1266	**116157**	7%
1988	72	115	85	560	20358	3329	16452	6100	17399	3736	520	1249	966	958	**71899**	4%
1989			1878	4159	13225	4965	6740	455	70	2247	4820	9285	3785		**51629**	3%
1990	250	497	200	4198	6900	4570	13705	5340	10	1295	2692	1504	1500	1058	**43719**	3%
1991	75	80	116	1657	28446	21473	2740	8830	2640	2010	3882	2520	1532	2430	**78431**	7%
1992	330	610	2180	6650	14425	38610	19242	24020	275	525	12227	1500	2982	1830	**125406**	5%
1993	670	182	160	1295	7025	4474	1900	1425	251	300	1300				**18982**	1%
1994		170	440	602	7135	10475	33275	44300	4458	1600	6916	12225	1885	10510	**133991**	7%
1995	355	95	190	235	14230	3101	21042	39785	5085	1700	675	3627	5495	880	**96495**	5%
1996	6380	5800	1935	11455	36625	39570	23675	22585	10755	11507	8311	24335	16675	16595	**236203**	8%
1997	480	200	620	6589	7916	27160	7725	14872	23570	5415	5235	11750	5790	4747	**122069**	4%
1998		155	575	2412		47503	65698	5000	492	9898	8376	4303	8421	4570	**157403**	4%
1999	616	685	743	613	2120	6280	4615	8621	7005	14728	12547	8229	3617	2165	**72584**	3%
2000	250	63	102	92	2000	8860	4117	5000	5005	9861	3555	2747	4461	2117	**48230**	2%

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Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR

Data are included for Blue-winged Teal, Bufflehead, Canvasback, Cinnamon Teal, Common Goldeneye, Fulvous Whistling-Duck, Gadwall, Green-winged Teal, Mallard, Northern Pintail, Northern Shoveler, Redhead, Ring-necked Duck, Ruddy Duck, Scaup (Lesser), Wigeon, Wood Duck

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Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	**Total**	% SW*
Grand Total	17,144	33,870	48,967	166,869	547,925	633,305	554,945	621,926	358,469	266,402	312,198	229,067	200,493	161,900	4,153,480	

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Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR

Data are included for Canada Goose, Ross' Goose, Snow Goose (Lesser -white), White-fronted Goose (Greater)

All periods in the header are included

Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	**Total**	% SW*
1970		15	41	1542	3062			6482		2869	3100	1350	3275		**21736**	4%
1971					2960	3925	3425	4104	6000	3660			535	250	**24859**	3%
1972				800	5570	4550	5075	4900	3000	1900	1070	3320	3300	470	**33955**	3%
1973	170				5370	6175	1825	895		40	5500	3428	1357	1545	**26305**	3%
1974				806											**806**	0%
1975		8	700	9100	12500	15350	18200	17300	7800	5120	5135	5150	2225	300	**98888**	13%
1976		10	1000	6000	12000	16000	20000	10800		2000	2000			4800	**74610**	15%
1977		25	2600	6000	22000	23500	23000	28500	16710	5120	16100	14600	21000	5850	**185005**	23%
1978			800	1550	5600	6900	4110	6753		6800	7800	7200	17400	810	**65723**	14%
1979			500	2500	12600	9600	17500	7700	8750	8175	7600	6560	150	305	**81940**	12%
1980				2060	6100	7420	7500	8170	5400	6000	7340		9350	450	**59790**	13%
1981			150	613	5500	6100		10800	17017	15000	3245	13295	16172	1076	**88968**	8%
1982			27	713	3380	14023	17833	11513	10090	10340	5100	2368	1550	700	**77637**	16%
1983				1025	5100	13200	29595	14010	5840	6360	8795	250	515	732	**85422**	11%
1984			83	1201	13455	13800	17800	13766	3925	833	870	910	1860	2673	**71176**	9%
1985			30	1400	13000	43917	5213	2689	4012	5190	1262	10080	5683	20	**92496**	12%
1986	3		25	950	19928	21611	14506	11265	6285	4500	16170	100	4836	125	**100304**	9%
1987	10	12	18	305	12393	24480	20700	10475	250	6160	4200	7220	815	504	**87542**	10%
1988	50	35	25	380	6350	19640	17323	20600	6668	2200	250	60	5440	68	**79089**	7%
1989			40	1200	11300	13275	20850	1280	725	1940	390	2050	7140		**60190**	7%
1990	40	35	200	1000	13445	28305	29150	950		800	1885	150	3000	87	**79047**	8%
1991	50	81	80	55	45398	24150	7700	5025	3215	1250	5560	575	438	562	**94139**	7%
1992	60	75	340	620	15675	27100	21690	47500	14200	100	22160	22150	12050	22	**183742**	8%
1993	50	20	30	80	2055	11450	4600	3500	2900	500	1500				**26685**	2%
1994		10		2	1964	21100	13450	4600	102	25	6763	13500	1135	153	**62804**	4%
1995	45	2			10378	7265	5461	3660	175	880		3945	1950	390	**34151**	2%
1996	150	200	200	150	7825	20200	135	18100	5300	16970	716	19600	11735	1701	**102982**	5%
1997	78		66	2915	4355	21455	50350	1440	1847	2175	3225	19550	3850	5835	**117141**	3%
1998		30	60	811		37100	45985	8080	480	2200	2250	925	810	218	**98949**	4%
1999		25	20	26	1530	29250	23230	5360	12360	19666	19442	16743	2802	297	**130751**	8%
2000			30	50	3639	21480	911	547	3550	2205	703	3533	11544	405	**48597**	2%
Grand Total		**583**		**43,854**		**512,321**		**290,764**		**140,978**		**178,612**		**30,348**		
	706		**7,065**		**284,432**		**447,117**		**146,601**		**160,131**		**151,917**		**2,395,429**	

Usage Notes A 'year' is the period 7/1 to 6/30 The earliest of the calender years is shown * (% SW) % of Statewide is based on species and periods listed

Tuesday, June 19, 2001

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

May 8, 2000

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. William H. Gill
Field Supervisor
U.S. Fish and Wildlife Service
315 Houston Street, Suite E
Manhattan, KS 66502

Dear Mr. Gill:

This is in regards to the ongoing John Redmond Lake Reallocation Study, Kansas. In accordance with Section 7 of the Endangered Species Act of 1973, as amended, the District is requesting an official list of Federally listed threatened or endangered species which might be affected by the proposed action.

Pertinent information and a description of the proposed action were previously furnished to your office during development of our Fiscal Year 2000 funding agreement.

If you have any questions or require additional information, please contact Jim Randolph at 918-669-4396.

Sincerely,

James C. Randolph

for David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

May 8, 2000

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Steve Williams
Kansas Department of Wildlife and Parks
Box 54-A, Route 2
Pratt, KS 76124-9599

Dear Mr. Williams:

This is to inform you that the Tulsa District is initiating a water supply reallocation study for John Redmond Lake, Kansas. Enclosed is a negotiated scope of work with the U.S. Fish and Wildlife Service which describes the proposed action.

Presently, we are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate any comments from your agency regarding state listed threatened or endangered species and fish and wildlife.

If you have any questions or require additional information, please contact Jim Randolph at 918-669-4396.

Sincerely,

James C. Randolph

for David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

SCOPE OF WORK
FOR
U.S. FISH AND WILDLIFE SERVICE ACTIVITIES

FISH AND WILFLIFE COORDINATION ACT REPORT AND MITIGATION ANALYSIS
JOHN REDMOND LAKE, REALLOCATION STUDY, KANSAS

Background: In 1975, the state of Kansas and the Federal government entered into a water supply agreement at John Redmond Lake for an estimated 34,900 acre-feet of storage remaining after 50 years of sedimentation. Recent studies have determined that sediment has been deposited unevenly within the reservoir from what had been predicted. The sediment is accumulating in the conservation pool while the flood control pool has experienced less than expected sedimentation.

Storage available for water supply purposes in the lake have been depleted by the uneven distribution of sediment such that the water supply agreement obligations are being infringed upon. Most of the sediment deposition in the John Redmond pool has been below elevation 1039.0 feet (top of conservation pool) National Geodetic Vertical Datum (NGVD). Based on Tulsa District sediment surveys for 1964 and 1993, it was predicted that adequate storage would be available below elevation 1068.0 feet NGVD (top of flood control pool) at the end of the economic project life (2014) to meet all authorized project purposes.

A recent Kansas Water Office (KWO) water supply yield analysis indicated that the disproportionate sediment deposition has reduced the water supply capacity at design life by 25%. The water supply agreement with the KWO allows for pool adjustment in one-half foot increments. In order to make an equitable redistribution between the flood control and conservation pools, the District has been directed to study an equitable redistribution of storage between the flood control and conservation pools. Consequently, the District proposes to raise the conservation pool from elevation 1039 NGVD to elevation 1041 NGVD. The proposed pool level increase would be a phased approach with the first pool increase to elevation 1040 NGVD, the second to 1040.5 NGVD, and finally to elevation 1041, if needed.

Tasks:

1. The U.S. Army Corps of Engineers (USACE) will provide the following to the U.S. Fish and Wildlife Service (USFWS) as it becomes available; 1) digital two-foot contour maps, 2)color IR aerial photography of the lake, 3) pertinent data (including project alternatives and purposes,4)historic and projected changes to flood control operation and downstream releases of flood waters.

2. The USACE will invite the USFWS to participate in all pertinent planning meetings related to the project.

3. The USFWS will participate in field trips to the project site to evaluate proposed project impacts. The USFWS will complete the following tasks: 1) evaluate existing wetland types at the specified elevations for John Redmond and determine changes to habitat types as with the various increased conservation pool alternatives; 2) evaluate boat ramp, access road, and State Park acreages that may be inundated permanently and/or more frequently due to loss of flood storage; 3) evaluate if alternatives will affect timing and release schedules of floodwater evacuation and potential for adverse impacts to the Neosho River downstream of John Redmond; 4) evaluate dike and control structure elevations for managed wetlands on Fling Hills NWR to determine if management of the wetland complex will be compromised; 5) coordinate with Kansas Department of Wildlife and Parks and USFWS refuge personnel to evaluate and determine impacts of proposed pool level impacts on fish and wildlife resources, Flint Hills refuge, existing fishery, and water level management plans.

4. USFWS will prepare and coordinate a draft and final Fish and Wildlife Coordination Act report describing and evaluating existing fish and wildlife resources threatened or endangered species or habitat, and current management activities associated with John Redmond Lake. The report shall also address expected impacts associated with the proposed changes in conservation pool to John Redmond Lake on the noted resources. If impacts are deemed significant mitigation measures shall be recommended.

Estimated costs:

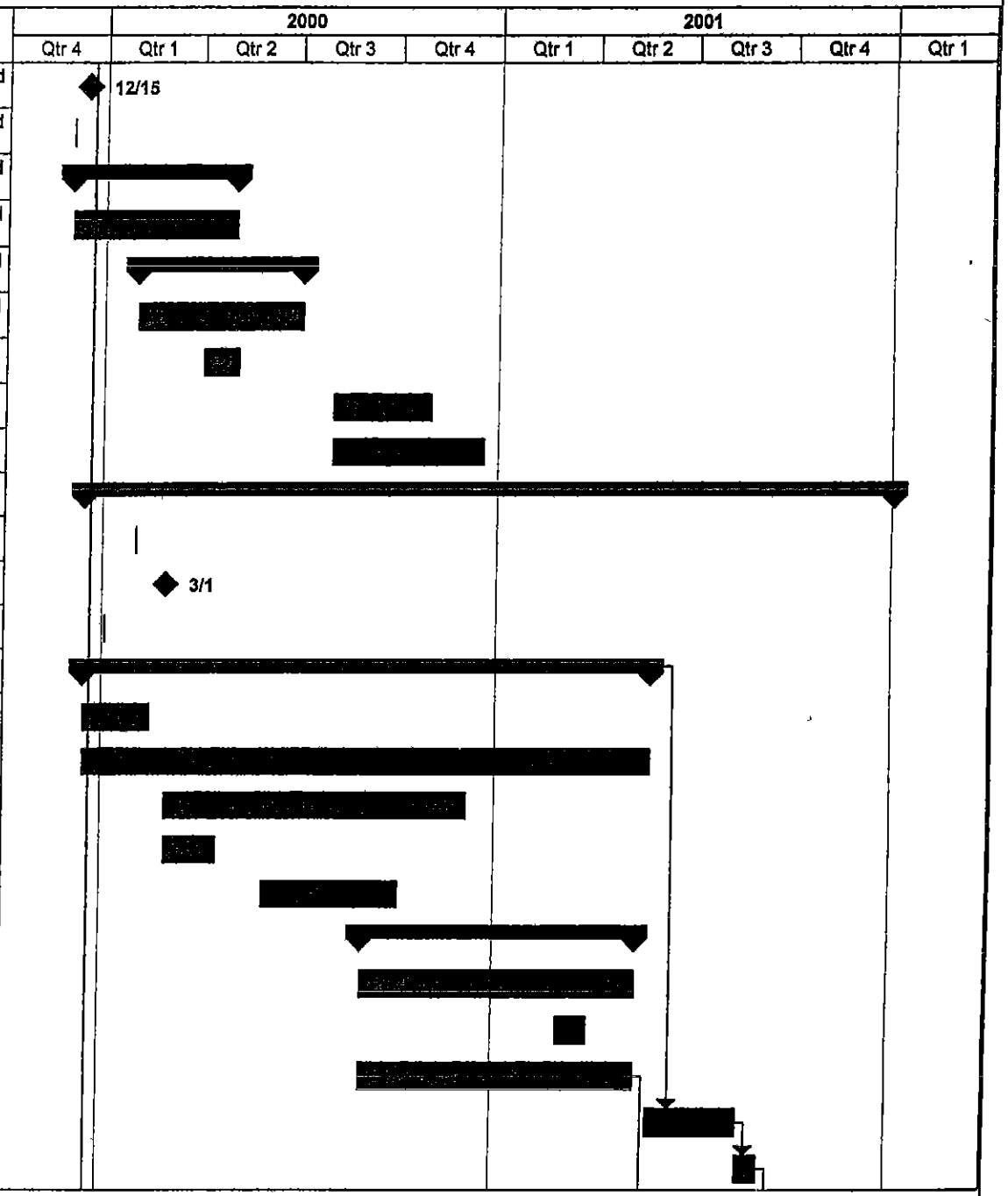
Lit. review, data collection and analysis	20 Md. @ 328/day	6,650
Prep. Of DFWCAR	60 Md. @ 328/day	19,680
Prep of FFWCAR	30 Md. @ 328/day	9,840
Overhead	(38%)	13,745
Total		49,915

Completion Dates:

Draft FWCA report 1 October 2000
Final FWCA report 15 March 2001

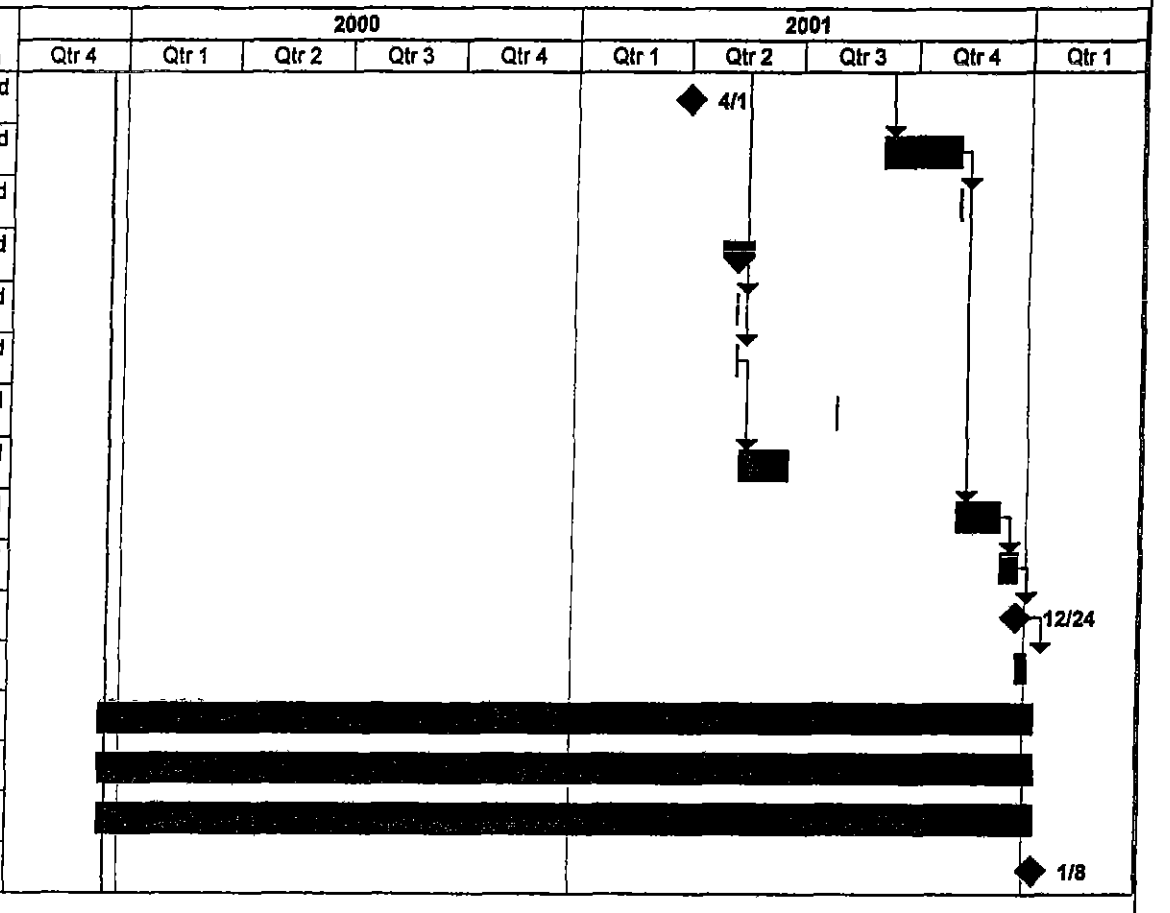
JOHN REDMOND REALLOCATION STUDY

ID	Task Name	Duration
1	RECEIVE FUNDS	0d
2	TEAM MEETING	1d
3	H&H ANALYSES	110d
4	FLOOD CONTROL ANALYSIS	110d
5	SOCIOECONOMIC ANALYSIS	110d
6	ECONOMIC ANALYSES	110d
7	SOCIOLOGICAL STUDIES	25d
8	GEOTECHNICAL ANALYSIS	65d
9	REAL ESTATE FLOWAGE EASEMENTS	100d
10	NEPA DOCUMENTATION [SUPPLEMENT TO FEIS]	536d
11	PUBLIC MEETING	1d
12	PUBLISH NOTICE OF INTENT	0d
13	SCOPING MEETING	1d
14	CULTURAL RESOURCES	375d
15	INVENTORY SHORELINE & VERIFY SITES	45d
16	NRHP EVALUATION OF CULTURAL RESOU	375d
17	GEOMORPHIC STUDY & C.R INVENTORY	200d
18	HTRW EVALUATION	35d
19	BIOLOGICAL ASSESSMENT	90d
20	USF&WL COORDINATION	180d
21	Mitigation Analysis	180d
22	TD Participation & Analysis	20d
23	Endangered Species Coordination	180d
24	WRITE DRAFT SFEIS	60d
25	INTERNAL SFEIS REVIEW	14d



JOHN REDMOND REALLOCATION STUDY

ID	Task Name	Duration
26	PUBLIC MEETING	0d
27	AGENCY/PUBLIC REVIEW OF SFEIS	45d
28	INCORPORATE COMMENTS	1d
29	IN-HOUSE REVIEW OF SFEIS	1d
30	FT. WORTH DIST. PERFORMS TECH REVIE	1d
31	T.D REVIEW OF SFEIS	1d
32	PUBLIC MEETING	1d
33	INCORPORATE IN-HOUSE COMMENTS	30d
34	WRITE FINAL SUPPLEMENT TO FEIS	25d
35	REPORT REPRODUCTION	10d
36	PUBLISH SUPPLEMENT TO FEIS	0d
37	PREPARE RECORD OF DECISION	7d
38	PUBLIC COORDINATION	540d
39	GIS SUPPORT	540d
40	PROJECT MANAGEMENT	540d
41	END OF PROJECT	0d



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
315 Houston Street, Suite E
Manhattan, Kansas 66502-6172

May 23, 2000

David L. Combs, Chief
Environmental Analysis and Compliance Branch
Tulsa District, Corps of Engineers
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Dear Mr. Combs:

This is in response to your May 8, 2000 letter requesting threatened and endangered species information relative to a proposal to reallocate water in John Redmond Reservoir, Coffey County, Kansas. The following information is provided for your consideration.

In accordance with section 7(c) of the Endangered Species Act (16 U.S.C 1531 et seq.), we have determined that the following federally-listed species may occur in or around the reservoir, or in the Neosho River upstream or downstream of the reservoir: bald eagle (*Haliaeetus leucocephalus*), Neosho madtom (*Noturus placidus*), and western prairie fringed orchid (*Platanthera praeclara*) If it is determined the project may adversely affect any listed species, the District should initiate formal section 7 consultation with this office. If there will be no effect, or if the Fish and Wildlife Service concurs in writing there will be beneficial effects, further consultation is not necessary

Thank you for this opportunity to provide input on your proposed study.

Sincerely,

William H. Gill

William H Gill
Field Supervisor

cc: KDWP, Pratt, KS (Environmental Services)

WHG/dwm

STATE OF KANSAS

DEPARTMENT OF WILDLIFE & PARKS

Operations Office
512 SE 25th Avenue
Pratt, KS 67124-8174
316/672-5911 FAX 316/672-6020

June 16, 2000

Mr. David Combs
Department of the Army
Corps of Engineers, Tulsa District
Environmental Analysis and Compliance Branch
1645 South 101st East Avenue
Tulsa, OK 74128-4609

Ref: D4 0201
Coffey, Lyon
Trak 20000423

Dear Mr Combs

This responds to your request for preliminary state-listed threatened and endangered species and general sensitive resource information for your water supply reallocation study for John Redmond Lake, which includes a 2 foot incremental increase in the conservation pool elevation for the reservoir, located in Coffey and Lyon Counties, Kansas We have included information on any crucial wildlife habitats, current state-listed threatened and endangered species, species in need of conservation, designated critical habitats, and state public recreation areas for which this agency has some administrative authority

The Neosho River immediately upstream of John Redmond Reservoir is designated critical habitat for the state-listed threatened ouachita kidneyshell mussel (*Ptychobranchus occidentalis*) and Neosho madtom (*Noturus placidus*) The Cottonwood River immediately upstream of the reservoir is also designated critical habitat for the above listed species and the state-listed endangered Neosho mucket mussel (*Lampsilis rafinesqueana*) The Neosho River immediately downstream of the John Redmond dam is designated critical habitat for the state-listed endangered rabbitsfoot mussel (*Quadrula cylindrica cylindrica*) and the state-listed threatened ouachita kidneyshell mussel (*Ptychobranchus occidentalis*) and Neosho madtom (*Noturus placidus*) There are also several mussel species that are known to be present in the Neosho River around John Redmond Reservoir that are designated as species in need of conservation by our agency. All of the above species prefer gravel substrates with flowing water. Increased areas of inundation in the rivers above the reservoir from increasing the elevation of the conservation pool would impact those designated critical habitats and associated species There could also be temporary impacts to downstream critical habitat and species from reduced releases during conservation pool expansion Our agency also considers riparian woodlands to be crucial wildlife habitat for many game and nongame wildlife species. Increasing the area of inundation would temporarily impact and possibly permanently decrease the quantity of riparian woodlands. Additionally, our agency manages the recreational fishery of the reservoir and would be interested in coordinating the timing of the incremental increases and development of mitigation measures to enhance those recreational resources. We would like to see all of the above listed resources and potential impacts dealt with in any environmental assessment and fish and wildlife coordination report developed for the project.

Thank you for the opportunity to provides these comments and recommendations If you have any questions or need additional information, please free to contact me at the phone number or address listed above

Sincerely,

John R Phillips, Aquatic Ecologist
Environmental Services Section

xc KDWP Reg 5 FW Sup , Tiemann
KDWP, Nygren
FWS, Gill

May 24, 2001

Mr. Chris Hase
Kansas Department of Wildlife & Parks
Operations Office
512 SE 25th Avenue
Pratt, KS 67124-8174

Dear Mr Hase·

I am sending this letter to update your files concerning the water supply reallocation study for John Redmond Lake and our May 8, 2000 request for comments regarding state listed threatened or endangered species and fish and wildlife. Per our May 21 and May 23, 2001 conversations, I understand that the information in the letter response dated June 16, 2000 (Trak: 20000423) from your agency remains valid and that you requested this letter of update

Presently, we are preparing project documentation for compliance with the National Environmental Policy Act of 1969 If you have any questions or require additional information please contact Jim Randolph, USACE Fish and Wildlife Biologist, at 918-669-4396. Thank you for your assistance with this update request.

Sincerely,

James D. Von Loh
Senior Biologist
engineering-environmental Management, Inc.

Enclosures· 1) Letter of Request (May 8, 2000), 2) Letter of Response (June 16, 2000), 3) Scope of Work (May 8, 2000).

Cc: Jim Randolph, USACE, Tulsa District: Planning, Environmental, and Regulatory Division; Environmental Analysis and Compliance Branch

1510 West Canal Court, Suite 2000, Littleton, CO 80120 • (303) 721-9219 • Fax (303) 721-9202
TULSA SACRAMENTO JACKSONVILLE SAN DIEGO

APPENDIX D

Biological Assessment
U.S. Fish and Wildlife Service Response to Biological Assessment

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Field Office
2609 Anderson Avenue
Manhattan, Kansas 66502

October 18, 2012

Ms. Patricia Newell, Senior Biologist
U.S. Army Corps of Engineers, Tulsa District
Planning and Environmental Division
1645 South 101st East Avenue
Tulsa, OK 74128

Dear Ms. Newell:

Thank you for your September 18, 2012 email regarding the final supplement to the final environmental statement concerning the John Redmond Reservoir pool raise. Our original conclusions, as stated in our March 3, 2008 letter, remain consistent at this time.

However, while we still agree that the pool raise is not likely to adversely affect federally listed species, we wish to emphasize this conclusion is relative to current operating conditions. As previously stated in our comments on your biological assessment, we believe that the Tulsa District should initiate section 7 consultation on current ongoing operations of John Redmond Dam to explore whether operations are affecting the federally listed Neosho madtom (*Noturus placidus*) and to determine whether flexibility exists to improve operations for the Neosho madtom. Analyses of Neosho madtom population trends and John Redmond Dam operations indicate that current operations may be affecting the Neosho madtom (Wildhaber et al., 2000; Bryan et al., 2010). In addition, two species of freshwater mussels, the Neosho mucket (*Lampsilis rafinesqueana*) and the rabbitsfoot mussel (*Quadrula cylindrical*), exist downstream of John Redmond Dam. These species are currently categorized as Federal candidate species under the Endangered Species Act, and a proposal for their listing is currently being developed by the Service's Arkansas Field Office.

Initiation of consultation on current operations at this time would help to fulfill recommendations 3 and 4 of the Service's March, 2002 Fish and Wildlife Coordination Act Report. These recommendations called for development of an Environmental Management Plan and an annual reservoir water level management plan which would integrate reservoir water management into conservation and protection of all natural resources in the Neosho River Basin, including the Neosho madtom, the Neosho mucket, and the rabbitsfoot mussel. Development of these plans should be a collaborative effort involving the Kansas Water Office, Kansas Department of Wildlife, Parks, and Tourism, basin water users and other stakeholders, as well as the Tulsa District and the Service. We believe it would be most efficient to develop these plans concurrently with section 7 consultation on current operations and implementation of the pool raise project.

Thank you for the opportunity to comment on this project. If you have any questions or comments, please contact me or Vernon Tabor of my staff.

Sincerely,

Daniel Mulhern
Acting Field Supervisor

cc: KDWPT, Pratt, KS (Environmental Services)
USFWS, Hartford, KS (Flint Hills National Wildlife Refuge)
Kansas Water Office, Topeka, KS

DM/vmt

Citations:

Bryan, J.L., M.L. Wildhaber, W.B. Leeds, and R. Dey. 2010. Neosho madtom and other ictalurid populations in relation to hydrologic characteristics of an impounded Midwestern warmwater stream—update. U.S. Geological Survey, Open-File Report 2010-1109, Columbia, Missouri.

Wildhaber, M.L., V.M. Tabor, J.E. Whitaker, A.L. Allert, D.W. Mulhern, P.J. Lambertson, and K.L. Powell. 2000a. Ictalurid populations in relation to the presence of a mainstem reservoir in a Midwestern warmwater stream with emphasis on the threatened Neosho madtom. Transactions of the American Fisheries Society 129:1264-1280.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Ecological Services Office
2609 Anderson Avenue
Manhattan, Kansas 66502-2801

March 3, 2008

Stephen L. Nolen, Chief
Environmental Analysis and Compliance Branch
Tulsa District, Corps of Engineers
1645 South 101 East Avenue
Tulsa, OK 74128-4609

RE: John Redmond Reservoir Reallocation Study FWS Tracking # 2008-B-0301

Dear Mr. Nolen:

This letter is in response to your January 30, 2008 request for a review of currently listed species and new information to ensure that original conclusions regarding potential impacts to Federally-listed species remain valid and that no further Section 7 consultation is necessary. As you stated in your letter, the Tulsa District is preparing to release the Final Supplement to the Final Environmental Statement (SFES) for the action in accordance with the National Environmental Policy Act of 1969 (Public Law 91-190). A draft SFES was circulated for agency and public review on July 11, 2002.

Work on this project is based on agreements in the FY 2000 Scope of Work identifying a 2-foot raise as the level upon which to perform an assessment. This study was carried out under authority and in accordance with provisions of the U.S. Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.).

The Service previously provided a Planning Aid Report on the Proposed Reallocation of Storage at John Redmond dated December 1995; a response to the Biological Assessment (BA) dated March 15, 2002; Final Report on Fish and Wildlife Resources dated March 2002 (aka Fish and Wildlife Coordination Act Report (FWCA)); and comments on the Draft Supplement to the Final Environmental Impact Statement (DSFEIS) dated September 9, 2002.

We have reviewed past documents and conclude that no new species have been included as federally listed species since the Draft SFES. The bald eagle was listed as threatened under the Endangered Species Act (ESA) at the time the Draft SFES was issued. It was delisted from the ESA in 2007. However, it is still protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act and measures to minimize impacts to this species should still be

implemented. It is our understanding the COE intends to replace the loss of 195 acres of medium value woodlands by planting 166 acres to a mixture of hardwood trees native to the project area which should result in higher value woodlands. This action would appear to minimize long-term adverse impacts to bald eagles and would alleviate our concerns relating to the bald eagle.

The Tulsa District prepared a Biological Assessment (BA), dated November 2001, addressing impacts to Federally-listed species associated with this proposed permanent two-foot increase in the conservation pool elevation at John Redmond Lake. The BA concluded that this action is not likely to adversely affect Federally-listed species over and above the current operating conditions. In a letter dated March 15, 2002, our office concurred with this determination and concluded that no further Section 7 consultation would be necessary for the two-foot pool raise.

While we still agree with our conclusion that the pool raise is not likely to adversely affect federally-listed species, we wish to emphasize this conclusion is relative to **current operating conditions.** As previously stated in our comments on the BA, we believe that the Tulsa District should initiate Section 7 consultation on current ongoing operations of John Redmond Dam to explore whether operations are affecting Neosho madtom and to determine whether flexibility exists to improve operations for Neosho madtom. Analyses of Neosho madtom population trends and John Redmond dam and reservoir operations (Wildhaber et. al., 2000)[1] indicates that current operations may be affecting the Neosho madtom.

Initiation of consultation on current operations at this time would help to fulfill Recommendations 3 and 4 of the Service's March, 2002 Fish and Wildlife Coordination Act Report. These recommendations called for development of an Environmental Management Plan and an annual reservoir water level management plan which would integrate reservoir water management into conservation and protection of all natural resources in the Neosho River Basin, including the federally-listed Neosho madtom. Development of these plans should be a collaborative effort involving the Kansas Water Office, Kansas Department of Wildlife and Parks, basin water users and other stakeholders in addition to the Tulsa District and Fish and Wildlife Service. We believe it would be most efficient and timely to develop these plans in parallel with the Section 7 consultation on current operations and implementation of the pool raise project.

Thank you for the opportunity to comment on this project. If you have any questions, please contact me or Susan Blackford, of my staff, at (785) 539-3474.

Sincerely,

Michael J. LeValley

Michael J. LeValley
Field Supervisor

cc: EPA, Kansas City, KS (Wetland Protection Section)
KDWP, Pratt, KS (Environmental Services)
USFWS, Hartford, KS (Flint Hills Wildlife Refuge)

MJL/shb

[1]Wildhaber, M.L, V.M. Tabor, J. E. Whitaker, A.L. Allert, D.W. Mulhern, P.J. Lamberson, and K.L. Powell. 2000. Ictalurid populations in relation to the presence of a main-stem reservoir in a Midwestern warmwater stream with emphasis on the threatened Neosho madtom. Transactions of the American Fisheries Society 129: 1264-1280.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
315 Houston Street, Suite E
Manhattan, Kansas 66502-6172

March 15, 2002

David L. Combs, Chief
Environmental Analysis and Compliance Branch
U.S. Army Corps of Engineers
Tulsa District
P O. Box 61
Tulsa, Oklahoma 74121-0061

Dear Mr Combs.

This is in response to your Biological Assessment for the John Redmond Pool Raise, Proposed Two Foot Increase in Conservation Pool, Coffey County, Kansas, which we received December 28, 2001 The biological assessment evaluated various sources of impact to the federally-listed bald eagle (*Haliaeetus leucocephalus*), western prairie fringed orchid (*Platanthera praeclara*), and Neosho madtom (*Noturus placidus*), as well as three state-listed mussels. The assessment concluded there would be no effect to the western prairie fringed orchid, due to lack of this species being present in the impact area The assessment further concluded there would be minor effects, many of these temporary, to the bald eagle and Neosho madtom, with a resulting overall net beneficial effect for both species. We readily concur with the determination of no effect for the orchid, and offer the following comments regarding the other two species.

As indicated in our Final Fish and Wildlife Coordination Act Report (FWCA), we anticipate inundation of 195 acres of woodlands from this action, rather than the 158 acres discussed in the biological assessment In either case, this represents a significant impact to the woodland habitat of the area Your assessment identified this as a temporary beneficial effect for the bald eagle, because of the increased number of dead snags which would be available for perches. However, this seems to imply that only dead trees are suitable for use by bald eagles, which is inaccurate It is true that eagles prefer perch trees which afford them a wide view of their surroundings, but live trees can also provide this habitat, for a much longer period of years than dead trees can be sustained. Additionally, during the winter when most eagles utilize the area, live trees are in a dormant state which makes them structurally equivalent to dead trees. And, although there are no currently active bald eagle nests at John Redmond, use of live nest trees is known from elsewhere in the state

It can be expected that trees flooded by this action will decrease in number and suitability as decay, waves, and ice work to destroy them It is unlikely that natural tree regeneration along the fringe of the new pool elevation will be sufficient to replace the total loss through time,

especially considering the adverse effects of frequent flood storage Therefore, we do not concur with the biological assessment's statement of overall beneficial effects from the drowning of this many trees However, it is true there could be a temporary increase in foraging habitat resulting from an increased number of trees being located within or very near the pool. We also concur that fish populations should be enhanced for a period of several years following the pool raise, potentially providing an increased prey base for visiting eagles Given these ameliorating factors, it appears that long-term adverse impacts to bald eagles should be minimized, as long as the tree mitigation measures recommended in the FWCA are implemented

Regarding the Neosho madtom, we concur with the biological assessment that this action will not permanently inundate the upstream gravel bars which currently provide habitat By raising the conservation pool elevation, the likelihood of inundation of these bars by flood storage will increase by about 2%, according to our interpretation of the Corps' data. The long-term impact of this will remain to be seen, but hopefully will not be significant. Downstream, there will be a change in the hydrograph, resulting in a slight increase in the depth and longevity of flood storage releases. In the assessment you conclude that this change will not constitute a significant impact on the Neosho madtom or other aquatic organisms Yet the scientific literature cited in your assessment implicates the presence of John Redmond dam and its operation in decreased madtom populations immediately downstream of the dam, with these negative effects evidenced as far downstream as Iola So it may be questionable to assume that a slight change for the worse in a situation which is already believed poor for a listed species should not be determined to have an adverse effect on that species In fact, the Tulsa District should consider whether it should initiate section 7 consultation on current ongoing operations of the John Redmond dam.

At the same time this assumption of no impact is questioned, however, we concur with the assessment that a benefit may be realized for this and other species by having additional water storage from which to make drought releases Although we believe that sustained high flow releases during flood periods may adversely affect habitat, it is certainly true that little or no release during droughts could significantly adversely affect individuals and populations Therefore, as indicated in the FWCA, the overall net effect may be relatively neutral I would strongly urge the Corps to consider as natural a hydrograph as possible during flood conditions This would necessitate evacuating more water during a shorter period of time, rather than nearly bank full flows sustained for many days or even weeks on end

As you can see, my staff and I do not agree completely with statements of beneficial effect to listed species from this action. However, when all these factors are considered, I concur with the biological assessment's determination that this action is not likely to significantly adversely affect the three federally-listed species over and above the current existing condition. Therefore, there is no need for further section 7 consultation on this pool raise action. The three mussel species evaluated have no federal status at this time, but our comments regarding the Neosho madtom pertain to them as well. The Kansas Department of Wildlife and Parks maintains authority for these state-listed species, as well as for the three federally-listed species.

An idea is presented in the biological assessment with which we do not agree; the notion that small impoundments in the upper portions of tributaries in the basin will have a net beneficial effect to fish and wildlife resources There is ample scientific evidence of the adverse biological effects of small tributary dams, both on the tributaries themselves and on the larger receiving stream The federally-listed endangered Topeka shiner (*Notropis topeka*), which occurs in several tributary watersheds within the basin, has been shown to be intolerant of such dam development. It is hoped that the organized watershed districts within the Cottonwood and Neosho basins do not take your comments as an endorsement for increased development.

Thank you for providing such a thorough biological assessment, and for the opportunity to review and provide our comments. If there are any questions regarding any of these comments, they should be directed to Dan Mulhern of this office, 785-539-3474, ext. 109.

Sincerely,

For: William H Gill
Field Supervisor

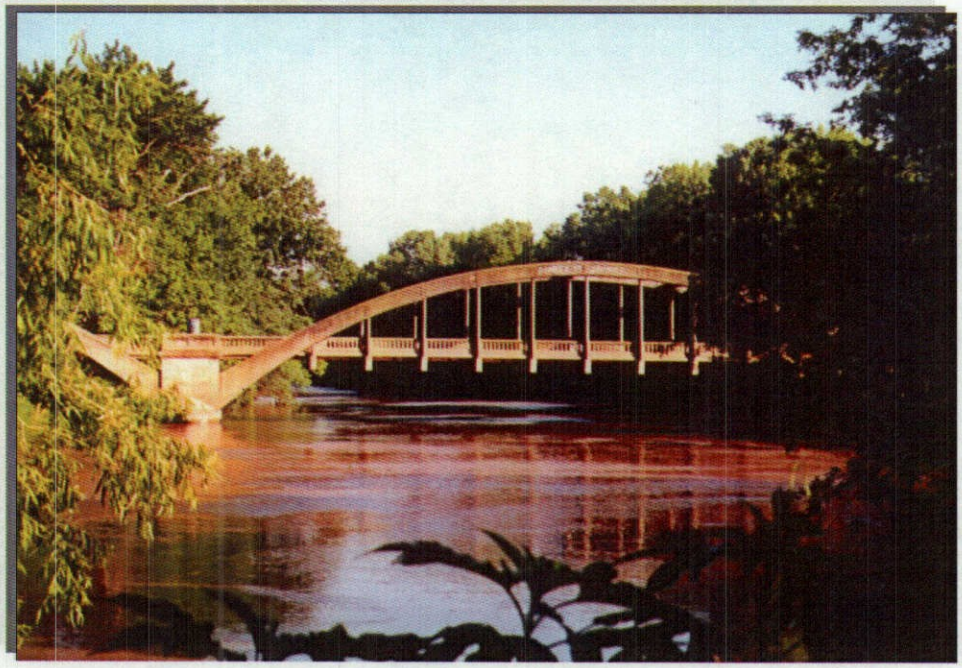
cc FWS, Hartford, KS (Flint Hills NWR)
KDWP, Pratt, KS (Environmental Services)

WHG/dwm

BIOLOGICAL ASSESSMENT

Prepared for the:

REALLOCATION OF WATER SUPPLY STORAGE PROJECT: JOHN REDMOND LAKE, KANSAS



November 2001

United States Army Corps of Engineers; Tulsa District
1645 South 101 East Avenue
Tulsa, Oklahoma 74128-4609

BIOLOGICAL ASSESSMENT

Prepared For

Reallocation of Water Supply Storage Project: John Redmond Lake, Kansas

U.S Army Corps of Engineers, Tulsa District
1645 South101East Avenue
Tulsa, Oklahoma 74128-4609

November 2001

Prepared By

engineering-environmental Management, Incorporated
1510 West Canal Court, Suite 2000
Littleton, Colorado 80120

EXECUTIVE SUMMARY

This biological assessment addresses threatened, endangered, and candidate species listed by the U.S. Fish and Wildlife Service and the Kansas Department of Wildlife & Parks, relative to alternative actions determined for the Reallocation of Water Supply Storage Project: John Redmond Lake, Kansas, proposed by the Tulsa District, U.S. Army Corps of Engineers. The John Redmond Dam was constructed in the Neosho River Basin of Coffey County during the late 1950s and early 1960s, to provide flood control, water supply, water quality, and recreation.

Reservoir water levels fluctuate widely and somewhat unpredictably (up to 30 vertical feet) behind the dam structure. These fluctuations are due to flood flows received from the approximately 3,015-square mile drainage basin upriver from the dam. Approximately 2,569-square miles are uncontrolled below Marion and Council Grove Dams. As a result of pool fluctuations, it has been difficult to farm agricultural land located within the flood pool limits—these fields produce crops only about two of every five years. Each flood event results in a loss of some vegetation, including mature trees, due to inundation and subsequent drowning. Downriver from the dam, releases into the Neosho River are controlled to limit flooding and provide water to the Wolf Creek Generating Station and the Cottonwood and Neosho River Basins Water Assurance District No 3. Flows downriver from the John Redmond Dam to the Oklahoma border encounter an additional 12 low-head dams from 3–15 feet in height The small dams, constructed from the 1930s through the 1950s, are used for diverting flows for municipal and agricultural use.

An assessment is being conducted of four water storage alternatives: two for raising the elevation of the conservation pool by two feet (1,039 ft.–1,041 ft. NGVD), dredging sediments to achieve the desired capacity, and the no-action alternative. Six species identified for the biological assessment are the:

- bald eagle (*Haliaeetus leucocephalus*) – threatened;
- western prairie fringed orchid (*Platanthera praeclara*) – threatened;
- Neosho madtom (*Notorus placidus*) – threatened;
- Neosho mucket mussel (*Lampsilis rafinesqueana*) – species of concern;
- rabbitsfoot mussel (*Quadrula cylindrica clylindrica*) – species of concern; and
- Ouachita kidneyshell mussel (*Ptychobranchus occidentalis*) – species of concern.

A raise in conservation pool elevation would inundate approximately 33 acres of cropland, 18 acres of grassland, 158 acres of woodland, 166 acres of open water, and 196 acres classified as palustrine wetland, totaling approximately 570 acres

The western prairie fringed orchid does not occur in the predominately introduced grasslands adjacent to the conservation pool and will not receive impacts. The bald eagle is transient through the project area and uses John Redmond Lake primarily as a winter foraging site for fish and waterfowl. An increase of trees and snags used as perches will occur and short-term food-supply benefits to the bald eagle will result from an enhanced fishery and increased waterfowl use due to increased habitat during the first five to eight years following a raise in conservation pool elevation.

Affects to the Neosho madtom are not expected to change from the existing condition, e g., they may periodically lose access to two gravel bars in the vicinity of Hartford, Kansas, during drought periods and flood events, but may migrate to these bars during appropriate flows from more suitable riffle and run habitat upriver near Neosho Rapids, Kansas The Neosho mucket mussel, rabbitsfoot mussel, and Ouachita kidneyshell mussel are potentially extirpated upriver from the reservoir and will not be affected by the reservoir raise. A minor shift in the downriver hydrograph due to an elevated conservation pool will have negligible effects to the Neosho madtom and listed mussel species and a beneficial affect may result from additional releases for water quality flows during periods of drought.

There are minor, potentially beneficial impacts to listed aquatic species downriver of John Redmond Dam as a result of this action; the principle one being release of water quality flows during drought periods. Other than timing of dredge operations and a need for a threatened, endangered, or rare species survey of sediment storage, haul roads, and maintenance areas, only minor impacts related to potential release of sediments and associated contaminants washed in from upriver sources have been identified to listed species for the dredge alternative

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ABBREVIATIONS AND ACRONYMS

BA	Biological Assessment
CFS	Cubic Feet Per Second
CY	Calendar Year
DOA	Department of Agriculture
e^2M	engineering-environmental Management, Incorporated
ESA	Endangered Species Act of 1973
FHNWR	Flint Hills National Wildlife Refuge
GIS	Geographic Information System
JRL	John Redmond Lake (Reservoir)
KDH&E	Kansas Department of Health & Environment
KDW&P	Kansas Department of Wildlife & Parks
KNHI	Kansas Natural Heritage Inventory
KS	Kansas
MSL	Mean Sea Level
NGVD	National Geodetic Vertical Datum
NRCS	Natural Resource Conservation Service
OCWA	Otter Creek Wildlife Area
OK	Oklahoma
RM	River Mile
RWSS	Reallocation of Water Supply Storage Project
US	United States (Federal)
USACE	United States Army Corps Engineers
USC	United States Code
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WCGS	Wolf Creek Generating Station
WPFO	Western Prairie Fringed Orchid

1.0 INTRODUCTION

In accordance with Section 7(c) of the Endangered Species Act of 1973 (ESA), as amended (16 U.S C. 1531 *et seq.*), the U S. Fish and Wildlife Service (USFWS) is responsible for providing a species list for a Biological Assessment (BA) concerning the possible effects of proposed federal actions on federally-listed species This BA has been prepared at the request of the U.S. Army Corps of Engineers; Tulsa District (USACE) for the proposed Reallocation of Water Supply Storage Project at John Redmond Lake, KS, and will analyze the potential effects of project alternatives and future operation on federally-listed threatened or endangered species. Species listed as threatened or endangered by the USFWS and the Kansas Department of Wildlife & Parks (KDW&P) are addressed herein (**Table 1-1**) Only federally-listed plant and wildlife species are afforded protection under the Endangered Species Act of 1973 (ESA). State-listed species are considered, but are not afforded protection under the ESA.

Table 1-1. Federally- and Kansas-Listed Species for the John Redmond Lake Project Area (Sources USFWS 2000, KDW&P 2000, and KNHI 2001) (Attachment A)

Species	Status / Rank	Comments
Common Name / *Scientific Name*	**Federal / Kansas**	**Source and Habitat**
Bald Eagle (*Haliaeetus leucocephalus*)	US – Threatened KS – Threatened G4/S1B, SZN	USFWS response letter. Transient use of larger trees in the vicinity of open water
Neosho Madtom (*Noturus placidus*)	US – Threatened KS – Threatened G2/S2	USFWS and KDW&P response letters Use shallow riffles with loose/uncompacted gravel bottoms.
Western Prairie Fringed Orchid (*Platanthera praeclara*)	US – Threatened KS – Threatened G2/S1	USFWS response letter Grows in tallgrass silt loam soils, moist sand prairies, or hay meadows with full sunlight
Neosho Mucket Mussel (*Lampsilis rafinesqueana*)	KS– Endangered G2/S1	KDW&P response letter Requires clean, in-stream gravel beds
Rabbitsfoot Mussel (*Quadrula cylindrica cylindrica*)	KS– Endangered G3/S1	KDW&P response letter. Requires clean, in-stream gravel beds.
Ouachita Kidneyshell Mussel (*Ptychobranchus occidentalis*)	KS – Threatened G3G4/S1	KDW&P response letter Requires clean, in-stream gravel beds.

Rank: G2· Globally imperiled because of rarity, typically 6-20 occurrences, G3 Globally vulnerable because it is very rare and local throughout its range, typically 21-100 occurrences, G4· Globally apparently secure, uncommon but not rare, widespread, typically 100 occurrences or more. S1 State critically imperiled because of extreme rarity, typically five or fewer occurrences, S2 State imperiled because of rarity, typically 6-20 occurrences, SZN Zero occurrences/non-breeding population, occurs during migration (KNHI 2001).

The above-listed species were identified in letters addressed during May and June 2000 (**Attachment A**), and were reviewed by each agency for accuracy and completeness during May

2001 (Mulhern, pers.com. 2001 and Hase, pers com. 2001). Listed species status and rank were obtained from the USFWS, KDW&P, and the KS Natural Heritage Inventory (KNHI).

1.1 Project Description

This section describes the water supply storage reallocation project for John Redmond Lake (JRL) and the proposed alternatives The State of Kansas and the federal government entered into a water supply agreement at JRL to provide water for the Cottonwood and Neosho River Basins Water Assurance District No. 3 and the Wolf Creek Generating Station. The Cottonwood and Neosho River Basins Water Assurance District includes 12 cities and four industrial water users (Lewis, pers. com. 2001). JRL is located three miles northwest of Burlington, in Coffey County, KS (**Figure 1-1**).

An estimated 34,900 acre-feet of storage remaining after 50 years of sedimentation (CY 2014) forms the basis of the 1975 agreement (USACE 1976). Water storage was to occur within the conservation pool (1,039.0-ft elevation), however, studies have determined that sediment has been deposited unevenly within JRL, both for the predicted amount and location of sediment deposition. The sediment is accumulating in the conservation pool while the flood control pool has experienced less than predicted sedimentation (**Figure 1-2**).

The uneven sediment distribution has depleted storage available for water supply purposes and is infringing upon the water supply agreement obligations. A recent Tulsa District Office water supply yield analysis indicated a 25 percent reduction in the water supply capacity at design life (CY 2014) because of the disproportionate sediment deposition. Most of the sediment deposition has been below the top of the current conservation pool (elevation 1,039.0 ft.). The USACE has been directed by congress to study an equitable redistribution (reallocation) of water storage between the flood control and conservation pools. Therefore, the USACE is evaluating the alternative actions described in Section 1 3 to resolve the depleted water storage situation and describe potential impacts to threatened or endangered species.

Construction of John Redmond Dam began in June 1959, and final water storage began during September 1964 (USACE 1996). John Redmond Dam is an integral component of a three-dam and reservoir system that includes Council Grove and Marion Reservoirs The three structures provide flood control and other benefits to the Neosho River Basin. The conservation pool of JRL was filled to its initial elevation of 1,036.0 feet during November 1964, and was raised to the current 1,039.0-ft. elevation during April 1976. The Cottonwood and Neosho River Basins Water Assurance District No. 3 and Western Resources, the operators of Wolf Creek Nuclear Power Plant, have contracted with the State of Kansas for all of the water supply storage in the reservoir (USACE 1996). The power plant pumps water from the Neosho River below the dam structure to store in the Coffey County Fishing Lake, approximately three miles east of the John Redmond Dam.

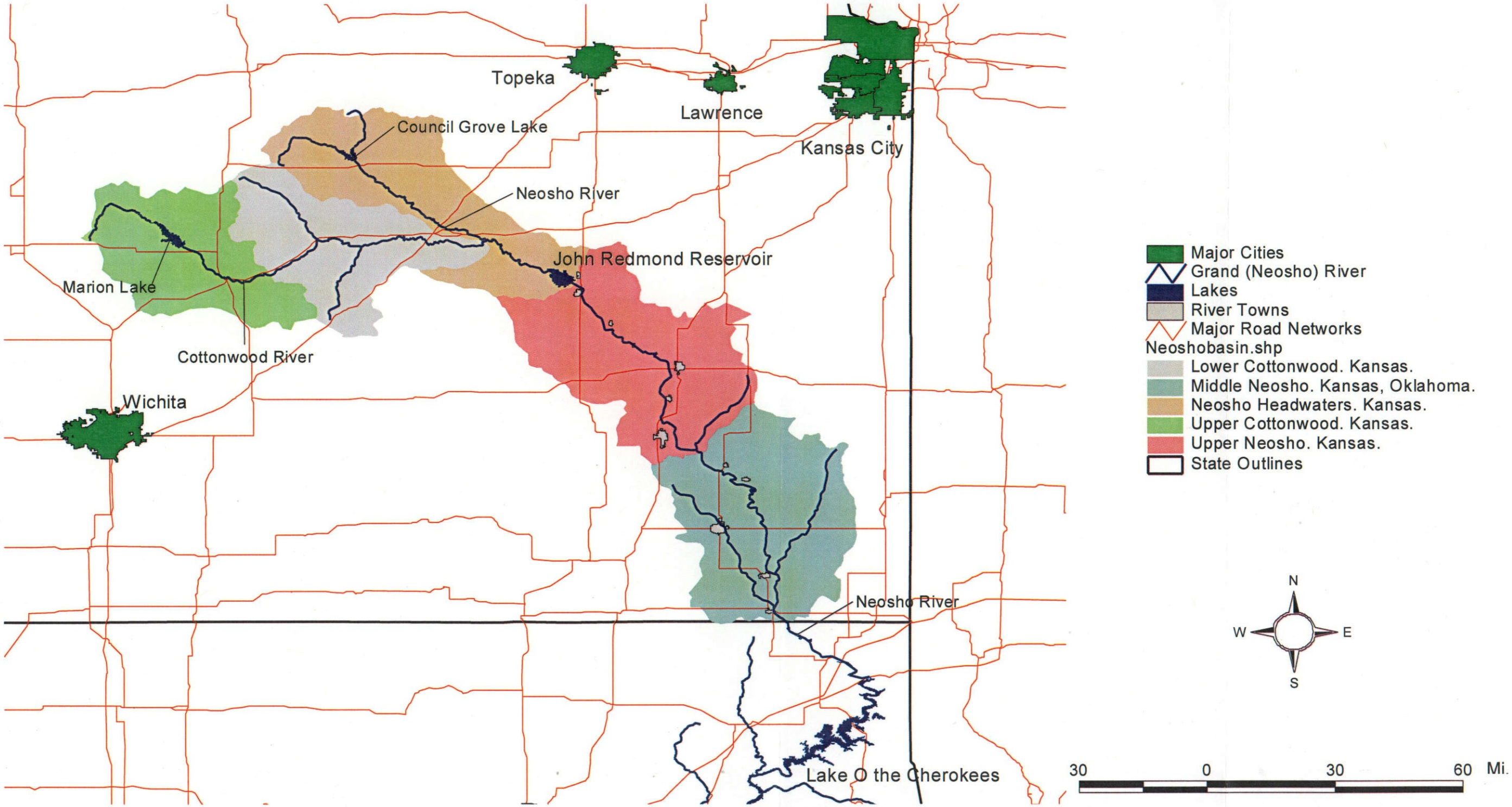


Figure 1-1. Location Map for John Redmond Dam, Lake, and the Neosho River to the Grand (Lake O' the Cherokees) Reservoir

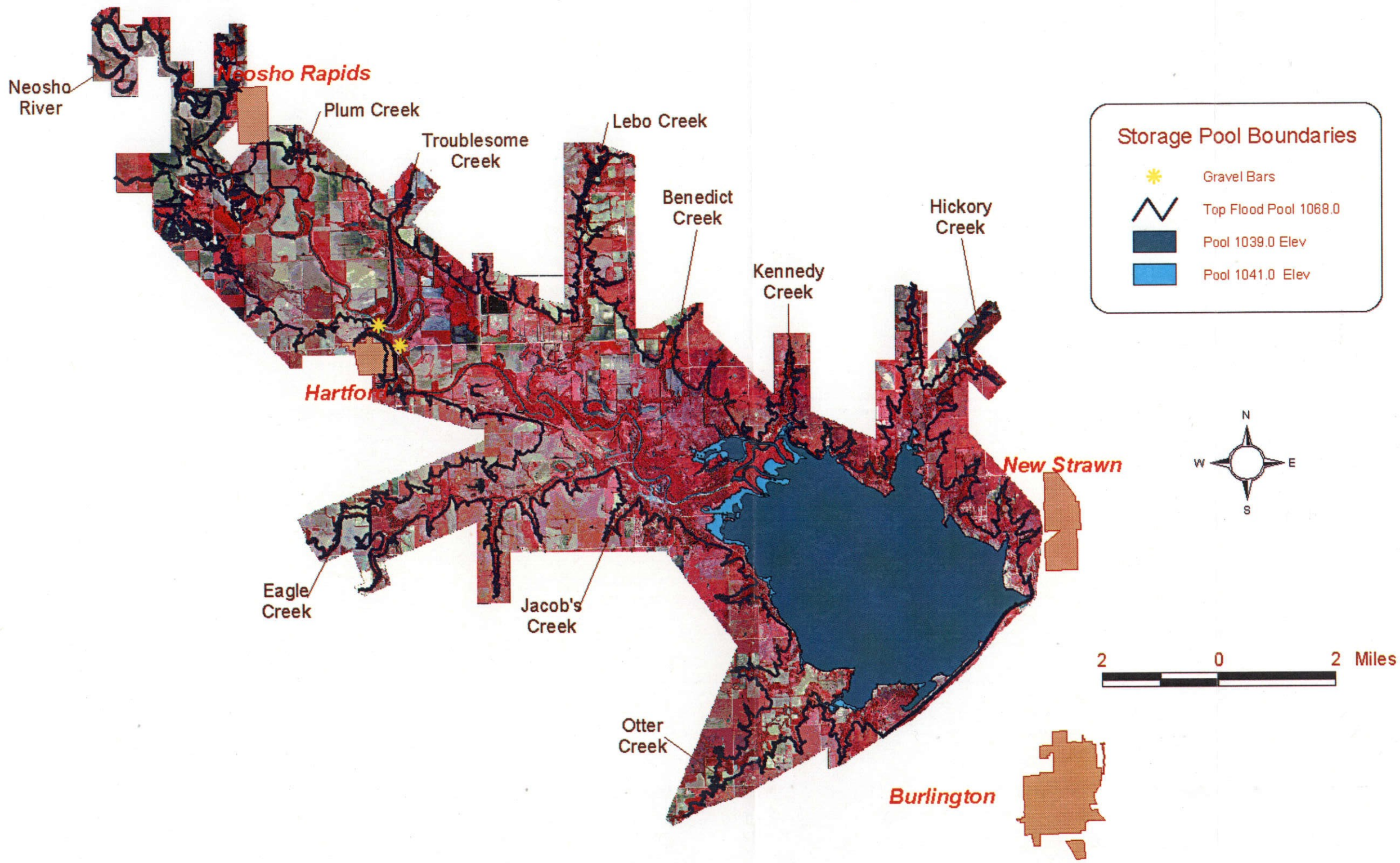


Figure 1-2. John Redmond Lake Site
Conservation and Flood Control Storage Pool Boundaries

1.2 Project Area Location and Management

John Redmond Dam and Lake lie between the towns of Neosho Rapids, Hartford, and Burlington on the Neosho River (RM 343.7) in Coffey and Lyon Counties, KS (**Figure 1-1**) The project area evaluated for the BA includes JRL, associated federal and state leases, and the Neosho River downriver of the dam to the upper limits of Grand Lake (Lake O' the Cherokees), OK (**Figures 1-1 and 1-2**). The USACE (the Arkansas River Control Section of the Hydrology and Hydraulics Branch, Tulsa District) regulates John Redmond Dam and Reservoir according to the water control plan (USACE 1996)

The USACE project manager operates the dam and reservoir under the direction of the Operations Division, Tulsa District. It is a multi-purpose project authorized for flood control, water supply, water quality, recreation, and fish and wildlife. The principal regulation issue identified historically was river bank erosion that occurs during and after periods of high flows in the Neosho River below the dam. To minimize river bank erosion, releases are decreased as slowly as possible to slow the rate of fall in the river stage, since this erosion has been attributed to the fast rate of fall from natural and regulated flows (USACE 1996). However, a recent research project determined that aside from localized channel widening, there was little post-dam construction change in bank-full channel width (Juracek 1999).

In addition to site management by the USACE, leases have been signed with other federal (USFWS) and state (KDW&P) agencies to provide land management for the Flint Hills National Wildlife Refuge (FHNWR) and Otter Creek Wildlife Area (OCWA) (**Figure 1-2**) The USACE maintains six public-use areas, five of which have recreation parks providing camping, picnic areas, drinking water, and sanitary facilities (USACE 1996). Additional recreation facilities present on USACE-managed lands include five boat ramps, an overlook, and a swimming beach.

FHNWR was established in 1966 and consists of approximately18,500 acres located on the upstream portion of JRL (FHNWR 2000). The refuge is managed primarily for migratory waterfowl; its specific management focus includes:

- Intensive use by ducks and geese during spring and fall migration;
- Intensive use by shorebirds during late summer migration,
- Farmlands managed on a share basis with area farmers – the Refuge portion provides food for migrating waterfowl and resident wildlife;
- Numerous constructed ponds and shallow marshes provide additional waterfowl habitat;
- Closures are provided for waterfowl and bald eagle management, and
- Public access restrictions are incorporated during periods of intensive waterfowl use.

OCWA was established in 1966 and consists of approximately 1,472 acres adjacent to FHNWR and the southeast portion of John Redmond Dam. This wildlife area is managed primarily for upland game species: white-tailed deer, wild turkey, mourning dove, bobwhite quail, cottontail rabbit, and squirrel. It's specific management focus includes·

- Farmlands managed on a share basis with area farmers – the wildlife area portion provides food for resident upland game animals and migrating waterfowl;

- Fishing access and management, particularly for channel and flathead catfish;
- Introduction of native ground cover for restoration sites, particularly tallgrass prairie species; and
- Day use recreation.

Permitted activities on the FHNWR include wildlife observation, hiking and sightseeing, photography, boating, picnicking, camping, fishing, hunting, wild food gathering, and fish bait collection. Interpretive trails are present and include the Dove Roost Trail and the Headquarters Trails. OCWA provides wildlife observation, sightseeing, photography, boating, fishing, and hunting opportunities (**Figure 1-3**).

Figure 1-3. Loading at the Boat Ramp and Cat-Fishing, John Redmond Lake—From OCWA.

1.3 Project Alternative Actions

Four potential alternative actions have been identified and proposed for the Reallocation of Water Supply Storage Project at JRL; they are:

I. **No Action**. The current operating plan for the reservoir remains in effect with its existing sedimentation and water storage issues.

II. **Dredge John Redmond Reservoir**. Remove enough sediment from the reservoir to provide the required water supply storage.

III. **Storage Reallocation**. Raise the reservoir conservation pool to elevation 1,041.0 feet (NGDV) to accommodate for sediment buildup. A phased pool raise of one foot to elevation 1,040.0 feet (NGVD), then two 0.5-foot increments, first to 1,040.5 feet and then to 1,041.0 feet elevation.

IV. **Proposed Action: <u>Storage Reallocation</u>.** Raise the reservoir conservation pool to elevation 1,041 0 feet (NGVD) to accommodate for sediment buildup using a single pool raise of two feet.

The following data and **Table 1-2** presents the post-construction JRL baseline Specific physical data describing the dam (USACE 1996), include:

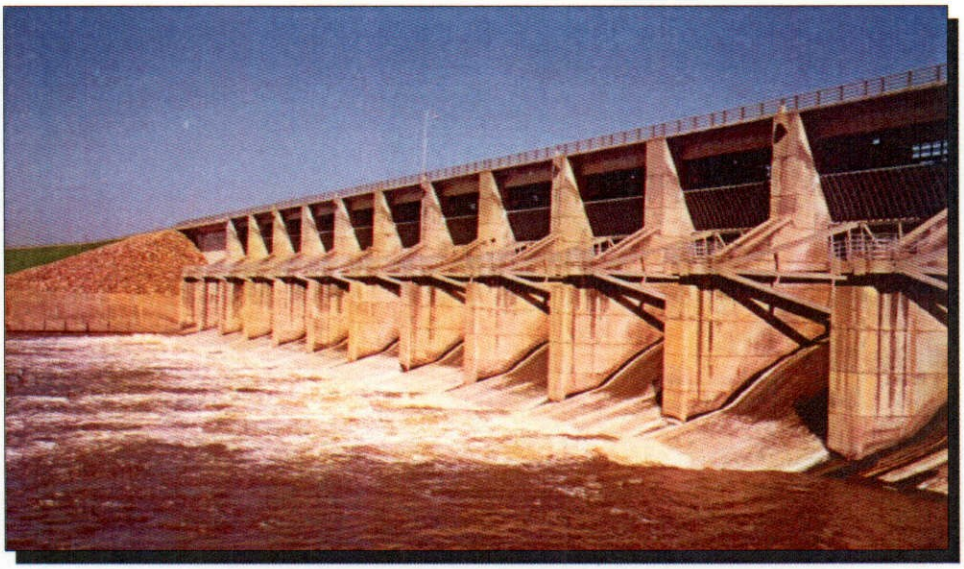
- Earthfill Dam Structure: 20,740 feet long (not including spillway); dam top = 1,081.5 feet NGVD; maximum height = 86 5 feet above the Neosho River bed; crest width = 35 feet 7 inches.
- Spillway· located near left abutment; concrete chute, gated ogee weir; crest elevation = 1,033 0 feet NGVD; length = 560 feet; control = 14 (40 ft. x 35 in.) tainter gates; hoists are individual electric motors.
- Outlet Works: two 24-inch circular pipes for low flow; one 30 inch circular pipe for water supply; invert elevation = 1,015 5 feet NGVD; invert placed through left abutment of spillway; control = motor-operated butterfly valves for low flows and manually-operated gate valves.
- Land Acquisition: taking line is semi-blocked to elevation 1,063.0 feet; easement is elevation 1,073.0 feet or limits of backwater envelope curve.

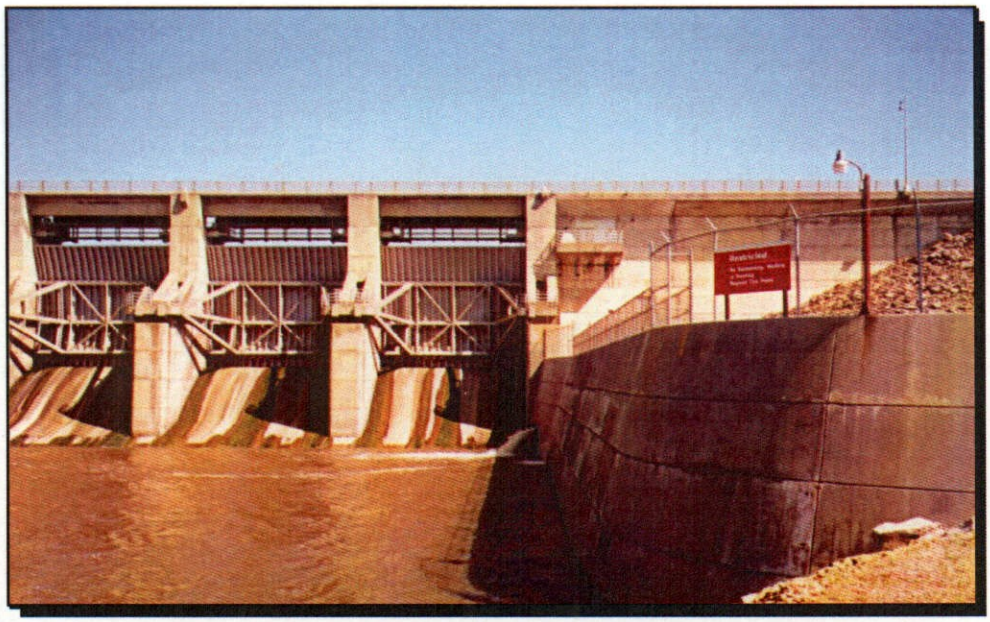
Table 1-2. Project Elevations, Surface Areas, and Storage Volumes (Source USACE 1996)

Project Feature	Elevation in Ft. NGVD	Surface Area in Acres	Storage Volume in Acre-Ft.[1]	Spillway Capacity (cfs)
Top of Dam	1081 5	58,187	1,171,000	732,000
Maximum Pool	1074 5	43,106	807,941	575,000
Surcharge Pool	1073.0	41,111	748,977	542,000
Flood Control Pool	1068.0	34,331	574,918	430,000
Conservation Pool	1039.0	8,084	50,501	25,000
Spillway Crest	1033 0	4,801	9,980	0
Inactive Pool	1020.0	0	0	—
Streambed – Dam	995 0	—	—	—
Flood Control Storage	1039 0 – 1068 0	—	524,417	—
Conservation Storage	1020 0 – 1039.0	—	50,501	—

(1) Based on runoff from uncontrolled drainage area of 2,569 mi^2 (top of dam = 8 55 in and spillway crest = 0 11 in. of precipitation. Resurvey using 2000 data.

Figure 1-4. John Redmond Dam, KS





2.0 METHODS

Three methods were used to gather data for this BA 1) existing literature and data was gathered and reviewed pertinent to the analyses required to describe the project baseline and assess impacts to listed species; 2) researchers/resource professionals knowledgeable of the region, site, and species under consideration were contacted and interviewed; and 3) a site visit was conducted when the water level was at 1,041.5 feet (0.5 ft. higher than the proposed pool raise), to observe the JRL landscape. Listed species recovery plans were of particular importance because they describe the species natural history, distribution and abundance, and delineated actions considered necessary for recovery and/or protection (USFWS 1991 and 1996).

2.1 Existing Data Review

Existing literature and data available for the JRL area were obtained from federal and state resource agencies, and requested from researchers contacted via telephone and electronic mail. Other data sources were accessed from Internet Web sites and reviewed from regional references All data were evaluated for inclusion in this BA. Relevant data for the site hydrology, abiotic and biotic conditions, and species biology, provided the baseline descriptions from which project-related impacts were determined. Of particular importance in impact evaluation to aquatic species was the hydrology modeling performed by the USACE (2001).

Hydrology Model

The JRL and Neosho River hydrology was modeled to determine the impact of reallocating flood control storage to water supply storage to meet contractual water supply requirements through the year 2014, which is the end of the original project economic life (USACE 2001). The USACE SUPER computer model was used to simulate regulation of a multi-purpose reservoir system on a daily basis and to perform an economic analysis of the simulation (Hula 1990).

Four SUPER runs were performed to model:

1. existing conditions for the year 2014 (I. No Action Alternative);
2. raising the top of conservation pool to elevation 1,040 feet (III Multiple Raise Alternative);
3. raising the top of conservation pool to elevation 1,040 5 feet (III Multiple Raise Alternative); and
4. raising the top of conservation pool to elevation 1,041 feet (III. Multiple Raise Alternative and IV. Proposed Alternative).

SUPER runs 2, 3, and 4 were analyzed to determine the impacts of these pool raises on upstream (backwater) and downstream (flow) conditions. The computer simulation assumed all reservoirs were in place for the entire period of record and that each reservoir operated based on specific operational criteria. The period of record for the Arkansas River system model used was 56 years (January 1940–December 1995)

The basic SUPER regulation simulation model was run for each alternative operational scenario in the study, except dredging. Two additional modules were also run to develop hypothetical frequency discharges up to the Standard Project Flood for both existing and modified conditions. The additional frequency points were calculated to provide better definition to the upper end of the discharge-frequency curve for extremely rare events Also for this study, hypothetical storms were developed at 67 storm centers within the modeled area at 40 and 50 percent of the Probable Maximum Precipitation.

Reallocation to elevation 1,041 feet accounted for a small amount (3.18%) of the flood pool and resulted in only slight increases in the outflows. For larger flood events there was virtually no difference in pool levels and operations, and only slight differences were observed for smaller flood events. These differences were considered minimal by USACE hydrologists (SUPER 2001).

Listed Species

Recent conservation plan development by the USFWS for FHNWR (2000) and the Geographic Information System (GIS) database development by the Kansas Biological Survey (Egbert et al. 2001) provided current data concerning vegetation and wildlife habitat within JRL. The GIS database was produced using three-date, multi-seasonal Landsat Thematic Mapper imagery and a hybrid classification approach to create an alliance-level cover map for Kansas An assessment of map accuracy was conducted using independent ground verification samples and standard accuracy assessment analysis and reporting procedures. The Kansas GAP vegetation map (Egbert et al. 2001) is considered appropriate for use in large-area resource planning (watershed or county level, or higher). In terms of scale, the map can generally be used for analysis at the 1 100,000 or possibly the 1:50,000 scale, using the GAP land cover map at scales of 1:24,000 or finer is usually inappropriate (Egbert et al. 2001). The minimum mapping unit is approximately five acres. Data analysis and review of the conservation plan allowed preparation of general habitat descriptions, habitat distribution, and also allowed an overlay of elevation data to more accurately describe potential impacts to habitats that may support listed species.

The KDW&P conducts bald eagle surveys along with waterfowl surveys twice monthly, or 14 counts from September through March (Kraft, pers. com. 2001). Most surveys were conducted from various vantage points on the ground around water bodies used by waterfowl. Data were presented for the years 1970–2000 (Kraft 2001) (**Attachment B**)

The Neosho madtom has received increased research emphasis relative to its listed status since the publication of the recovery plan in 1991. Several studies addressing the species distribution, abundance, and behavior were important for potential impact assessment Studies published by Obermeyer et al. (1997), compared quantitative and qualitative sampling methods for species of mussels in the Neosho River and provided results from 99 freshwater mussel assemblages in the study region.

Valuable sources of information for listed species included recovery plans prepared by the USFWS, research studies conducted by federal and state agency personnel, university scientists and graduate students, private organizations, and consultants. This research provided information

on listed species distribution, abundance, reproductive biology, behavior, and habitat parameters such as structure, flow, water velocity, water quality, and additional aspects of listed species biology.

2.2 Contact with Research Professionals

Research professionals with information concerning listed species were identified and contacted via telephone or interviewed in person. Their knowledge of the project area, the listed species, and of published, unpublished, and/or ongoing research was discussed and recorded in contact records These contacts are documented in the reference section of this BA and form one basis for the ensuing discussions and impact assessment.

2.3 Site Visit

A site visit was conducted June 11–12, 2001, to meet with resource managers from the USACE, USFWS, and KS and discuss the biological resources present, including the listed species, and management implications related to operation of JRL. Coincidentally, the reservoir elevation was at the 1,041.5-foot level for a week prior to and during the site visit. This allowed project biologists and other research professionals to observe the reservoir and upriver and downriver conditions at the approximate elevation (0.5 ft. higher) of the proposed action (IV).

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3.0 EXISTING CONDITIONS

The JRL project area is influenced by a continental climate with average annual precipitation of approximately 35 inches (USACE 1996). Precipitation is heaviest from late spring through early summer, with about 75 percent falling during the growing season. Temperatures range from below zero to above 100° F and the winds are predominantly from the south (FHNWR 2000). Evaporation rates range from approximately 73 inches during normal years to approximately 111 inches during drought years (USACE 1996).

3.1 Topography, Geology, and Soils

JRL lies among low, rounded hills. The topography is a result of generally westerly to northwesterly dipping strata that creates resistant bend and irregular cuesta-like ridges The Neosho River Valley is composed of Holocene, Post-Kansan alluvium and is bordered by the Pennsylvanian–Virgilian, Waubansee Group (west end) and Shawnee Group (east end) sedimentary exposures (Merriam 2000; O'Connor 1953). Small exposures of Tertiary Terrace deposits are present at the northwest end of the reservoir (Merriam 2000). The broad, shallow Neosho River Valley is the most prominent topographical feature on the landscape. The maximum relief is about 225 feet, with most of the site ranging from approximately 1,020-foot elevation near the South Recreation Area below the dam to approximately 1,100-foot elevation west of Neosho Rapids, KS within the flood pool boundary.

Soils formed in the region are relatively shallow silty loams and silty clay loams that tend to be fertile, but are low in organic matter and phosphoric acid (FHNWR 2000). Lack of sufficient depth caused by subsoil restrictions such as tight silty clay, shale, limestone, or sandstone, results in saturated soil in wet seasons and droughty soils during dry seasons. The soils are also highly erosive by water and wind.

Several soils within JRL fit the criteria for prime farmland and farmland of statewide importance. The Woodson silt loam, Verdigris silt loam, Summit silty clay loam (1–4% slopes), Kenoma silt loam (1–3% slopes), Eram silt loam (1–3% slopes), and Dennis silt loam (1–4% slopes) are considered prime farmland (NRCS 1993). The Kenoma silty clay loam (1–3% slopes – eroded) and Dennis silty clay loam (2–5% slopes – eroded) soils are considered farmland of statewide importance (NRCS 1993). In addition, Osage silty clay, Osage silty clay loam, and Lanton silty clay loam soils meet the prime farmland designation if they are drained (NRCS 1993).

3.2 Hydrology

John Redmond Dam was constructed to provide flood control, water supply, maintenance of downstream water quality, and recreation opportunities. This project was originally authorized in 1950 under the Flood Control Act, and was known as the Strawn Dam and Reservoir (DOA–TD 1976). Renamed the John Redmond Dam and Reservoir in 1958, construction was initiated during 1959 and completed in1964. The drainage area was calculated at 3,015-square miles in the upper Neosho River Valley As of January 1, 1976, at the design conservation pool elevation 1039 msl, there were 82,100 acre-feet of water storage, 9,400-surface acres of water, and 58

miles of shoreline. At flood pool elevation 1,068 msl, there were 574.918 acre-feet of water storage and a surface area of 34,331 acres. In 1975, the State of Kansas and the federal government entered into a water supply agreement for an estimated 34,900 acre-feet of storage remaining after 50 years of sedimentation (DOA–TD 2001).

Dams are known to affect river systems, generally decreasing the distribution of sediments and altering the hydrologic regime, physical habitat, and water quality downriver (various authors in Wildhaber et al. 2000) A large amount of sediment is delivered to JRL as a result of erosion from riverbanks and farmlands within the watershed Over 25 percent of the original conservation storage has been filled with sediment, although little change has resulted in flood storage (USACE 1996). This results in approximately 25,500 acre-feet of water quality storage available in the reservoir

Juracek (1999) determined that overall channel response to the altered stream flow regime and sediment load introduced by the John Redmond Dam was minor There was some localized channel widening, but little post-dam change in bank-full channel width This is likely attributable to a substantial reduction in the magnitude of the post-dam annual peak flows in combination with the resistance to erosion of bed and bank geologic exposures and vegetated shoreline (Juracek 1999) The channel may also have been over-widened historically by a series of large floods prior to dam construction.

3.3 Water Quality

The water entering JRL is turbid, carrying silt and sediments from tributary drainages and from agricultural land upriver. Water quality concerns have been documented for most of the surface water entering JRL, including contaminants (FHNWR 2000). Consumption advisories are issued most years for the Neosho River due to chlordane compound concentrations in fish During the 1970s several fish kills were related to runoff from confined livestock feedlots. Investigations by the USFWS, Kansas Field Office, identified PCB, atrazine, and heavy metals, including lead, mercury, and arsenic in biota samples, along with lead in sediment samples (FHNWR 2000). Lead, zinc, and cadmium may lower populations of benthic macroinvertebrates used as food sources by the Neosho madtom, therefore reducing its population (Wildhaber et al 1998).

Water quality samples are taken from selected sites at JRL, analyzed on a periodic basis, and published (USACE 1996). The United States Geological Survey (USGS) maintains a national stream-quality accounting network station on the Neosho River near Parsons, KS, where specific conductance, pH, and temperature are recorded bimonthly. Samples are also taken at this site for chemical, biological, and sediment analysis The USGS also collects and analyzes periodic samples for specific conductance, pH, and temperature on the Neosho River at Americus, Burlington, and Iola, KS These data are published in the *Water Resources Data, Kansas* annual report. Neosho River water quality is considered good, requiring only basic treatment for industrial or municipal use (USACE 1996).

Surface water is also sampled monthly below the John Redmond Dam, near the Wolf Creek Generating Station (WCGS) take-up screen house (KDH&E 1999) These samples are taken as controls to compare water quality with that of the Coffey County Lake, discharge cove, and the

spillway. The radiological analyses of samples included gross alpha, gross beta, tritium (H^3), and gamma isotopes.

Thirty sedimentation ranges established upriver from the dam are measured periodically Both endpoints of each range are identified with permanent markers of known vertical and horizontal positions and all are surveyed periodically to compute sediment deposition (USACE 1996). Sedimentation was last measured during the summer of 2000.

The Kansas Department of Health & Environment (KDH&E) classified the Neosho River (downstream from Council Grove Reservoir) and the Cottonwood River as special aquatic life use waters (USFWS 1991). Further defined, these are waters that contain unique habitat types and biota, or species that are listed as threatened or endangered in KS. The general provisions of the KS surface water quality standards (K.A.R. 28-16-28c) state· "... no degradation of water quality by artificial sources shall be allowed that would result in harmful effects on populations of any threatened or endangered species of aquatic life in a critical habitat..." (USFWS 1991) The KDH&E could issue a variance, however, if "important social and economic development" is impaired (USFWS 1991).

The KDW&P (2000) (**Attachment A**) stated. "The Neosho River immediately upstream from John Redmond Reservoir is Kansas-designated critical habitat for the Neosho madtom and Ouachita kidneyshell mussel The Neosho River immediately downstream from the John Redmond Dam is designated critical habitat for the Neosho madtom, Ouachita kidneyshell mussel, and rabbitsfoot mussel. The Cottonwood River immediately upstream of John Redmond Reservoir is designated critical habitat for the Neosho madtom, Ouachita kidneyshell mussel, and the Neosho mucket mussel."

Low flow releases are currently made during dry periods in order to meet minimum flow requirements at Chanute, KS. The minimum flow requirements range from 21 cfs (November-March) to 48 cfs (July-August), or an average of 30 cfs annually (USACE 1996). Major deviations to the water control plan have been approved historically (at the request of the State of Kansas) to manipulate pool levels for the benefit of fish and wildlife habitat.

3.4 Logjam

A drift logjam up to 3/8–mile in length occurs in the Neosho River, near the Jacob's Landing site, above JRL (**Figure 3-1**). The logjam has formed above an island in the Neosho River, which causes the river to fork into two channels. This logjam has attracted local attention in favor of removal, and was a topic of comments obtained during public meetings held in Burlington, KS (USACE 2000). Although the logjam does not contribute to downriver flooding, it is quite large and was considered cost prohibitive to remove (FHNWR 2000)

Figure 3-1. Logjam Area Upriver of John Redmond Lake.

Local citizens attempted removal of the logjam by burning during the summer of 1999, but the wet wood would not carry the fire (FHNWR 2000). The accumulated debris at this site is considered economically unfeasible to remove by demolition or mechanical means. The Neosho River may form a new channel around this location, south of the existing channel (Jirak, pers. com. 2001).

3.5 Fishery

The JRL was recently studied to determine its affect within the Neosho River and on the associated Ictalurid (catfish) populations (Wildhaber et al. 2000). Research conducted to date indicated a positive relationship between the density of Neosho madtoms and the density of other riffle-dwelling benthic fishes. The evidence suggested that interspecific competition was not limiting Neosho madtom populations (Wildhaber et al. 1999). Comparative studies were conducted to determine differences in the Neosho River fishery above the John Redmond Reservoir and below the dam structure (Wildhaber et al. 2000). Generally, more fish were present above JRL than occurred below the dam. The Neosho madtom densities were very low near a Burlington, KS river gauge, but increased to almost the population levels determined above the reservoir near the Iola, KS gauge. The Neosho madtom densities decreased again from Iola, KS, downriver to Parsons, KS.

Table 3-1. Mean Density of Ictalurid Fish Species Captured Above John Redmond Lake and Below John Redmond Dam, Kansas. (Source: Wildhaber et al. 2000.)

Fish Species	Mean Density Above JRL	Mean Density Below Dam
Neosho madtom	$19.82/100m^2$	$5.64/100m^2$
Channel catfish	$34.31/100m^2$	$18.73/100m^2$
Stonecat	$4.61/100m^2$	$2.83/100m^2$
All catfish excluding Neosho madtom	$45.40/100m^2$	$25.66/100m^2$

Note: research was conducted at an average water depth - velocity of 0.33m - 0.34m/s above JRL and 0.38m - 0.35m/s below the dam.

Water temperature was cooler by approximately 3°C above the dam (24.74°C) than below (27.58°C) (Wildhaber et al. 2001). Turbidity was higher above the dam (57.0 NTU) than downriver of the dam (27.17 NTU), but the pH was nearly the same (8.37 above vs. 8.47 below). Dissolved oxygen increased downriver of the dam (4.66 mg/l vs. 5.62 mg/l); however, conductivity, alkalinity, and hardness were all higher above the dam structure. It is unknown if these factors limit ictalurid populations (Wildhaber et al. 2000).

The Fredle Index (geometric mean adjusted for distribution of particle sizes) was lower above the dam than downriver from the dam (5.52 vs. 7.82). Although not significantly different, this index indicates that more evenly distributed substrate sizes occur upriver from the reservoir, and a shift to the predominance of larger gravel below the dam may be occurring. This increased coarseness of the substrate is considered a common effect of reservoirs and could be a limiting factor for Neosho madtom populations (Wildhaber et al. 2000).

3.6 Vegetation Resources and Land Cover

A variety of vegetation types that provide wildlife habitat are present within the JRL project area. The highest site elevations support tall- and mid-grasses in a Bluestem Prairie type, also known as Tallgrass Prairies (McGregor et al. 1986). Dry, upper slopes, ridges, and hilltops are dominated by little bluestem, a mid-grass, and lower slopes are dominated by big bluestem, a tall grass. Common associates of the drier upper slopes include side-oats grama, purpletop, and Indian-grass. More mesic lower slopes support broomsedge bluestem, Kentucky bluegrass, silver bluestem, switchgrass, and witchgrass, in addition to big bluestem.

The valley adjacent to the flood plain of the Neosho River and its tributaries, and the reservoir margin, support deciduous woodlands, shrublands, and emergent wetlands. Remnants of farmstead and windbreak plantings are also present, including eastern red cedar, American elm, and Osage orange trees.

Figure 3-2. Representative Upland Woodland at JRL.

Upland woodlands occupy drier sites and may be described as an Oak–Hickory Woodland. This type is dominated by burr oak, northern red oak, pin oak, shagbark hickory, and shell bark hickory. On the driest sites, bitternut hickory, chinquapin oak, Osage orange, redbud, and eastern red cedar are the common tree species. Upland sites typically have good surface and internal drainage. The red oak dominated, north-facing slopes are unique Ozarkian Woodlands as observed in the Eagle Creek drainage (Minnerath, pers. com. 2001).

Figure 3-3. Representative Bottomland Woodland at JRL.

Lowland woodlands occupy relatively mesic sites and may be described as Elm-Ash-Cottonwood Woodland or a Bottomland Hardwood Type. This type is dominated by American elm, green ash, eastern cottonwood, black willow, black walnut, sycamore, silver maple, burr oak, box-elder, and hackberry. Lowland sites typically have heavy soils with poor surface and internal (subsurface) drainage

Figure 3-4. Representative Shrublands at JRL.

Shrublands are present as buttonbush and seedling black willow and eastern cottonwood growing adjacent to the reservoir and river margins. In addition, flood plain shrublands dominated by buckbrush, greenbriar, dogwood, American plum, and the liana, wild grape are present within the project area. Some shrublands are also invading grasslands; these are dominated by species of sumac and seedling trees such as eastern red cedar.

Figure 3-5. Representative Wetlands at JRL.

Wetlands of JRL are typically smartweed beds that grow in shallow coves or in the moist soil units introduced (using levees) to FHNWR. Some emergent wetland species present in moist soil units include spike-rush, bulrush, cattail, and sedge. Some stands of seedling silver maple, eastern cottonwood, and black willow are also present. On the reservoir draw-down zone, weedy annuals such as cocklebur, foxtail grass, and barnyard grass are the common species. Millet is sometimes aerially seeded to draw-down sites to produce waterfowl and fisheries forage.

Croplands within the JRL project area are planted to corn, milo, soybean, winter wheat, sunflower, and alfalfa (**Figure 3-6**). Crops are shared with tenant farmers; a portion is harvested and sold by the farmer, and a portion remains in the field for high-nutrient wildlife forage. Retired agricultural lands and other disturbed lands have been identified as sites for restoration using native grass species (Gamble and Barlow, pers. com. 2001). Several native grass restoration sites on the FHNWR and the OCWA have failed due to flood events during the 1990s.

Figure 3-6. Representative Fallow and Planted Croplands at JRL.

3.7 Wildlife Resources

FHNWR (2001) lists 294 species of birds, including 90 species that are known to nest on the refuge. The refuge provides habitat for a variety of avifauna that use the upland, grassland, agricultural land, hardwood riparian stands, marshes, and flooded sloughs. The peak of migration is April–May for passerine species, July–August for shorebirds, and November–December for waterfowl species. The John Redmond area provides for non-consumptive naturalist activities such as bird watching and for the consumptive use of waterfowl, turkey, northern bobwhite quail, and mourning dove through hunting.

Raptors common to the area include the American kestrel, prairie falcon, northern harrier, red-tailed hawk, great-horned owl, barred owl, and wintering bald eagles. Although not strictly raptors, the turkey vulture and American crow are also common (FHNWR 2001).

Passerine birds common to and nesting within JRL include the American goldfinch, eastern meadowlark, red-winged blackbird, northern cardinal, common yellowthroat, brown thrasher, northern mockingbird, American robin, house wren, black-capped chickadee, barn swallow, horned lark, eastern kingbird, and red-bellied woodpecker among many other species (FHNWR 2001). The introduced European starling and house sparrow are also considered abundant passerine birds for the area.

Shorebirds common to the area include the killdeer, American avocet, herons, plovers, sandpipers, yellowlegs, dowitchers, gulls, and terns (FHNWR 2000). Common waterfowl species present during migration include the mallard, teal (green-winged, cinnamon, and blue-winged), northern shoveler, common merganser, lesser scaup, redhead, wood duck, and

American coot (KDW&P 2001). Commonly observed species of goose include Canada, Ross, snow, and white-fronted.

The numbers of waterfowl present through the season is variable, depending on habitat availability and quality. During the year 2000 migration, approximately 48,600 geese and 48,000 ducks were counted (KDW&P 2001). During the year 1996 migration, approximately 103,000 geese and 236,000 ducks were counted (KDW&P 2001). The primary use of the JRL site by waterfowl is for resting and foraging during migration, little waterfowl nesting activity occurs in the area (Gamble, pers. com. 2001).

A variety of game and non-game mammals are present within the JRL area. The principal game mammals include the eastern cottontail, eastern fox squirrel, and white-tailed deer. Common furbearers present include the muskrat, raccoon, and a few beaver, and the carnivores, coyote, red and gray fox, mink, and species of weasel. The river otter has been reintroduced to the region and a few have been observed using the Neosho River (Gamble, pers. com. 2001).

Fish species common to JRL include the channel and flathead catfish, carp, white bass, and crappie (FHNWR 2000). A variety of amphibians are present, including the plains leopard frog, bullfrog, Woodhouse's toad, and tiger salamander. Common reptiles using JRL aquatic and upland habitats include the snapping turtle, map turtles, softshell turtles, box turtles, the common garter snake, northern water snake, and species of skink.

3.8 Bald Eagle

The bald eagle (**Figure 3-7**) is federally listed as threatened; however, it is under consideration for delisting (*Federal Register* 1999). The species is considered a transient through the FHNWR and the JRL site, and its occurrence is listed as common during the winter months (FNHWR 2000 & 2001). The KDW&P conducts counts of eagles, along with waterfowl species, every other week from the latter half of October through the end of March (Kraft and Culbertson, pers. com. 2001) (**Attachment B**). Bald eagles are first observed in the latter half of October, at the beginning of waterfowl census, and remain through the latter half of March when waterfowl counts are discontinued (KDW&P 2001).

Figure 3-7. Representative Photograph of the Bald Eagle.

Bald eagles use trees around JRL and along the Neosho River and its tributaries as perches for foraging, resting, and as roosts (Gamble, Kraft, and Culbertson, pers. com. 2001). When ice formed on JRL, bald eagles were observed resting directly on the ice where they consumed waterfowl and fish from an open portion of the lake (Culbertson, pers. com. 2001). Bald eagles may take waterfowl directly, in addition to foraging or scavenging for dead and wounded birds.

The total season counts have ranged from as few as one bald eagle in 1974 to as many as 280 in 1988. On average, 10 to 20 individual bald eagles use the JRL area at any one time (Culbertson, pers. com. 2001). Bi-weekly counts over the past 30 years have yielded no bald eagles observed (several periods) and as many as 104 individuals present in the latter half of February 1987 (KDW&P 2001). During the year 2000, 65 bald eagle observations were recorded during the season. four in late December (12/16-31), zero in early January, eight in late January (1/16-31), seven in early February (2/1-15), 29 in late February (2/16-28), 15 in early March (3/1-15), and two in late March (3/16-31) (KDW&P 2001).

Bald eagles were also listed as a nesting species for the FHNWR (FHNWR 2000). In approximately three of the last ten years, a pair (or possibly different pairs) of bald eagles performed nest initiation, but rapidly abandoned the behavior (Gamble, pers. com 2001). It is probable that these were young eagles, as they did not complete nest construction or initiate breeding or egg-laying activities (Gamble, pers. com 2001). The principal site for nest initiation activity at JRL was in the Lebo Creek area (Culbertson, pers. com. 2001). A successful nest site was reported from near the Coffey County Fishing Lake, near the Wolf Creek Power Plant (Culbertson, pers. com 2001).

3.9 Western Prairie Fringed Orchid

The western prairie fringed orchid (WPFO) is federally listed as threatened. Populations of the WPFO in KS, south of the Kansas River, occur in ecoregion 251E (Osage Plains Section of the Prairie Parkland Province) (Bailey et al. 1994). The species may be found within unplowed mesic to wet-mesic prairies and sedge meadows on unglaciated, level to hilly sites, and on Pennsylvanian-age sediments covered with a thin, discontinuous mantle of loess residuum (USFWS 1996). WPFO plants have been observed in the successional communities of borrow pits, old fields, and roadside ditches, and may also have occurred historically on mesic sites in the flood plains of several major rivers in KS (USFWS 1996) The species decline is principally attributed to the conversion of habitat to cropland.

In eastern KS, WPFO habitat was described as mesic to wet-mesic prairies and in northeastern KS it was described as wet-mesic to mesic tallgrass prairie. Freeman (pers. com. 2001) stated that south of the Kansas River the WPFO grows in mesic prairie (dominated by species of sedge, switchgrass, and big bluestem) and moist seeps (the seeps usually are the result of water flowing along a contact between shale and limestone formations). Populations of WPFO in KS are isolated and small and none support more than 50 individual plants (USFWS 1996)

The WPFO has not been documented within the JRL project boundaries Habitat here is considered too dry to support the species (Minnerath, pers. com 2001). There is no mesic tallgrass or wet meadow habitat between the 1,039-foot and the 1,041-foot elevation of the existing and proposed conservation pool (Minnerath, pers. com. 2001). One mesic prairie site of approximately 380 acres has been identified near Neosho Rapids, KS, approximately three miles northwest of the northwestern-most project boundary and within the flood easement boundary This site is dominated by prairie cordgrass and eastern gammagrass and represents potential habitat for the WPFO, although no plants have been observed (Minnerath, pers. com. 2001).

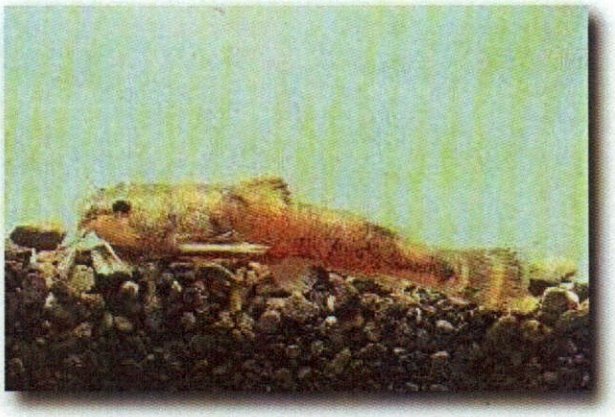
Figure 3-8. Representative Photograph of the Western Prairie Fringed Orchid.

The western prairie fringed orchid is known from Douglas, Franklin, Jackson, Jefferson, Leavenworth, Lyon, Osage, and Shawnee counties in Kansas (USFWS 1996; Freeman, pers. com. 2001). These counties lie mostly north of JRL, which is located predominantly in Coffey and Lyon Counties (although Osage and Franklin counties abut along the north and northeastern Coffey County boundary, respectively). One historical report of the WPFO was documented within the Waverly Prairie of Coffey County during 1969. This prairie was converted to cropland, destroying the former WPFO habitat (Freeman and Brooks 1989). Another population was known in the vicinity of Reading, KS in northeastern Lyon County (Freeman, pers. com. 2001).

3.10 Neosho Madtom

The Neosho madtom (**Figure 3-9**) is federally listed as threatened. It is a small catfish that occupies gravel bars and smaller areas of gravel in rivers of the Neosho Basin (USFWS 1991, Edds, pers. com. 2001). It was federally listed as threatened by the USFWS in May 1990, and a recovery plan was approved the following year (Wildhaber et al. 2000). Historically, it was documented in the Neosho, Cottonwood, Spring, and Illinois Rivers in Kansas, Missouri, and Oklahoma. However, the last collections from the Illinois River were made during the mid–1940s (NSRA 1996). The current distribution for the Neosho madtom includes the Neosho River from Commerce, OK to extreme southeastern Morris County, KS; the Cottonwood River from its Neosho River confluence to central Chase County, KS; and the Spring River from its Neosho River confluence to western Jasper County, MO (USFWS 1991, NSRA 1996) (**Figure 1-1**).

Figure 3-9. Representative Photograph of the Neosho Madtom.



In the vicinity of John Redmond Dam, the Neosho madtom is thought to occupy gravel bars near Hartford, KS and is known near Neosho Rapids, KS, upriver from the reservoir. The site that lies approximately 0.75 miles west of Neosho Rapids, KS was sampled in 1994 and supported the Neosho madtom (27 individuals) (NSRA 1996). This location represents a permanent monitor site and has been sampled every year from 1991–2000 (Tabor, pers. com. 2001 and Wildhaber et al. 2000).

The two gravel bars near Hartford, KS are located west of the SH 130 bridge and east of the Hartford Recreation Area loop road (**Figure 1-2**). Historic sampling, e g , 1950s through 1975, determined that Neosho madtoms were present on the gravel bar west of the SH 130 bridge (two individuals). The gravel bar east of Hartford has yet to be sampled (Shaw, pers. com. 2001).

Further upriver from Neosho Rapids, KS, the Neosho madtom has been collected at the following general locations: 1) Lyon County; 13 km east of Emporia, 11 km east of Emporia, 7 25 km east of Emporia, 5 25 km east of Emporia, 2 5 km east of Emporia, Bridge site at SH 99, Emporia water intake at the Prairie Street Bridge, 4 km west of Americus, 6.5 km north of Americus, and 2) Morris County, 1 km west of Dunlap (NSRA 1996). In addition, eight collection sites have been identified for Lyon County and five for Chase County on the Cottonwood River above its confluence with the Neosho River (NSRA 1996).

Downriver from John Redmond Dam, the Neosho madtom has been found as near as Burlington, KS – City Park (NSRA 1996); however, there is a gradual increase in numbers of individual Neosho madtoms further from the dam to the OK border (Tabor, pers. com. 2001). The Neosho madtom has been collected below the dam at the following general locations: 1) Coffey County; Burlington City Park, 2 km east of Burlington, 2.5 km east of Burlington, and 3 km east of Burlington, 2) Woodson County; at Neosho Falls, and 1.5 km east of Neosho Falls, 3) Allen County; 2 km west of Iola, and downriver of the Humboldt Dam, 4) Neosho County; 3 km east of Chanute, southwest of Erie, 2 km south of Erie, 4 km west of St. Paul, 3 km south of St. Paul, 5 km south of St. Paul, and 19 km northeast of Parsons, 5) Labette County; 13 km east of Parsons, downriver of the Oswego Dam, 2 5 km east of Oswego, and downriver of the Chetopa Dam, 6) Cherokee County; 19 5 km west of Columbus and on Lightning Creek 20 km west of Columbus, and 7) Ottawa County, OK; 10 km west of Commerce, 7.5 km west of Commerce, 7 km west of Miami, and 5 km west of Miami (NSRA 1996).

Neosho madtoms are small, less than three inches (approximately 38–78 mm) in length (Bulger et al. 1998) and occupy riffles or portions of riffles (Wildhaber et al. 2000). Young-of-the-year tended to use areas with slower flow, lower substrate compaction, and shallower depths than did adults (Bulger et al. 1998). These catfish burrow into the substrate during the day and emerge to feed in the late afternoon through evening hours (USFWS 1991). They feed at night on larval insects found among the gravel and pebbles (Cross and Collins 1995 in Wildhaber et al. 2000). Other madtoms that share the gravel bed habitat favored by Neosho madtoms include the slender madtom, stonecat, brindled madtom, and freckled madtom (USFWS 1991). Young-of-the-year channel and flathead catfish have also been found in this riffle habitat, in addition to species of minnows and darters (USFWS 1991).

A few Neosho madtom habitat features were summarized by NSRA (1996) from various studies, and a mean habitat range was determined as follows:

Parameter	Range of Data Means
Water Depth	17-20 cm to 46.3 cm
Water Velocity	10.0 cm/s to 50 cm/s at substrate level 25.8 cm/s to 46 2 cm/s at 0.6m depth
Water Temperature	1°C to 29°C
Dissolved Oxygen	Undetermined (minimum value <6 mg/L)
Turbidity	Undetermined
Substrate Material	8mm to 40mm and 65% to 69% gravel/pebble
Density of Occurrence / *Overall Density*	Winter–Spring· 0.6-2.0/10m^2 / *0 3-1 2/10m^2* Summer–Fall 2.5-6.0/10m^2 / *0.8-2.0/10m^2*

Based on samples collected throughout the year and research conducted by Bulger et al. (1998), the highest numbers of Neosho madtoms occur in riffles during daylight hours in late summer/early fall when young-of-the-year are believed to have recruited to the population (Wildhaber et al. 2000). Research further suggest that Neosho madtoms have a short life cycle (possibly annual) with young-of-the-year appearing with adult collections about the same time the adults began disappearing from collections (Wildhaber et al. 2000). They probably spawn during the period of highest discharge during the summer (USFWS 1991)

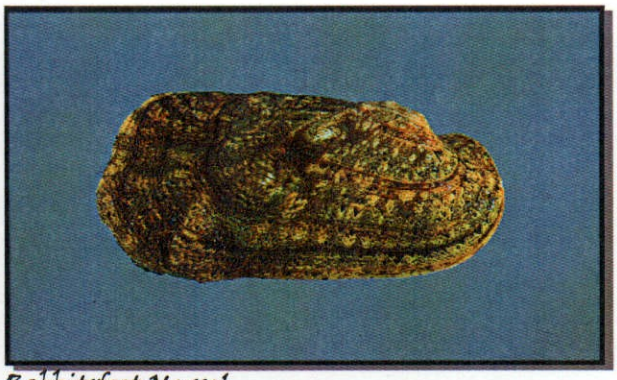
Bulger et al. (1998) reported that most individuals spawned in their second summer (Age I individuals) and very few, if any, survived to spawn at Age II. Also, Bulger et al (1998) observed the development of genital papillae and other external morphological characteristics in breeding adults Courtship behavior was observed and included the carousel and tail curl, similar to behavior observed in other madtom species. Two successful spawning events were studied in the laboratory, and the Neosho madtom females produced 32 and 30 eggs respectively (Bulger et al. 1998). Only two eggs survived, but these hatched in eight days and produced young that were 13 mm and 14 mm in length. In two earlier studies, a Neosho madtom female produced 63 eggs in a flow aquarium at Emporia State University (Pfingsten and Edds 1994) and another produced approximately 60 eggs (Wilkinson and Edds 1997). Bulger et al. (1998) suggested that the small clutch size may be due to time of season (second clutch production) or stress related to the experimental environment.

3.11 Neosho Mucket Mussel, Rabbitsfoot Mussel, and Ouachita Kidneyshell Mussel

Three rare species of unionid mussels recognized as federal species of concern and KS endangered (Neosho mucket mussel and rabbitsfoot mussel) or threatened (Ouachita kidneyshell mussel) may occupy gravel bars of the Neosho River, including some that support the Neosho madtom (USFWS 1991; Obermeyer et al. 1997, Shaw, pers. com. 2001) (**Figure 3-10**). The Neosho mucket mussel is under consideration for listing as a candidate species by the USFWS, an action that may occur during the year 2001 (Mulhern, pers. com 2001).

Figure 3-10. Representative Photographs of Listed Mussel Species.

Ouachita Kidneyshell Mussel



Rabbitsfoot Mussel

The Neosho mucket mussel is endemic to the Arkansas River system, including the Neosho, Spring, Elk, Illinois, and Verdigris River basins of Kansas, Missouri, Oklahoma, and Arkansas. The Ouachita kidneyshell mussel occupies the Arkansas, Black, Red, St. Francis, and White River systems in Arkansas, Kansas, Missouri, and Oklahoma. The rabbitsfoot mussel is more widespread, occupying the Ozarkian and Cumberland faunal regions of 13 states, but is most abundant in the Black River system of Arkansas (Obermeyer et al. 1997).

Nine sites were surveyed in the Neosho River during the summer of 1994 (Obermeyer et al. 1996) to compare quantitative and qualitative sampling methods for evaluating relative abundance, species richness, diversity, size structure, and evidence of recruitment. There was little evidence of recent recruitment detected for mussels observed during this study. Of 21 sites surveyed in the Neosho River from 1993–1995, 32 species of mussel were identified, including 24 live species, four species identified from a literature search, two species identified from recent dead shells, and two species identified from weathered dead shells (Obermeyer et al. 1997).

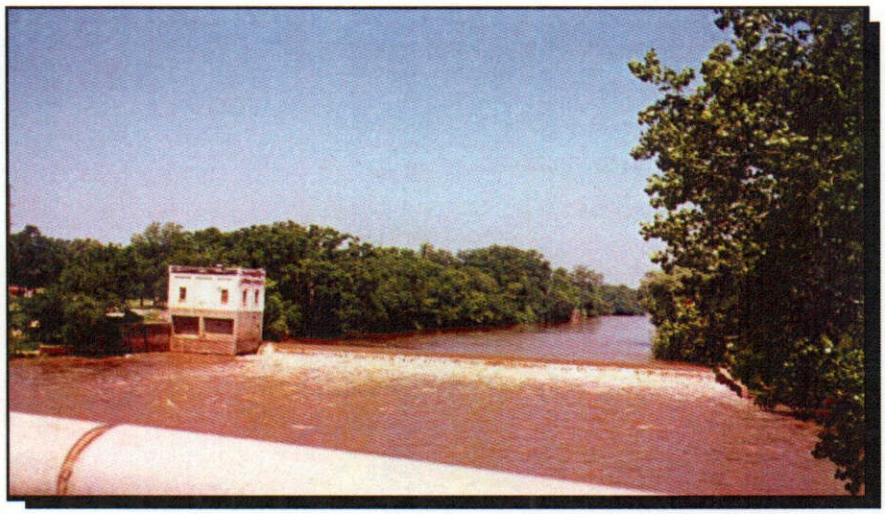
The three mussel species under consideration in this BA were consistently found in shallow riffles and runs (mean depth 25.0-33.7 cm), with stable and moderately compacted substratum, predominantly gravel with a minimum of silt. A chert-gravel derived from Permian and Pennsylvanian limestones is the dominant substratum of shallow riffle habitats. The mussels prefer riffle/run areas with relatively clear, flowing water (Miller, pers. com. 2001). Gravel bar stability is usually the result of some stabilizing force in the river, such as bedrock exposed along the river edge or bedrock on the riverbed (Miller, pers. com. 2001). The stabilizing force slows flows allowing sediments and gravel to collect, versus being swept downstream.

In the Neosho River, the observed habitat used by Neosho mucket mussels (Obermeyer et al. 1997) was: depth = 39.6 cm; current speed = 16.0 cm/s and 27.0 cm/s (100% and 60% depth); substratum character = 41.3% gravel, 35.9% cobble, 14.9% sand, 4.4% boulder, and 3.3% mud; compaction rated 1.1 and siltation rated 1.4. Also in the Neosho River, the observed habitat used by rabbitsfoot mussels was: depth = 12.5 cm; current speed = 27.5 cm/s and 38.0 cm/s (100% and 60% depth); substratum character = 60.0% gravel, 32.5% cobble, 7.0% sand, and 0.5% mud; compaction rated 1.0; and siltation rated 1.0. Living Ouachita kidneyshell mussels were not identified in the Neosho River by Obermeyer et al. (1997), only weathered shells were observed at sampling sites.

All three mussel species of concern have likely become extirpated from the Neosho River above John Redmond Reservoir (Tabor, pers. com. 2001). Research conducted by Obermeyer, et al. (1997) supports this observation because none of the listed species were located on sites sampled upriver of the reservoir. Only weathered shells of the Neosho mucket mussel and rabbitsfoot mussel have been found along the Neosho River above John Redmond Reservoir (Miller, pers. com. 2001). Downstream from the John Redmond Dam, Obermeyer et al. (1997) collected 32 living Neosho mucket mussels and two living rabbitsfoot mussels, in addition to weathered dead shells for these species and the Ouachita kidneyshell mussel. Distribution of mussel species in the Neosho River below John Redmond Dam may also be influenced by 12 overflow dam structures placed to divert water for agricultural and municipal use (Juracek 1999b).

Mr. Shaw (pers. com. 2001) stated that the Neosho River below John Redmond Dam supports a rich mussel population for KS. This observation was supported by Obermeyer et al. (1997), with evidence of 32 species occurring in the Neosho River, using present and historical collection records. Both the Neosho mucket mussel and the rabbitsfoot mussel occur in the Neosho River below John Redmond Dam (Obermeyer et al. 1997). Thirty-two individual Neosho mucket mussels were observed below the John Redmond Dam, occupying 6 of 21 sites surveyed (Obermeyer et al. 1997). These individuals were greater than 20 years old, determined from counts of annular rings. Two individual rabbitsfoot mussels were observed below the dam for the 21 sites sampled on the Neosho River to near the OK border (Obermeyer et al. 1997). A reproducing population of rabbitsfoot mussel is known to occupy gravel bar habitat near Iola, KS (Miller, pers. com. 2001). No Ouachita kidneyshell mussels were identified from the sample sites evaluated below the dam other than some weathered dead shells (Obermeyer et al. 1997).

Figure 3-11. Representative Example of an Overflow Dam on the Neosho River.



In contrast, 1,192 individual Neosho mucket mussels, five rabbitsfoot mussels, and 53 Ouachita kidneyshell mussels were collected from the Spring River, and 77 individual Neosho mucket mussels and 30 individual Ouachita kidneyshell mussels were collected from the Verdigris River (Obermeyer et al. 1997). The Spring River was described as having a faster, cleaner flow while

the Verdigris and Neosho Rivers were considered prairie streams with slower flows and a heavier silt load (Obermeyer et al. 1997).

Both the Neosho mucket and Ouachita kidneyshell mussels are bradytictic breeders, the females attract potential hosts with a mantle lure (Obermeyer et al. 1997) Potential larval hosts for the Neosho mucket mussel include smallmouth and largemouth bass, while for the Ouachita kidneyshell mussel orangethroat, greenside, and rainbow darters have been identified as larval hosts The rabbitsfoot mussel is a tachytictic breeder whose larval hosts may include species of shiner (Obermeyer et al 1997).

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4.0 POTENTIAL EFFECTS

The listed species covered by this report were evaluated for both direct and indirect project-related impacts These impacts may be further categorized as either permanent or temporary, as defined below:

Impact Type	Definition
Direct	Alteration, disturbance, or destruction of biological resources that would result from project-related activities is considered a direct impact Examples include the loss of individual species, covering over habitat by facilities, clearing vegetation, and long-term management as agricultural land, etc
Indirect	Project-related impact that is ancillary to the proposed action or its alternatives Examples include elevated noise levels, dust generation, increased human activity, introduction of exotic species of wildlife and plants, etc.
Permanent	Impacts resulting in the irreversible removal of biological resources. Examples include conversion of habitat to agricultural fields, construction of facilities over cleared land, etc
Temporary	Impacts having effects on biological resources that are reversible. Examples include native grasslands mown annually for hay, fugitive dust generation during construction activities, etc.

The actions assessed in this BA are described in more detail in Section 1.3 and include:

I. No Action
II. Dredge John Redmond Reservoir
III. Storage Reallocation in a Phased Pool Raise
IV. Proposed Action: Storage Reallocation

The impact type and duration are described by listed species in Sections 4.1 through 4 4
In general, the proposed water level raise of the conservation pool to the 1,041-foot elevation using either multiple raise stages or a single raise, would result in an expanded and deeper conservation pool covering approximately 570 additional surface acres. Some major effects related to the higher conservation pool alternatives include.

1. deeper water in the reservoir;
2. backwater up the Neosho River and its tributaries;
3. reduced flow velocity and siltation near the upper end of the reservoir;
4. wave action against higher shorelines;
5. inundation/drowning of shoreline vegetation;
6. debris accumulation;

7. a minor shift in flood release (hydrograph) downstream; and
8. additional water storage during drought seasons and years.

Table 4-1. Summary of Impacts and Types By Listed Species and Proposed Project Alternative

Species	I. No Action	II. Dredge Sediments	III. Phased Raise	IV. Proposed Action
Bald Eagle (Threatened)	existing conditions.	*indirect/temporary.* presence of humans & equipment. *indirect/temporary*: potential release of contaminants in sediments. *indirect/temporary* fugitive dust release during dredging	*direct/temporary* increase of perch/roost trees and snags. *indirect/temporary* increase in forage fish for 5-8 years *indirect/temporary* increase in waterfowl used as prey for 5-8 years	*direct/temporary* increase of perch/roost trees and snags *indirect/temporary*: increase in forage fish for 5-8 years *indirect/temporary* increase in waterfowl used as prey for 5-8 years
Western Prairie Fringed Orchid (Threatened)	n/a	require assessment of sediment disposal, staging, and haul road sites	no impact	no impact
Neosho Madtom (Threatened)	existing conditions.	*indirect/temporary* release of silt and fine sediments. *indirect/temporary* potential release of contaminants in sediments. *indirect/temporary.* release of small amounts of hydrocarbons from equipment.	*direct/permanent* minor shifting of down-river hydrograph. *indirect/temporary*: additional water available for low-flow conditions	*direct/permanent* minor shifting of down-river hydrograph *indirect/temporary.* additional water available for low-flow conditions.

Species	I. No Action	II. Dredge Sediments	III. Phased Raise	IV. Proposed Action
		indirect/temporary: additional water available for low-flow conditions		
Neosho Mucket Mussel (Species of Concern)	existing conditions.	*indirect/temporary*: potential release of contaminants in sediments *indirect/temporary*: additional water available for low-flow conditions	*indirect/temporary*: additional water available for low-flow conditions.	*indirect/temporary*: additional water available for low-flow conditions.
Rabbitsfoot Mussel (Species of Concern)	existing conditions	*indirect/temporary*: potential release of contaminants in sediments. *indirect/temporary* additional water available for low-flow conditions	*indirect/temporary*: additional water available for low-flow conditions	*indirect/temporary*: additional water available for low-flow conditions
Ouachita Kidneyshell Mussel (Species of Concern)	existing conditions	*indirect/temporary*: potential release of contaminants in sediments *indirect/temporary* additional water available for low-flow conditions	*indirect/temporary* additional water available for low-flow conditions.	*indirect/temporary* additional water available for low-flow conditions.

4.1 Bald Eagle

In a typical year, approximately 10 to 20 bald eagles are present in the JRL vicinity as transients. The potential project effects are summarized for the preferred action and alternatives, as follows:

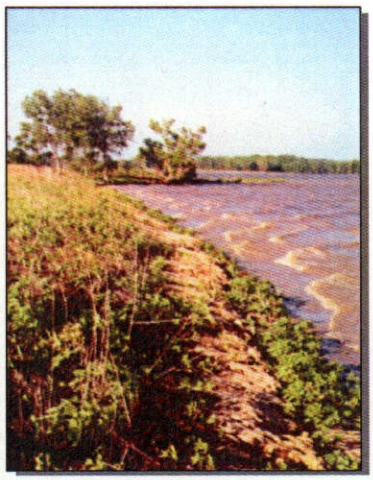
4.1.1 No Action

Bald eagle use of the JRL area and population size fluctuations will continue as described in Section 3.8. Individual shoreline trees used for perches will occasionally succumb to drowning or toppling by high water and wave action during flood events, as currently occurs (**Figure 4-1**). Note that **Figure 4-1** photographs were taken when the lake level was 1,041.5 feet or 0.5 foot higher than the water raise of the proposed action (1,041.0 feet). Without the project, any enhancement of fish and waterfowl populations, or use of the area, would be performed as part of a predetermined management program or would be secondary to unplanned, natural high water events that occurred in a timely fashion.

The JRL proposed water level management plan prepared for October 1, 2001 through September 30, 2002, currently allows a three-month raise to the 1,041.0-foot elevation from mid-October through mid-January (USACE 2001). This raise benefits migrating waterfowl by providing flooded vegetation and supports waterfowl hunting activities, which indirectly benefits the bald eagle by making more potential prey available. JRL water elevations are then proposed for lowering to the 1,039.0-foot level to reduce ice damage to established vegetation and operational structures (approximately five months from February through June). During July, through September the water elevation is further proposed for lowering to 1,037.0 feet to allow growth of native vegetation (moist soil plant growth on mudflats), provide habitat for migrating shorebirds, reduce shoreline erosion, improve water clarity/quality, and create habitat for fall migrating waterfowl.

The bald eagle would continue to be protected by closures on FHNWR during waterfowl hunting season. Bald eagles would also continue to be counted on a bimonthly basis by the KDW&P, between the months of October and March. Personnel, researchers, and law enforcement staffs of the USACE, USFWS, and KDW&P will provide almost daily observation of wintering bald eagles during the course of their work assignments, and travel to and from the area.

Figure 4-1. Tree drowned during recent flood events and an example of wave action at John Redmond Lake (water elevation = 1,041.5 ft.)



4.1.2 Dredge John Redmond Reservoir

This assessment assumes that existing access is sufficient for dredge equipment to remove sediments and that additional impacts will not result from construction of staging areas, haul roads, and stockpile areas.

- Presence of humans and equipment during bald eagle migration, possibly precluding use of the site during dredging operation: indirect/temporary impact.
- Potential release of contaminants trapped within sediments, particularly agricultural pesticides, during the dredging or excavating operation that could enter the food chain through benthic macroinvertebrates, algae, fish, or waterfowl indirect/temporary impact
- Release of fugitive dust during the dredging or excavating operation, also causing air quality and aesthetic effects and potentially precluding use of the site due to poor visibility for foraging bald eagles· indirect/temporary impact
- Requires assessment of site or sites that would be used to stage and maintain equipment, deliver, and store sediments dredged or excavated from the reservoir.

4.1.3 Storage Reallocation in a Phased Pool Raise

- Woodland area that will be inundated by the proposed raise to the 1,041.0-foot elevation will be approximately 158 acres. There will be an increase in perches and snags on which bald eagles can scan the surroundings for prey, due to inundation: direct/temporary impact
- Increase in fish used as forage by bald eagles for up to five to eight years as a result of better fishery habitat: indirect/temporary impact.
- Increase in waterfowl used as prey by bald eagles because of flooded vegetation: indirect/temporary impact.

4.1.4 Proposed Action: Storage Reallocation

- Woodland area that will be inundated by the proposed raise to the 1,041.0 foot elevation will be approximately 158 acres. There will be an increase in perches and snags on which bald eagles can scan the surroundings for prey, due to inundation: direct/temporary impact.
- Increase in fish used as forage by bald eagles for up to five to eight years as a result of better fishery habitat. indirect/temporary impact.
- Increase in waterfowl used as prey by bald eagles because of flooded vegetation: direct/temporary impact

In summary, the bald eagle is a highly mobile species that will receive minor, direct, and temporary impacts and minor, indirect beneficial effects related to the proposed and alternative actions. The increase of perches and snags from 158 acres of woodland along the proposed 1,041 0-foot elevation shoreline is considered temporary and beneficial based on experience from other Tulsa District reservoirs. This condition will last from 10–15 years, during which time, small trees along the reservoir margin will mature and provide bald eagle perches Under

present reservoir operation, flood events result in drowning a few trees large enough to provide perches (**Figure 4-1**) The bald eagle may also rest on the ice when the reservoir freezes over. A potential positive effect will be an expected five to eight year increase in fish used as prey, and higher waterfowl concentrations due to raising the water level into smartweed, willow, sapling cottonwood and maple, and other vegetation that has become established in some coves, along the existing shoreline, and along tributary drainages. Along with increased waterfowl populations, the number of hunters, and therefore the number of wounded and dead waterfowl available for use as forage for the bald eagle, will likely increase.

4.2 Western Prairie Fringed Orchid

The WPFO has not been documented within the JRL project area, nor does appropriate habitat occur between the 1,039.0-foot and 1,041.0-foot elevation areas. Approximately 18 acres of introduced grassland and weedy forbs will be covered over by the raise to the 1,041.0-foot elevation. These grasslands are mostly planted to the exotics smooth brome and meadow fescue. The WPFO will not receive impacts from the proposed project or the three alternatives assuming that sites selected for storage of dredged sediments and sites supporting ancillary activities related to dredging do not contain WPFO habitat as determined by field review.

4.3 Neosho Madtom

Neosho madtom populations are divided into three distinct regions or subunits, separated by reservoirs, these are: 1) Cottonwood River and the Neosho River above JRL, 2) Neosho River between the JRL Dam and Commerce, OK, and 3) Spring River (USFWS 1991) The USFWS (1991) stated that the numbers of Neosho madtoms seemed to have remained reasonably stable at most sites, but local declines or extirpations have been noted and threats to local populations still exist.

The principal threats determined by the USFWS (1991) were identified:

1. Mainstream impoundments resulting in the loss of about one-third of the potential habitat;
2. Watershed impoundments on tributary streams reducing annual discharges and retaining storm runoff,
3 Drought resulting in riffle areas becoming dry and a projected increase in water demand of 25 percent between 1984 and 2040;
4. Gravel bar removal for construction material resulting in the loss of some populations and habitat of the Neosho madtom;
5. Wolf Creek Nuclear Power Generating Station resulting in a very small chance of possible releases of thermal or radioactive water to the Neosho River and a reduction in releases from JRL;
6. Feedlot pollution resulting in poor water quality,
7. Nonpoint source pollution resulting in urban and agricultural wastewater entering the Neosho River; and
8. Cherokee County, KS Superfund Site resulting in elevated levels of sulfate and trace metals in Spring Creek

The Neosho madtom is present in the Neosho River Basin, both upriver of JRL and downriver from the dam. A slight backwater effect from the reservoir elevation raise of the preferred alternative was examined over gravel bars near Hartford, KS. However, when these gravel bars were visited during the June 11–12, 2001 site visit, the Neosho River was flowing freely over them with no visible sign of pooling. During the time of the site visit, the water level of the reservoir was 0 5 foot higher (1,041.5 ft) than the preferred alternative (1,041 0 ft).

These gravel bars are located approximately four miles upriver of the 1,041-foot reservoir shoreline for the preferred alternative. When an approximately 1 2-ft. per-river-mile elevation increase is used, as reported in the *Water Control Manual* (USACE 1996) and Juracek (1999), the riverbed would lie at approximately the 1,045.8-foot elevation. Additionally, the gravel bars are elevated above the river bed (possibly by 1–3 ft.) and, therefore, should not receive backwater effects from the proposed reservoir raise. Potential effects to the Neosho madtom from the proposed project and alternatives are summarized, as follows:

4.3.1 No Action

The Neosho madtom will continue to experience the habitat quality and habitat effects, as described in Section 3.10 for the Neosho River relative to the current operation of John Redmond Dam and Reservoir. These include.

1. reduced turbidity downriver from the dam;
2. higher water temperature downriver from the dam;
3. marginally higher Fredle Index downriver from the dam;
4. marginally higher water depth downriver from the dam;
5. higher dissolved oxygen concentrations and marginally higher PO_4 concentrations downriver from the dam; and
6. lower alkalinity and NH_3 downriver from the dam

Generally, the effects of the dam on minimum and maximum flows of the Neosho River tended to decrease with increasing distance downstream. Neosho madtom population densities will likely continue to be lower immediately below the dam to near the Iola river gauge than population densities above the reservoir During low flows and drought periods, releases from the dam will continue to be made on a regularly scheduled basis to augment downriver (water quality) flows (USACE 1996).

In addition, the 12 concrete overflow (low-water) dams in place below the John Redmond Dam will continue to influence Neosho River hydrology (Juracek 1999). These dams create an up-river backwater pool, which may result in sediment deposition due to decrease in flow velocity. Down-river of the overflow dams, water velocity and erosive power increase, which may increase channel bed and bank erosion, particularly during high flows.

4.3.2 Dredge John Redmond Reservoir

- Release of silt and sediments downriver during the dredging or excavating operation and potential deposition of this silt and sediment on Neosho madtom gravel bar habitat: indirect/temporary impact.
- Potential release of contaminants trapped within sediments, particularly agricultural pesticides during the dredging or excavating operation: indirect/temporary impact.
- Release of small amounts of hydrocarbons downriver from fuel and lubricants used for maintenance and operation of dredging, excavating, and hauling equipment, potentially causing minor adverse water quality effects: indirect/temporary impact
- Release of fugitive dust during the dredging or excavating operation, causing siltation below the dam in addition to potential adverse air quality and aesthetic effects: indirect/temporary impact.

4.3.3 Storage Reallocation in a Phased Pool Raise

- Minor shifting of hydrograph (flood release) downriver, resulting in slightly deeper water flowing over Neosho madtom habitat for slightly longer periods of time: direct/permanent impact.
- Additional water potentially available for downriver (water quality) releases, enhancing Neosho madtom habitat during periods of low-flow: direct/permanent impact.

4.3.4 Proposed Action: Storage Reallocation

- Minor shifting of hydrograph (flood release) downriver, resulting in slightly deeper and possibly cooler water flowing over Neosho madtom habitat for slightly longer periods of time: direct/permanent impact
- Additional water potentially available for downriver (water quality) release, enhancing Neosho madtom habitat during periods of low-flow: direct/permanent impact.

4.4 Neosho Mucket Mussel, Rabbitsfoot Mussel, and Ouachita Kidneyshell Mussel

Three unionid mussel species of concern were present historically in the Neosho River; however, the Ouachita kidneyshell mussel may have become recently extirpated from the Neosho River (Obermeyer et al. 1995). Another, the Neosho mucket mussel is a federal candidate for listing These mussels are typically found in shallow riffles and runs (mean depths 25.0-33.7cm), with stable and moderately compacted substratum, predominantly gravel, with a minimum of silt (Obermeyer et al. 1997). Living representatives of the three species were not observed in the Neosho River above JRL, although weathered and relic valves of all three species were found upriver from the reservoir (Obermeyer et al. 1997).

Living Neosho mucket and rabbitsfoot mussels were observed in the Neosho River downstream of John Redmond Dam, but the Ouachita kidneyshell was represented only by weathered and relic valves (Obermeyer et al 1997). Little evidence of recent recruitment of mussels was detected during a survey in the Neosho River. Neosho mucket mussels sampled below the dam were all over 20 years in age and rabbitsfoot mussels were in their sixth year of growth (Obermeyer et al. 1997). Unionids produce ovisacs that release glochidia that attach to the gills of host fish, primarily bass and darters (Obermeyer et al 1997; and Unio Gallery 2001). A decrease in host fish populations could affect reproduction among mussel species dependent on them

4.4.1 No Action

The listed mussel species will continue to experience the habitat quality and effects, as described in Section 3 11 for the Neosho River relative to the current operation of John Redmond dam and reservoir. These include:

1. Reduced turbidity downriver from the dam;
2. Higher water temperature downriver from the dam;
3. Marginally higher Fredle Index downriver from the dam,
4. Marginally higher water depth downriver from the dam,
5. Higher dissolved oxygen concentrations and marginally higher PO_4 concentrations downriver from the dam, and
6. Lower alkalinity and NH_3 downriver from the dam.

Generally, the effects of the dam on minimum and maximum flows of the Neosho River tended to decrease with increasing distance downstream. Candidate mussel population densities will continue to be more diverse in terms of species and numbers below the dam because they are potentially extirpated above the reservoir During low flows and periods of drought, releases from the dam will continue to be made on a regularly scheduled basis to augment downstream (water quality) flows (USACE 1996).

4.4.2 Dredge John Redmond Reservoir

- Release of silt and sediments downriver during the dredging or excavating operation and deposition of silt and sediments on gravel bar habitat for mussel species indirect/temporary impact.
- Potential release of contaminants trapped within sediments, particularly agricultural pesticides during the dredging or excavating operation: indirect/temporary impact.
- Release of small amounts of hydrocarbons downriver from fuel and lubricants used for maintenance and operation of dredging, excavating, and hauling equipment, potentially causing minor adverse water quality effects: indirect/temporary impact.
- Release of fugitive dust during the dredging or excavating operation, causing siltation below the dam in addition to potential adverse air quality and aesthetic effects. indirect/temporary impact

4.4.3 Storage Reallocation in a Phased Pool Raise

- Minor shifting of hydrograph (flood release) downriver, resulting in slightly deeper and possibly cooler water flowing over habitat for the two mussel species present, for slightly longer periods of time: direct/permanent impacts
- Additional water potentially available for downriver (water quality) release, enhancing mussel habitat during periods of low-flow direct/permanent impact.

4.4.4 Proposed Action: Storage Reallocation

- Minor shifting of hydrograph (flood release) downriver, resulting in slightly deeper and possibly cooler water flowing over habitat for Neosho mucket and rabbitsfoot mussels for slightly longer periods of time: direct/permanent impact.
- Additional water potentially available for downriver (water quality) release, enhancing mussel habitat during periods of low-flow· direct/permanent impact.

4.5 Design and Implementation Measures to Minimize or Avoid Impacts

Water levels fluctuate widely in the JRL system and are dependant on the timing and intensity of weather events within the drainage basin. As a result, general impact avoidance related to water elevation management while fulfilling the flood control mission of the dam is extremely difficult. The remaining JRL functions of water supply, water quality, and fish and wildlife habitat provide additional complexity to water elevation management that are met by creating annual water level management plans These management plans are followed when the amount of water available is sufficient and controllable, but are unlikely to be met during flooding or extreme drought.

The bald eagle is currently protected with closures established by FHNWR staff during waterfowl hunting seasons. They are monitored regularly by the KDW&P during bimonthly waterfowl census.

Monitoring has been conducted annually by the USFWS for Neosho madtom and associated ictalurid populations; data concerning habitat parameters have also been collected by the USFWS and the USGS, as river conditions permit. Further, research has been conducted to learn more of the species' life history including reproductive behavior. Avoidance of impacts to listed aquatic species can only occur when the reservoir water levels are relatively stable and can be controlled by the reservoir manager. At these times, water quality releases can be made to mitigate low flow conditions, as in drought periods, resulting in more survivable conditions for the Neosho madtom and species of mussel.

4.6 Impact Summary

Most impacts to the listed species are considered indirect and temporary and many are considered beneficial (**Table 4-1**). The only impacts that are considered direct and temporary are the increase of shoreline trees and snags used by bald eagles for perches. Direct and permanent impacts were identified for water level effects. Water level effects include minor shifting of the downriver hydrograph. Beneficial impacts will also result from potentially having more water

stored for water quality release downriver during dry periods, additional perch and roost structures, an improved reservoir fishery, and improved waterfowl habitat.

Potential dredging may result in impacts related to the release of silt (to the water and air), sediment, and potentially environmental toxins (oil, fuel, metals, pesticides, etc.), which could affect downriver water quality, aquatic species, and habitat. In addition, dredged or excavated materials will require hauling and storage or disposal The sites used for these ancillary purposes would require a site visit and clearance to avoid impacts to the species listed in this BA and possibly other rare species in the region

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5.0 CUMULATIVE IMPACTS

5.1 On-going and Reasonably Foreseeable Actions

This section describes planned or continuing actions that along with the proposed action could contribute incrementally to cumulative biological impacts. These actions are not necessarily dependent on the proposed water level raise addressed in this BA nor part of the water storage reallocation project. Other actions in the Neosho Basin that could affect listed species habitat, water quality, and water quantity both above and below John Redmond Dam include the following.

- Installation of small check dams in the upper basin to further hold runoff following storm events. These structures could have a long-term beneficial effect if hydrology to the Neosho River is improved so that water supply is available during dry periods and/or years.
- Gravel mining of bars exposed during dry periods and years has been permitted downriver from the dam Continuation of this activity could result in the loss of habitat and forage for the Neosho madtom and rare mussel species. Historically, mined bars could also represent areas for restoration of aquatic habitat for riffle-dependent species.
- Urban wastewater from sources upriver from JRL may influence water quality, particularly during periods of low flow. Monitoring wastewater quality and quantity entering the Neosho Basin would establish baseline conditions and trends that can be related to future population growth and listed species research.
- Feedlot wastewater was a source of several diminished water quality events related to fish kills in past decades. Legislation has eliminated much of this form of pollution, but a few feedlots draining to the Neosho River still remain and would have a negative influence on water quality.
- Agricultural chemicals used for insect and weed control and soil fertility are released to the Neosho River, in addition to sediments washed from farm fields This is an on-going source for monitoring and potential water management effects.
- There is some research to suggest that a new, lower flood plain may be forming within the confines of the existing Neosho River channel below John Redmond Dam aided by the presence of 12 low-head dams (Juracek 1999). This may eventually result in the narrowing and deepening of the channel.

5.2 Biological Impacts

Cumulative biological impacts related to the water reallocation project alternatives are very minor for predominantly terrestrial species such as the bald eagle and western prairie fringed orchid. The listed aquatic species, which are adapted to riffle and run habitat in the form of gravel bars, are more sensitive to cumulative impacts within the drainage basin.

The first of these impacts would be naturally-occurring drought conditions over an extended period of time. Initially, the Neosho madtom and species of mussel downriver of the dam would

benefit from water quality releases from the reservoir. In a prolonged drought, however, the lack of water and the use of stored water via legal water rights would severely stress the drainage and its biota Drought may also expose gravel bars to mining, resulting in direct habitat loss for the listed aquatic species, if permits to do so are in place or are authorized

Installation of additional small check dams in the upper Neosho Basin could result in more water being available year-around, through recharge of aquifers. Small structures may also reduce the amount of soil washed into the Neosho River, trapping it higher in the basin, and could reduce storm runoff to the basin.

Feedlot runoff has largely been eliminated as a contaminant to the Neosho River from upriver sources (FNHWR 2000). Agricultural wastewater is a continual source of contaminants, including soil washed from farm fields, and could deliver concentrated chemicals during drought periods. The reservoir would help to dilute this concentration from upriver sources, but it also serves as a sink. Urban wastewater from upriver sources will probably increase in quantity over time as additional residents and industry move into the area. This could also mean additional consumption of water which could affect both water quantity and quality downriver

6.0 CONCLUSIONS

Reallocation of water storage in the conservation pool of JRL, proposed action (IV), will not significantly affect the bald eagle and western prairie fringed orchid. The bald eagle is transient, occurs as a winter migrant, and perches/roosts and forages in adjacent habitats. A few trees adjacent to the shoreline will be inundated because of the proposed conservation pool raise (III and IV), providing the bald eagles with additional perches and roosts. The bald eagle will also continue to rest on the ice when the reservoir freezes. A short-term beneficial impact for bald eagles will be the presence of larger numbers of fish and waterfowl for prey in the five to eight year period following the water level raise; the fishery and waterfowl species will respond positively to improved and expanded habitat amongst the water-covered vegetation. As established during past waterfowl hunting seasons when higher water levels were present, more hunters will use the area, attracted by the larger waterfowl population. As a result, it is probable that more wounded and dead ducks and geese will be available for bald eagle forage Following this five to eight year period of improved and increased habitat, the JRL fishery is expected to return to near its present condition (Jirak, pers. com 2001).

Under the dredging alternative (II), an indirect and temporary impact could occur to bald eagles relative to human presence, noise, and dust generation from dredged or excavated areas. There would be no short-term benefit to bald eagles from improved habitat for fish or waterfowl.

No impacts will occur to the western prairie fringed orchid due to the proposed action (IV) because appropriate habitat does not exist within or adjacent to the conservation pool raise zone Under the dredging alternative (II), storage and disposal areas, haul roads, and staging areas would require a site review process for threatened, endangered, and rare species presence.

The conservation pool raise (IV) will affect the Neosho madtom in a direct and permanent manner from a shift of the downriver hydrograph, which would result in slightly deeper and slightly longer floodwater flows. However, an indirect benefit to the Neosho madtom will result from more water availability as water quality releases during drought periods.

The three listed mussel species were not collected or observed in the Neosho River above JRL and may be extirpated from this reach (Obermeyer et al. 1997). Listed mussel populations downriver of John Redmond Dam are not expected to be affected by a slight change in the hydrograph and these populations would benefit from additional water available as water quality releases during low-flow conditions Dredging or excavating activities (II) within the reservoir area would release silt, sediments, and possible contaminants to the downstream habitat. However, these impacts are considered to be indirect and temporary.

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ATTACHMENTS

Attachment A: Lists of Threatened and Endangered Species Submitted by the U.S. Fish and Wildlife Service (2000) and the Kansas Department of Wildlife & Parks (2000).

- Correspondence: U.S Fish and Wildlife Service
- Correspondence: Kansas Department of Wildlife & Parks
- Correspondence: U.S. Corps of Engineers, Tulsa District
- Correspondence· e^2M
- Scope of Work for U.S. Fish and Wildlife Service Activities
- John Redmond Reallocation Study

Attachment B: Bald Eagle Winter Survey Summaries for John Redmond Reservoir.

- Kansas Bi-Monthly Waterfowl Survey / Survey Techniques and Methods of Data Handling
- Waterfowl Migration Report – Bald Eagle
- Waterfowl Migration Report – Bald Eagle, Golden Eagle, Osprey, Unknown Eagles

ATTACHMENT A

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

May 8, 2000

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. William H. Gill
Field Supervisor
U.S. Fish and Wildlife Service
315 Houston Street, Suite E
Manhattan, KS 66502

Dear Mr. Gill:

This is in regards to the ongoing John Redmond Lake Reallocation Study, Kansas In accordance with Section 7 of the Endangered Species Act of 1973, as amended, the District is requesting an official list of Federally listed threatened or endangered species which might be affected by the proposed action

Pertinent information and a description of the proposed action were previously furnished to your office during development of our Fiscal Year 2000 funding agreement.

If you have any questions or require additional information, please contact Jim Randolph at 918-669-4396.

Sincerely,

James C. Randolph

for David L. Combs
Chief, Environmental Analysis and
Compliance Branch

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

May 8, 2000

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Steve Williams
Kansas Department of Wildlife and Parks
Box 54-A, Route 2
Pratt, KS 76124-9599

Dear Mr. Williams.

This is to inform you that the Tulsa District is initiating a water supply reallocation study for John Redmond Lake, Kansas Enclosed is a negotiated scope of work with the U.S. Fish and Wildlife Service which describes the proposed action.

Presently, we are preparing documentation for compliance with the National Environmental Policy Act of 1969 and would appreciate any comments from your agency regarding state listed threatened or endangered species and fish and wildlife

If you have any questions or require additional information, please contact Jim Randolph at 918-669-4396.

Sincerely,

James C. Randolph

for David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

SCOPE OF WORK
FOR
U.S. FISH AND WILDLIFE SERVICE ACTIVITIES

FISH AND WILFLIFE COORDINATION ACT REPORT AND MITIGATION ANALYSIS
JOHN REDMOND LAKE, REALLOCATION STUDY, KANSAS

Background: In 1975, the state of Kansas and the Federal government entered into a water supply agreement at John Redmond Lake for an estimated 34,900 acre-feet of storage remaining after 50 years of sedimentation. Recent studies have determined that sediment has been deposited unevenly within the reservoir from what had been predicted. The sediment is accumulating in the conservation pool while the flood control pool has experienced less than expected sedimentation.

Storage available for water supply purposes in the lake have been depleted by the uneven distribution of sediment such that the water supply agreement obligations are being infringed upon. Most of the sediment deposition in the John Redmond pool has been below elevation 1039.0 feet (top of conservation pool) National Geodetic Vertical Datum (NGVD). Based on Tulsa District sediment surveys for 1964 and 1993, it was predicted that adequate storage would be available below elevation 1068.0 feet NGVD (top of flood control pool) at the end of the economic project life (2014) to meet all authorized project purposes.

A recent Kansas Water Office (KWO) water supply yield analysis indicated that the disproportionate sediment deposition has reduced the water supply capacity at design life by 25%. The water supply agreement with the KWO allows for pool adjustment in one-half foot increments. In order to make an equitable redistribution between the flood control and conservation pools, the District has been directed to study an equitable redistribution of storage between the flood control and conservation pools. Consequently, the District proposes to raise the conservation pool from elevation 1039 NGVD to elevation 1041 NGVD. The proposed pool level increase would be a phased approach with the first pool increase to elevation 1040 NGVD, the second to 1040.5 NGVD, and finally to elevation 1041, if needed.

Tasks:

1. The U.S. Army Corps of Engineers (USACE) will provide the following to the U.S. Fish and Wildlife Service (USFWS) as it becomes available; 1) digital two-foot contour maps, 2)color IR aerial photography of the lake, 3) pertinent data (including project alternatives and purposes,4)historic and projected changes to flood control operation and downstream releases of flood waters.

2. The USACE will invite the USFWS to participate in all pertinent planning meetings related to the project.

3. The USFWS will participate in field trips to the project site to evaluate proposed project impacts. The USFWS will complete the following tasks: 1) evaluate existing wetland types at the specified elevations for John Redmond and determine changes to habitat types as with the various increased conservation pool alternatives; 2) evaluate boat ramp, access road, and State Park acreages that may be inundated permanently and/or more frequently due to loss of flood storage, 3) evaluate if alternatives will affect timing and release schedules of floodwater evacuation and potential for adverse impacts to the Neosho River downstream of John Redmond; 4) evaluate dike and control structure elevations for managed wetlands on Fling Hills NWR to determine if management of the wetland complex will be compromised; 5) coordinate with Kansas Department of Wildlife and Parks and USFWS refuge personnel to evaluate and determine impacts of proposed pool level impacts on fish and wildlife resources, Flint Hills refuge, existing fishery, and water level management plans.

4. USFWS will prepare and coordinate a draft and final Fish and Wildlife Coordination Act report describing and evaluating existing fish and wildlife resources threatened or endangered species or habitat, and current management activities associated with John Redmond Lake. The report shall also address expected impacts associated with the proposed changes in conservation pool to John Redmond Lake on the noted resources. If impacts are deemed significant mitigation measures shall be recommended.

Estimated costs:

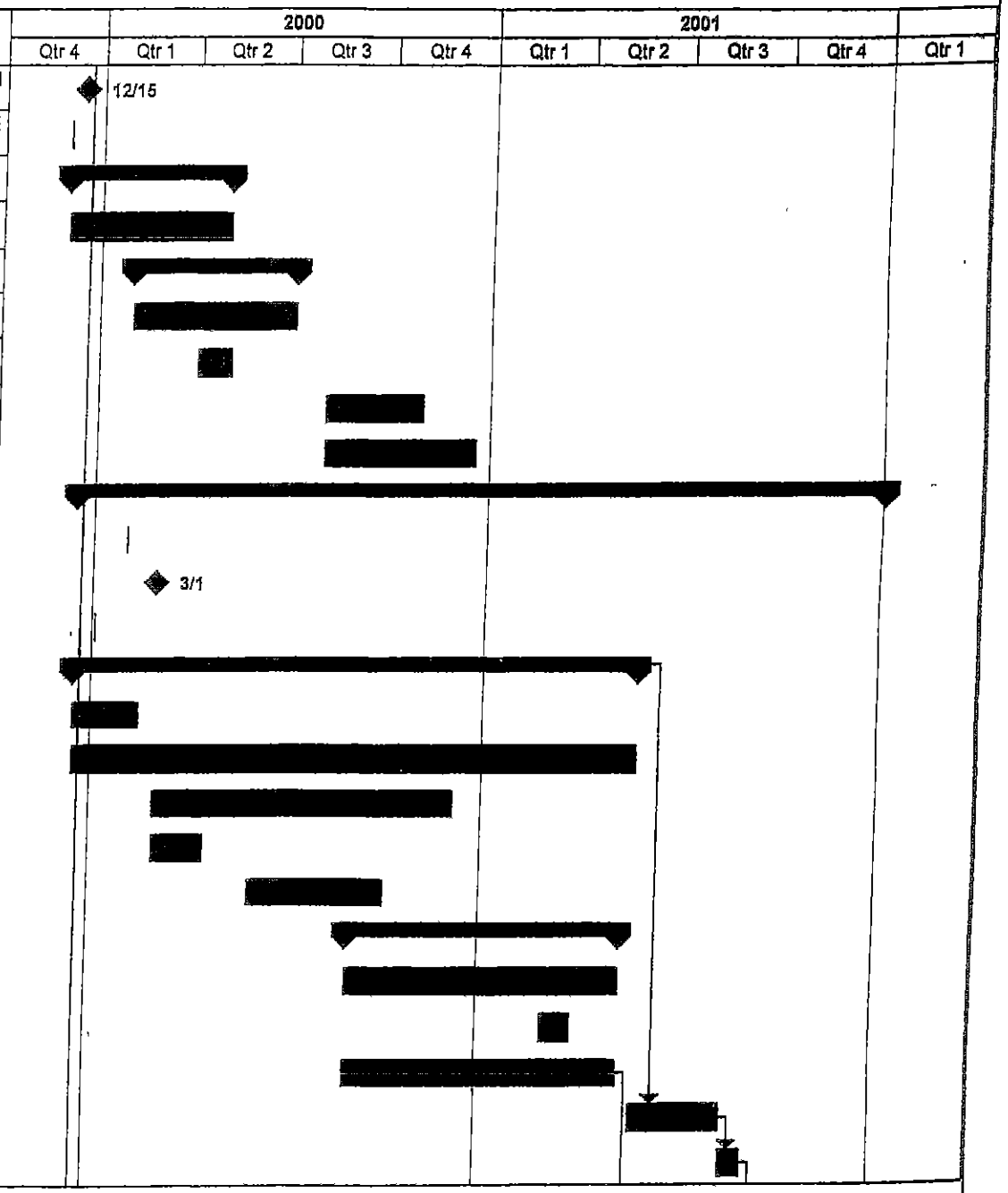
Lit. review, data collection and analysis	20 Md. @ 328/day	6,650
Prep. Of DFWCAR	60 Md. @ 328/day	19,680
Prep of FFWCAR	30 Md. @ 328/day	9,840
Overhead	(38%)	13,745
Total		49,915

Completion Dates:

Draft FWCA report	1 October 2000
Final FWCA report	15 March 2001

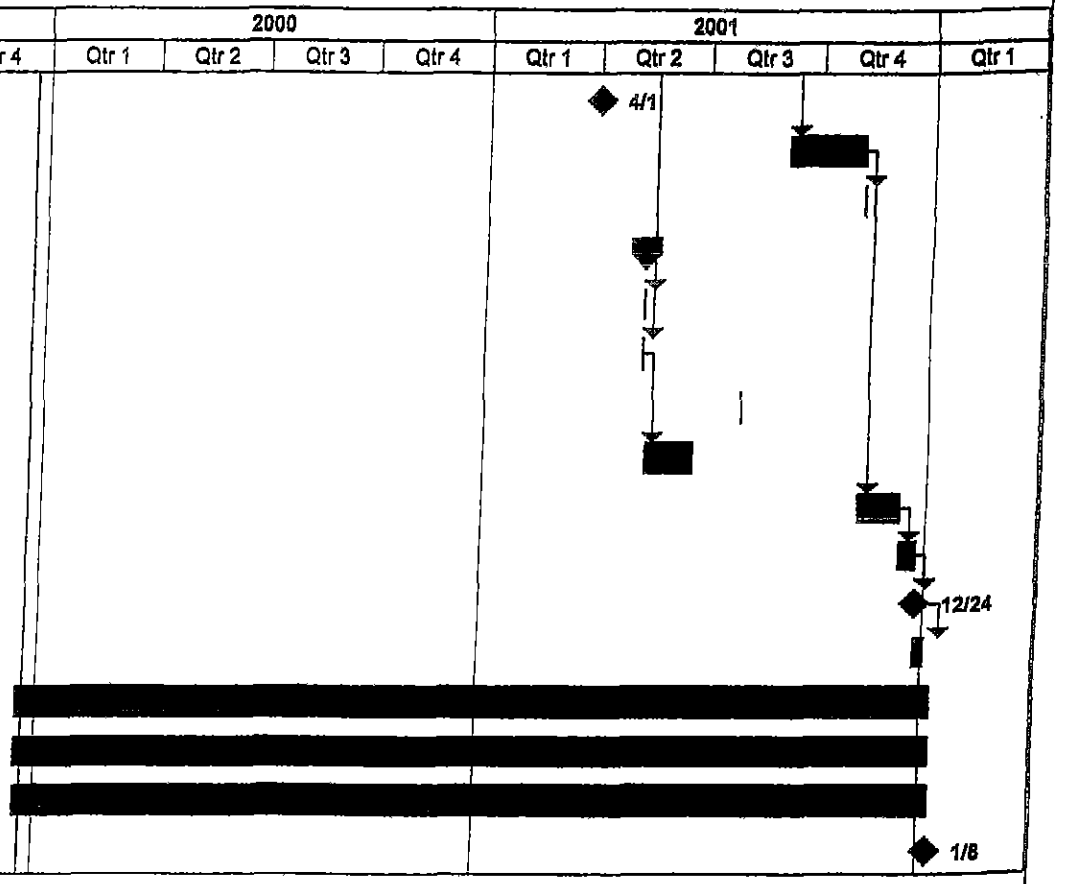
JOHN REDMOND REALLOCATION STUDY

ID	Task Name	Duration
1	RECEIVE FUNDS	0d
2	TEAM MEETING	1d
3	H&H ANALYSES	110d
4	FLOOD CONTROL ANALYSIS	110d
5	SOCIOECONOMIC ANALYSIS	110d
6	ECONOMIC ANALYSES	110d
7	SOCIOLOGICAL STUDIES	25d
8	GEOTECHNICAL ANALYSIS	65d
9	REAL ESTATE FLOWAGE EASEMENTS	100d
10	NEPA DOCUMENTATION [SUPPLEMENT TO FEIS]	636d
11	PUBLIC MEETING	1d
12	PUBLISH NOTICE OF INTENT	0d
13	SCOPING MEETING	1d
14	CULTURAL RESOURCES	375d
15	INVENTORY SHORELINE & VERIFY SITES	45d
16	NRHP EVALUATION OF CULTURAL RESOU	375d
17	GEOMORPHIC STUDY & C.R. INVENTORY	200d
18	HTRW EVALUATION	35d
19	BIOLOGICAL ASSESSMENT	90d
20	USF&WL COORDINATION	180d
21	Mitigation Analysis	180d
22	TD Participation & Analysis	20d
23	Endangered Species Coordination	180d
24	WRITE DRAFT SFEIS	60d
25	INTERNAL SFEIS REVIEW	14d



JOHN REDMOND REALLOCATION STUDY

ID	Task Name	Duration
26	PUBLIC MEETING	0d
27	AGENCY/PUBLIC REVIEW OF SFEIS	45d
28	INCORPORATE COMMENTS	1d
29	IN-HOUSE REVIEW OF SFEIS	1d
30	FT. WORTH DIST. PERFORMS TECH REVIE	1d
31	T D. REVIEW OF SFEIS	1d
32	PUBLIC MEETING	1d
33	INCORPORATE IN-HOUSE COMMENTS	30d
34	WRITE FINAL SUPPLEMENT TO FEIS	25d
35	REPORT REPRODUCTION	10d
36	PUBLISH SUPPLEMENT TO FEIS	0d
37	PREPARE RECORD OF DECISION	7d
38	PUBLIC COORDINATION	540d
39	GIS SUPPORT	540d
40	PROJECT MANAGEMENT	540d
41	END OF PROJECT	0d



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
315 Houston Street, Suite E
Manhattan, Kansas 66502-6172

May 23, 2000

David L. Combs, Chief
Environmental Analysis and Compliance Branch
Tulsa District, Corps of Engineers
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Dear Mr. Combs:

This is in response to your May 8, 2000 letter requesting threatened and endangered species information relative to a proposal to reallocate water in John Redmond Reservoir, Coffey County, Kansas. The following information is provided for your consideration

In accordance with section 7(c) of the Endangered Species Act (16 U S.C. 1531 et seq.), we have determined that the following federally-listed species may occur in or around the reservoir, or in the Neosho River upstream or downstream of the reservoir: bald eagle (*Haliaeetus leucocephalus*), Neosho madtom (*Noturus placidus*), and western prairie fringed orchid (*Platanthera praeclara*). If it is determined the project may adversely affect any listed species, the District should initiate formal section 7 consultation with this office. If there will be no effect, or if the Fish and Wildlife Service concurs in writing there will be beneficial effects, further consultation is not necessary

Thank you for this opportunity to provide input on your proposed study

Sincerely,

William H. Gill

William H. Gill
Field Supervisor

cc: KDWP, Pratt, KS (Environmental Services)

WHG/dwm

STATE OF KANSAS

DEPARTMENT OF WILDLIFE & PARKS

Operations Office
512 SE 25th Avenue
Pratt, KS 67124-8174
316/672-5911 FAX 316/672-6020

June 16, 2000

Mr David Combs
Department of the Army
Corps of Engineers, Tulsa District
Environmental Analysis and Compliance Branch
1645 South 101st East Avenue
Tulsa, OK 74128-4609

Ref: D4 0201
Coffey, Lyon
Trak 20000423

Dear Mr. Combs

This responds to your request for preliminary state-listed threatened and endangered species and general sensitive resource information for your water supply reallocation study for John Redmond Lake, which includes a 2 foot incremental increase in the conservation pool elevation for the reservoir, located in Coffey and Lyon Counties, Kansas We have included information on any crucial wildlife habitats, current state-listed threatened and endangered species, species in need of conservation, designated critical habitats, and state public recreation areas for which this agency has some administrative authority.

The Neosho River immediately upstream of John Redmond Reservoir is designated critical habitat for the state-listed threatened ouachita kidneyshell mussel (*Ptychobranchus occidentalis*) and Neosho madtom (*Noturus placidus*) The Cottonwood River immediately upstream of the reservoir is also designated critical habitat for the above listed species and the state-listed endangered Neosho mucket mussel (*Lampsilis rafinesqueana*) The Neosho River immediately downstream of the John Redmond dam is designated critical habitat for the state-listed endangered rabbitsfoot mussel (*Quadrula cylindrica cylindrica*) and the state-listed threatened ouachita kidneyshell mussel (*Ptychobranchus occidentalis*) and Neosho madtom (*Noturus placidus*) There are also several mussel species that are known to be present in the Neosho River around John Redmond Reservoir that are designated as species in need of conservation by our agency. All of the above species prefer gravel substrates with flowing water Increased areas of inundation in the rivers above the reservoir from increasing the elevation of the conservation pool would impact those designated critical habitats and associated species. There could also be temporary impacts to downstream critical habitat and species from reduced releases during conservation pool expansion. Our agency also considers riparian woodlands to be crucial wildlife habitat for many game and nongame wildlife species Increasing the area of inundation would temporarily impact and possibly permanently decrease the quantity of riparian woodlands. Additionally, our agency manages the recreational fishery of the reservoir and would be interested in coordinating the timing of the incremental increases and development of mitigation measures to enhance those recreational resources. We would like to see all of the above listed resources and potential impacts dealt with in any environmental assessment and fish and wildlife coordination report developed for the project.

Thank you for the opportunity to provides these comments and recommendations. If you have any questions or need additional information, please free to contact me at the phone number or address listed above.

Sincerely,

John R Phillips, Aquatic Ecologist
Environmental Services Section

xc. KDWP Reg. 5 FW Sup., Tiemann
KDWP, Nygren
FWS, Gill

May 24, 2001

Mr Chris Hase
Kansas Department of Wildlife & Parks
Operations Office
512 SE 25th Avenue
Pratt, KS 67124-8174

Dear Mr Hase.

I am sending this letter to update your files concerning the water supply reallocation study for John Redmond Lake and our May 8, 2000 request for comments regarding state listed threatened or endangered species and fish and wildlife Per our May 21 and May 23, 2001 conversations, I understand that the information in the letter response dated June 16, 2000 (Trak· 20000423) from your agency remains valid and that you requested this letter of update.

Presently, we are preparing project documentation for compliance with the National Environmental Policy Act of 1969 If you have any questions or require additional information please contact Jim Randolph, USACE Fish and Wildlife Biologist, at 918-669-4396. Thank you for your assistance with this update request.

Sincerely,

James D. Von Loh
Senior Biologist
engineering-environmental Management, Inc.

Enclosures: 1) Letter of Request (May 8, 2000), 2) Letter of Response (June 16, 2000), 3) Scope of Work (May 8, 2000)

Cc. Jim Randolph, USACE, Tulsa District: Planning, Environmental, and Regulatory Division; Environmental Analysis and Compliance Branch

1510 West Canal Court, Suite 2000, Littleton, CO 80120 • (303) 721-9219 • Fax (303) 721-9202
TULSA SACRAMENTO JACKSONVILLE SAN DIEGO

ATTACHMENT B

KANSAS BI-MONTHLY WATERFOWL SURVEY
SURVEY TECHNIQUES AND METHODS OF DATA HANDLING

Since the Kansas Department of Wildlife and Parks (formerly the Kansas Forestry, Fish and Game Commission) began conducting waterfowl surveys in 1959, a number of survey schedules have been used Initially, surveys were conducted weekly, usually beginning in August or September and continuing through April or May The weekly counts were reduced to one count every two weeks by administrative order in September, 1974 as a cost saving measure In August, 1978 the number of counts were further reduced, and since then have been conducted twice monthly, September through March (14 counts)

Most surveys were conducted from various vantage points on the ground around water bodies utilized by waterfowl On some larger impoundments such as Tuttle Creek and Milford Reservoirs, aircraft were used during some years to reduce the time required top conduct the survey and improve the coverage of the area involved The number of areas surveyed has varied from a low of 19 in 1976-77 to a high of 39 during recent years

In order to put the data into a form where all years could be presented in a comparable manner on the same table or graph, counts conducted 1970 to present were divided into those made during day 1 through day 15 (1st half of month) and day 16 through end of month (2nd half of month), for months September through March Where more than one count occurred in a one-half month time period, the counts were averaged, and that average represents the count for that area for that time period

Data for years 1970 through 2000 have been entered on computer and are easily accessed

Marvin Kraft
Waterfowl Program Coordinator
Kansas Department of Wildlife and Parks
P O Box 1525
Emporia, KS 66801

Jim
Although the Tables are titled as being for the Flint Hills NWR, the counts do include all of John Redmond Res.
MGK

Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR
Data are included for. Bald Eagle
All periods in the header are included

Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	Total	% SW*
1970				1	3	3									7	4%
1971									4				1		5	1%
1972							2		14	7	10	20	8		61	10%
1974				1											1	0%
1975					1		3	4	20	1		27			56	8%
1976					1		23	25		25	33				107	17%
1977					1	1	1	12	18	25	14	12	14	41	139	23%
1978								24		9	9	8	17	4	71	14%
1979							7	10	36		1	8	22	1	85	13%
1980								4	26	20			20	2	72	13%
1981						1	5	5	24	14	13	6	19		87	11%
1982						11	9	22	17	26	35	36	5	10	171	31%
1983				2	2	6	6			17	45	25	10	3	116	15%
1984					2	6	6	18	12	28	28	29	10	3	142	18%
1985							9	17		33	22	17	23	1	122	19%
1986					1	13	24	2	28	25	33	30	7		163	24%
1987					1	2	8	4		12	30	104	6		167	22%
1988					6	6	6	20	54	50	3	5	120	10	280	25%
1989					3	1	4	7	12	19	5	16			67	8%
1990					1	2	4	9		22	26	8	8		80	10%
1991					16	15	32	27		50	30	14	2		186	16%
1992				3	4	8	14	13		12	30	10	24	5	123	11%
1993					3	4	4	8	25	28	53				125	12%
1994					2	4	5	12		4	3	2	1		33	3%
1995					1	1	2	3	8	4	3	1		2	25	2%
1996					2	4	2	18	17	9	19	13	1		85	6%
1997					1	3	2	1	10	10	7	2			36	2%
1998							6	3	4	6	4	6	3	4	36	2%
1999				1	2	2	3	11	16	11	12	6			64	4%
2000								4		8	7	29	15	2	65	3%
Grand Total				8		93		283		475		434		88		
					53		187		345		475		336		2,777	

Usage Notes A 'year' is the period 7/1 to 6/30 The earliest of the calender years is shown * (% SW). % of Statewide is based on species and periods listed

Tuesday, June 19, 2001

Kansas Department of Wildlife and Parks

Waterfowl Migration Report (Summary x Year)

Data are included for Flint Hills NWR

Data are included for Bald Eagle, Golden Eagle, Osprey, Unknown Eagles

All periods in the header are included

Year	9/ 1-15	9/ 16-30	10/ 1-15	10/ 16-31	11/ 1-15	11/ 16-30	12/ 1-15	12/ 16-31	1/ 1-15	1/ 16-31	2/ 1-15	2/ 16-28	3/ 1-15	3/ 16-31	Total	% SW*
1970				1	3	6		4							14	4%
1971									4				1		5	1%
1972							3		14	7	10	23	8		65	8%
1974				1											1	0%
1975					1		4	6	20	1		27			59	8%
1976					1		23	25		25	33				107	16%
1977					2	1	1	16	18	25	14	12	14	41	144	20%
1978								24		9	9	8	17	4	71	13%
1979							7	10	36		1	8	22	1	85	14%
1980								4	26	20			20	2	72	12%
1981						1	5	5	24	14	13	6	19		87	11%
1982						11	9	22	17	26	35	36	5	10	171	29%
1983				2	2	6	6			17	45	25	10	3	116	14%
1984					2	6	6	18	12	28	28	29	10	3	142	17%
1985							9	17		33	22	17	23	1	122	18%
1986					1	13	24	2	28	25	33	30	7		163	23%
1987					1	2	8	4		12	30	104	9		170	21%
1988					8	6	6	20	56	50	3	5	120	11	285	25%
1989					3	1	4	7	12	19	5	16			67	8%
1990					1	2	4	9		22	26	8	8		80	10%
1991					16	15	32	27		50	30	14	2		186	16%
1992				3	4	8	14	13		12	30	10	24	5	123	11%
1993					3	4	4	8	25	28	53				125	12%
1994					2	4	5	12		4	3	2	1		33	3%
1995					1	1	2	3	8	4	3	1		2	25	1%
1996					2	4	2	18	17	9	19	13	1		85	5%
1997					1	3	2	1	10	10	7	2			36	2%
1998							7	3	4	9	4	6	3	4	40	2%
1999				1	2	2	3	11	16	11	12	6			64	4%
2000								4		8	7	29	15	2	65	3%
Grand Total				8	56	96	190	293	347	478	475	437	339	89	2,808	

Usage Notes A 'year' is the period 7/1 to 6/30 The earliest of the calender years is shown * (% SW) % of Statewide is based on species and periods listed

Wednesday, June 19, 2001

APPENDIX E

Farmland Protection Policy Act Coordination and Correspondence

United States Department of Agriculture
Natural Resources Conservation Service
2917 West Highway 50 Phone 620-343-7276
Emporia, KS 66801-5140 FAX 620-343-7871

RECEIVED
MAR 13 2002

March 11, 2002

James D Von Loh, Project Manager
e²M engineering-environmental Management, Inc
1510 West Canal Court, Suite 2000
Littleton, CO 80120

Dear Ms Bowers:

Thank you for the opportunity to review the proposed "Reallocation of Water Supply Storage Project John Redmond Lake, Kansas". This project is located in Lyon and Coffey counties in Kansas.

Since this project involves land already in COE jurisdiction, this project isn't affected by the Farmland Protection Policy Act Also since the area in question is immediately above the conservation pool and below the flood pool the flooding, ponding, and saturation of the soils involved are not properly reflected by the soil survey. Even though ag leases exist on a small portion of the acreage, the probability of successfully harvesting a annual crop is significantly diminished.

Because of the special nature of this request, the project was reviewed with Rod Egbarts, Soil Conservationist , on our state staff for concurrence

If I can be of further assistance please let me know

JEFFREY L. GROSS
Assistant State Conservationist

cc:
Robert K Harkrader, District Conservationist, NRCS, Burlington, KS
Rodney D. Egbarts, Soil Conservationist, NRCS, Salina, KS

engineering-environmental Management, Inc.

December 3, 2001

Mr Richard Schlepp
State Soil Scientist/MO Leader
USDA-NRCS
760 South Broadway
Salina, KS 67401-4642

Dear Mr. Schlepp.

engineering-environmental Management, Inc. is assisting the U S. Army Corps of Engineers, Tulsa District to prepare a Supplement to an Environmental Impact Statement for the "*Reallocation of Water Supply Storage Project John Redmond Lake, Kansas*". Attached for your consideration and evaluation relative to this project are: 1) Form AD-1006, Farmland Conversion Impact Rating, 2) a memorandum summarizing site soils, and 3) a figure to locate soils in relation to John Redmond Lake

Should you require additional information concerning this project and the attached evaluation, please contact me at (303) 721-9219 or·

Mr James Randolph
USACE – Tulsa District
Environmental Analysis & Compliance Branch
1645 South 101 East Avenue
Tulsa, OK 74128-4629

(918) 669-4396

Thank you in advance for your cooperation with this SEIS project and Form AD-1006 evaluation.

Sincerely,

James D Von Loh
e^{2}M Project Manager

Attachments
File

1510 West Canal Court, Suite 2000, Littleton, CO 80120 • (303) 721-9219 • Fax (303) 721-9202

TULSA SACRAMENTO JACKSONVILLE SAN DIEGO

U S DEPARTMENT OF AGRICULTURE **Form AD-1006**

FARMLAND CONVERSION IMPACT RATING

PART 1 *(To be completed by Federal Agency)*	1 Date of Land Evaluation Request November 5, 2001	2 Sheet _1___ of _3___
3 Name of Project: Reallocation of Water Supply Storage Project. John Redmond Lake, Kansas	4 Federal Agency Involved United States Army Corps of Engineers – Tulsa District	
5 Proposed Land Use Flood Control Reservoir with Water Supply Storage	6 County and State Coffey County and Lyon County, Kansas	7 Type of Project Corridor Other XX
PART II *(To be completed by NRCS)*	1. Date Request Received by NRCS	2. Person Completing the NRCS parts of this form
3. Does the site or corridor contain prime, unique, statewide or local important farmland? Yes ☐ No ☐ (If no, the FPPA does not apply - Do not complete additional parts of this form)		4. Acres Irrigated / 5. Average Farm Size
6. Major Crop(s)	7. Farmable Land in Government Jurisdiction Acres: %	8. Amount of Farmland As Defined in FPPA Acres: %
9. Name of Land Evaluation System Used	10. Name of Local Site Assessment System	11. Date Land Evaluation Returned by NRCS

PART III *(To be completed by Federal Agency)*	Alternative Site Rating			
	Site A	Site B	Site C	Site D
A Total Acres To Be Converted Directly	405 acres			
B Total Acres To Be Converted Indirectly, Or To Receive Services	--0--			
C Total Acres In Site	405 acres			
PART IV *(To be completed by NRCS) Land Evaluation Information*				
A. Total Acres Prime and Unique Farmland				
B. Total Acres Statewide and Local Important Farmland				
C. Percentage of Farmland in County or Local Govt. Unit to be Converted				
D. Percentage of Farmland in Govt. Jurisdiction with Same or Higher Relative Value				
PART V *(To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland to be Serviced or Converted (Scale of 0 - 100 Points)*				

PART VI *(To be completed by Federal Agency) Corridor or Site Assessment Criteria (These criteria are explained in 7 CFR 658 5(b & c))*	Max. Points Corridor Other				
1 Area in Nonurban Use	15				
2 Perimeter in Nonurban Use	10				
3 Percent of Site Being Farmed	0				
4 Protection Provided by State and Local Government	0				
5 Distance from Urban Built-up area	15				
6 Distance to Urban Support Services	10				
7 Size of Present Farm Unit Compared to Average	0				
8 Creation of Non-Farmable Farmland	0				
9 Availability of Farm Support Services	5				
10 On-Farm Investments	0				
11 Effects of Conversion on Farm Support Services	0				
12 Compatibility with Existing Agricultural Use	0				
TOTAL CORRIDOR OR SITE ASSESSMENT POINTS	55				
PART VII *(To be completed by Federal Agency)*					
Relative Value of Farmland (from Part V above)					
Total Corridor or Site Assessment (From Part VI above or a local site assessment)					
TOTAL POINTS *(Total of above 2 lines)*					

PART VIII *(To be completed by Federal Agency after final alternative is chosen)*

1 Corridor or Site Selected	2 Date of Selection	3 Was A Local Site Assessment Used? Yes ☐ No ☐

4 Reason For Selection

Signature of person completing the Federal Agency parts of this form	DATE

MEMORANDUM

TO: USACE and NRCS Staff
FROM: Jim Von Loh, engineering-environmental Management, Inc.
SUBJECT: Farmland Protection Policy Act Compliance using Form AD-1006; Farmland Conversion Impact Rating
DATE: November 5, 2001

Re: Reallocation of Water Supply Storage Project. John Redmond Lake, Kansas Environmental Impact Statement.

This memorandum constitutes a fact sheet for evaluators of farmland within the site boundaries of the above-mentioned U. S. Army Corps of Engineers – Tulsa District project (also see attached figure). Approximately 571 acres within the flood control pool may be permanently inundated for two EIS alternatives for additional water storage at John Redmond Lake. These alternatives would inundate the land by raising the existing conservation pool for water storage from elevation 1,039.0' to 1,041 0'. Of the 571 acres affected, approximately 166 acres are already under water as ponds, river channel, and a portion of the reservoir shoreline, leaving approximately 405 acres of potential farmland Approximately 33 acres of the 405 acres are currently leased for cultivation, however a crop is harvested only about 2 of 5 years because of flooding. It should also be noted that this land is under water several days during flood events and for three months in the fall to provide flooded habitat for migrating waterfowl.

The approximately 405 acres of affected land occupy the following soil types

1) Apperson-Dennis silty clay, 1-4%, 2) Dennis silt loam, 1-4%, 3) Dennis silty clay loam, 2-5%; 4) Eram silt loam, 1-3%; 5) Eram silt loam, 3-7%; 6) Eram-Collinsville complex, 4-15%; 7) Eram-Schidler silty clay loam, 4-15%; 8) Kenoma silt loam, 1-3%; 9) Lanton silty clay loam; 10) Orthents, clayey; 11) Osage silty clay loam; 12) Osage silty clay; 13) Summit silty clay loam, 1-4%; 14) Verdigris silt loam, 15) Woodson silt loam.

A third project alternative under consideration would be to dredge sediments from John Redmond Lake, which would achieve the desired water storage capacity and preclude the above flooding of approximately 405 acres However, haul and disposal of dredged sediments may affect farmland on sites as yet undetermined, and of an unknown acreage.

1510 West Canal Court, Suite 2000, Littleton, CO 80120 • (303) 721-9219 • Fax (303) 721-9202
TULSA SACRAMENTO JACKSONVILLE SAN DIEGO

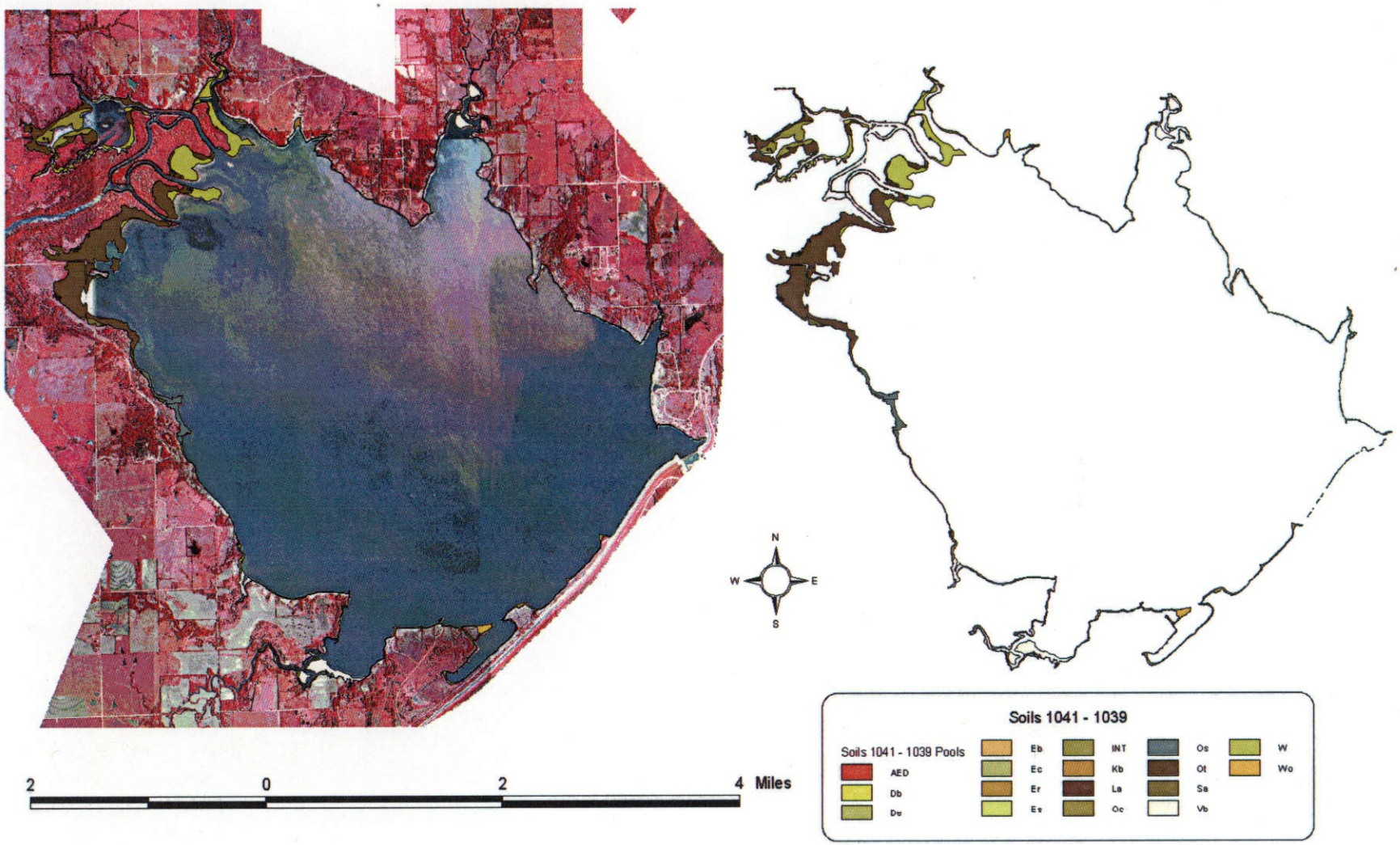


Figure 4-1. Soils Affected by the Pool Raise to 1,041.0 Feet

APPENDIX F

Fish and Wildlife Coordination Act Report
USACE Analysis of Fish and Wildlife Coordination Act Report

TULSA DISTRICT ANALYSIS
U.S FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE COORDINATION ACT REPORT

Purpose In accordance with the provisions of the Fish and Wildlife Coordination Act, the USACE funded the U. S Fish and Wildlife Service (USFWS) to report on the impacts of the proposed pool raise at John Redmond Lake, Kansas A final Coordination Act Report (CAR) dated March 15, 2002 was furnished and constitutes the report of the Secretary of the Interior on the project within the meaning of Section 2 (b) of the Act. A copy of the CAR is furnished in Appendix D. Information from the Kansas Department of Wildlife and Parks (KDWP) was used in preparation of the report and the Service has solicited concurrence from the KDWP. A letter of concurrence from the KDWP has not yet been received.

Summary. With the proposed project a portion of the flood control pool would be reallocated to water supply The proposed two-foot pool raise would inundate a small segment of the Neosho River, 385 acres of the Flint Hills National Wildlife Refuge administered by the USFWS, and 116 acres of the Otter Creek Wildlife Management Area managed by the KDWP. In total, approximately 556 acres of terrestrial wildlife habitat would be permanently inundated as a result of the proposed action

Public recreation facilities and wildlife management units which would be lost to permanent inundation include the Jacob's Creek boat launching ramp and parking lot, the Strawn wetland dike and outlet works, and the Goose Bend #4 wetland dike and outlet works, all of which are located within the Flint Hills National Wildlife Refuge

Cumulative impacts of the proposed action include more frequent and longer duration of inundation by retention of moderate floods within the reallocated flood pool The frequency and duration of flooding would increase by 1 or 2 % for elevations 1042 NGVD to about 1046 NGVD. Gravel bars that serve as habitat for the Neosho madtom would be inundated more frequently and for longer duration than at present. In addition roads and facilities within the Flint Hills NWR and the Otter Creek WMA would be subject to more frequent inundation disrupting management activities, public access, and use.

Recommendations and Comments. The USFWS recommended the following be incorporated into the reallocation study to lessen the impacts on fish and wildlife resources and facilities constructed for wetland creation and management or for public access to reservoir resources

Recommendation No. 1: The Jacob's Creek boat launching ramp and parking area be replaced/relocated above elevation 1041 msl but within the same general area to accommodate angler and hunter access as a cost of the project.

Comment: Concur. Similar facilities of the same type and size would be replaced and/ or relocated to a suitable area, to be jointly determined by the USFWS, USACE, and KDWP

Recommendation No. 2. The Corps of Engineers replace the Strawn Flats and Goose Bend #4 dikes, outlet works and pumping facilities at a site, to be determined by the Service but within the NWR, as a cost of the project

Comment: Concur These facilities would be replaced by recommending construction of mitigation Option #5, by developing 243 acres of wetlands on the Flint Hills NWR at an estimated cost of $437,000.

Recommendation No. 3. The Corps of Engineers initiate an Environmental Management Plan in the Neosho Basin integrating Reservoir Operations and management with conservation of and management of all natural resources within the basin with particular emphasis on providing protection and enhancement for species of concern

Comment Partially Concur. The USACE would be willing to participate in developing a management plan for the Neosho Basin. However, due to the complexity of issues that need to be addressed within the basin, there are many participants including state, other federal agencies, local interest groups, and governments that need to be included in such an effort. We feel it would be more appropriate for such a management effort to be initiated at the state level

Recommendation No. 4. An annual water level management plan be jointly developed by all agencies involved and implemented

Comment. Concur Consideration would be given to developing a water level manipulation plan compatible with the new conservation pool and associated operational guidelines for that pool. However, this plan would need to be originated by the Kansas Water Office and KDWP

Recommendation No. 5 Provisions be made for post-development impact evaluations (follow-up studies) for potential wetland development immediately above elevation 1041 NGVD

Comment: Concur. As a result of the reallocation study a GIS database has been developed for the project. At some point in the future, if required, it could be used to assess changes in wetland development.

List of Mitigation Options

[1]USFWS Mitigation (Alternatives) Options

Option #1 Acquisition: Lands can be acquired, in fee, from willing sellers, at project cost, and then retained in Federal ownership They would be managed under the existing cooperative agreement or lease The estimated land cost is approximately $1,000/acre.

Option #2 Lease of Land· Lands under flowage easement would be leased by the Corps of Engineers from owners for management by the Service or the Department. Wildlife management practices would be required on the land.

Option #3 Conservation Easements· Easements would resemble the Conservation Reserve Program Easements being purchased by the Natural Resources Conservation Service The Service would enforce the easements for tree plantings, wetland creation, and buffers on the Neosho River above and below John Redmond Reservoir.

Option #4 Kansas Army Ammunition Plant: The 13,737 acre Kansas Army Ammunition Plant near Parsons, Kansas is nearing closure The U S. Fish and Wildlife Service proposes to assume management of approximately 1,008 acres of mixed hardwood riparian forest and 515 acres of native bluestem prairie grassland that are being declared excess government property. In addition to the grassland and forest the broad floodplains along Labette Creek and the Neosho River support or could support a variety of wetland vegetation

The Service intends on accepting land from the Plant under Public Law 80-537 at which time it will become Service property administered by the Flint Hills NWR through a no-cost transfer from the U S Army

There are opportunities on the Plant site for increased management of riparian forest, wetland enhancements, or potential for wetland development/creation to benefit wildlife The Service will accomplish these goals over the life of the project (perpetuity) on an incremental basis through our own budget initiatives. There is an opportunity to accelerate management, and enhancements however, through initiation of mitigation measures deemed appropriate for losses incurred at John Redmond Reservoir.

Mitigation could take the form of small wetland enhancement, development or creation of wetlands at appropriate sites, forest stand improvements and assumption of operation and maintenance cost at this satellite facility Operation and maintenance cost are assumed to be approximately $21/acre/year for the 1008 acres of woodland on the site

The advantage to implementation of mitigation at this site are 1.) No initial land cost, 2) Land is relatively free of flooding (not within the John Redmond flood pool), 3.) The site is within the Neosho River basin, 4) Service personnel would manage the resource as part of the Refuge System, 5) Public access would be assured, 6.) Management activities

could commence upon land transfer, 7.) Management of existing woodland is preferable to planting trees in cropland and waiting for them to mature.

Option #5 Wetland Creation on Refuge Lands. The loss of the Strawn Marsh, dike and outlet works and the Goose Bend Marsh, dike and outlet works and fringe palustrine wetlands within the 1039 and 1041 contour will by and large be accomplished by converting cropland within the refuge boundary to wetland.[1] The cost of wetland development is approximately $1,800/acre (U S Army Corps of Engineers) At a bare minimum 243 acres will be needed to be replaced/developed at a cost of approximately $435,000.

[1] Additional land be acquired (does not mean purchase as the only option for the project and be made available to the Service or the department for wildlife management under terms of the existing agreement or license.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Kansas Field Office
315 Houston Street, Suite E
Manhattan, Kansas 66502-6172

March 15, 2002

Mr. David L. Combs
Chief, Environmental Analysis and Compliance Branch
U S. Army Corps of Engineers
Tulsa District
P O. Box 61
Tulsa, Oklahoma 74121-0061

ATTN. Jim Randolph

Dear Mr. Combs:

This Final Fish and Wildlife Coordination Act Report (FWCA) is provided pursuant to the Fiscal Year 2000 Scope-of-Work Agreement for the John Redmond Pool Raise, Proposed Two Foot Increase In Conservation Pool, Neosho River, Coffey County, Kansas between the U.S Fish and Wildlife Service (Service) and the Tulsa District, Corps of Engineers This Final FWCAR was prepared in accordance with provisions of the Fish and Wildlife Coordination Act (16 U S.C. 661 et seq), and constitutes the report of the Secretary of the Interior on the project within the meaning of Section 2 (b) of this Act

Cooperation and information utilized in preparation of this report was obtained from the Kansas Department of Wildlife and Parks, and the Corps. The Service is concurrently soliciting a concurrence letter from the Kansas Department of Wildlife and Parks. The Departments concurrence letter, when received, will be sent to you for inclusion as appendix A

We appreciate the opportunity to discuss impacts to fish and wildlife anticipated by implementation of this project. If you should have any questions concerning the content of our Final FWCAR, please feel free to contact me at 913 539-3474 Ext. 105

Sincerely,

For: William H. Gill
Field Supervisor

Enclosure

WHG/drc

cc ES, Program Supervisor, South, Denver CO
Refuge Manager, Flint Hills NWR, Hartford KS

John Redmond Pool Raise
Proposed Two Foot Increase In Conservation Pool
Neosho River, Coffey County, Kansas

FINAL
Report on Fish and Wildlife Resources
Submitted To
The Tulsa District
U.S. Army Corps of Engineers
Tulsa, Oklahoma

Prepared by
the Kansas Field Office
Ecological Services
Manhattan, Kansas

March 2002

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EXECUTIVE SUMMARY

The John Redmond Pool Raise Study is an assessment by the Corps of Engineers to increase the water supply capabilities of John Redmond Reservoir A portion of the flood control pool will be reallocated to water supply. A two foot pool raise would inundate a small area of the free-flowing Neosho River, 385 acres of the Flint Hills National Wildlife Refuge administered by the U.S Fish and Wildlife Service (Service), 116 acres of Otter Creek Wildlife Area managed by the Kansas Department of Wildlife and Parks (Department). In total (all project lands) approximately 556 acres of terrestrial wildlife habitat will be permanently inundated if the conservation pool is increased by two feet.

Physical structures, man made improvements, which will be lost to permanent inundation include the Jacob's Creek Boat Launching Ramp and Parking lot, the Strawn wetland dike and outlet works, and the Goose Bend #4 wetland dike and outlet works, all of which are located within the Flint Hills National Wildlife Refuge

Secondary impacts of the pool raise include more frequent and longer duration inundation by retention of moderate floods within the reallocated flood pool The frequency and duration of flooding will increase by 1 or 2% for elevations 10421 NGVD to about 1046 NGVD. Gravel bars that serve as habitat for the Neosho madtom will be inundated more frequently and for longer duration than at present. In addition roads and facilities within the NWR and Wildlife Area will be subject to more frequent inundation disrupting management activities, public access and use

Since the Service and the Department do not own the land within the project area, the Corps does, we are not in a position to oppose reallocation of the flood pool. However, shoreline habitat and permanent facilities inundated by the increased pool elevation should be considered irretrievable during the expected life of the project. Their loss should be mitigated by replacement of physical facilities, above the new conservation level (1041 NGVD) and by acquisition, creation and management of habitat to replace that which is lost.

Recommendation

1 The Jacob's Creek boat launching ramp and parking area be replaced/relocated above elevation 1041 NGVD but within the same general area to accommodate angler and hunter access as a cost of the project.

2 The Corps of Engineers replace the Strawn flats and Goose Bend #4 dikes, outlet works and pumping facilities at a site to be determined by the Service but within the NWR, as a cost of the project.

3 The Corps of Engineers initiate an Environmental Management Plan in the Neosho Basin integrating Reservoir Operations and management with conservation of and management of all natural resources within the basin with particular emphasis on providing protection and enhancement for species of concern.

4 An annual water level management plan be jointly developed by all agencies involved and implemented

5 Provisions be made for post-development impact evaluations (follow-up studies) for potential wetland development immediately above elevation 1041 NGVD.

6 Additional land be acquired (does not mean purchase as the only option) for the project and be made available to the Service or the Department for wildlife management under terms of the existing cooperative agreement or license

INTRODUCTION

This report evaluates the effects on fish and wildlife resources of a proposed 2 foot pool raise above John Redmond Dam, Neosho River, Kansas. The proposed pool raise is due to an uneven distribution of sediment within the lake from what had been predicted at the time the dam was built (1964) Over time, sedimentation has changed the amount of storage the lake has for flood control, water supply and other purposes Storage available for water supply purposes in the lake has been depleted by sediment distribution such that the water supply agreement obligations between the Federal Government and the state of Kansas are being infringed upon.

Work on this project is based on agreements in the FY 2000 Scope of Work identifying a 2 foot raise as the level upon which to perform an assessment. This study was carried out under authority and in accordance with provisions of the U.S Fish and Wildlife Coordination Act of 1958 (16 U S.C. 661 et seq.)

The U.S Fish and Wildlife Service previously provided a planning Aid Report on the Proposed Reallocation of Storage at John Redmond in December of 1995.

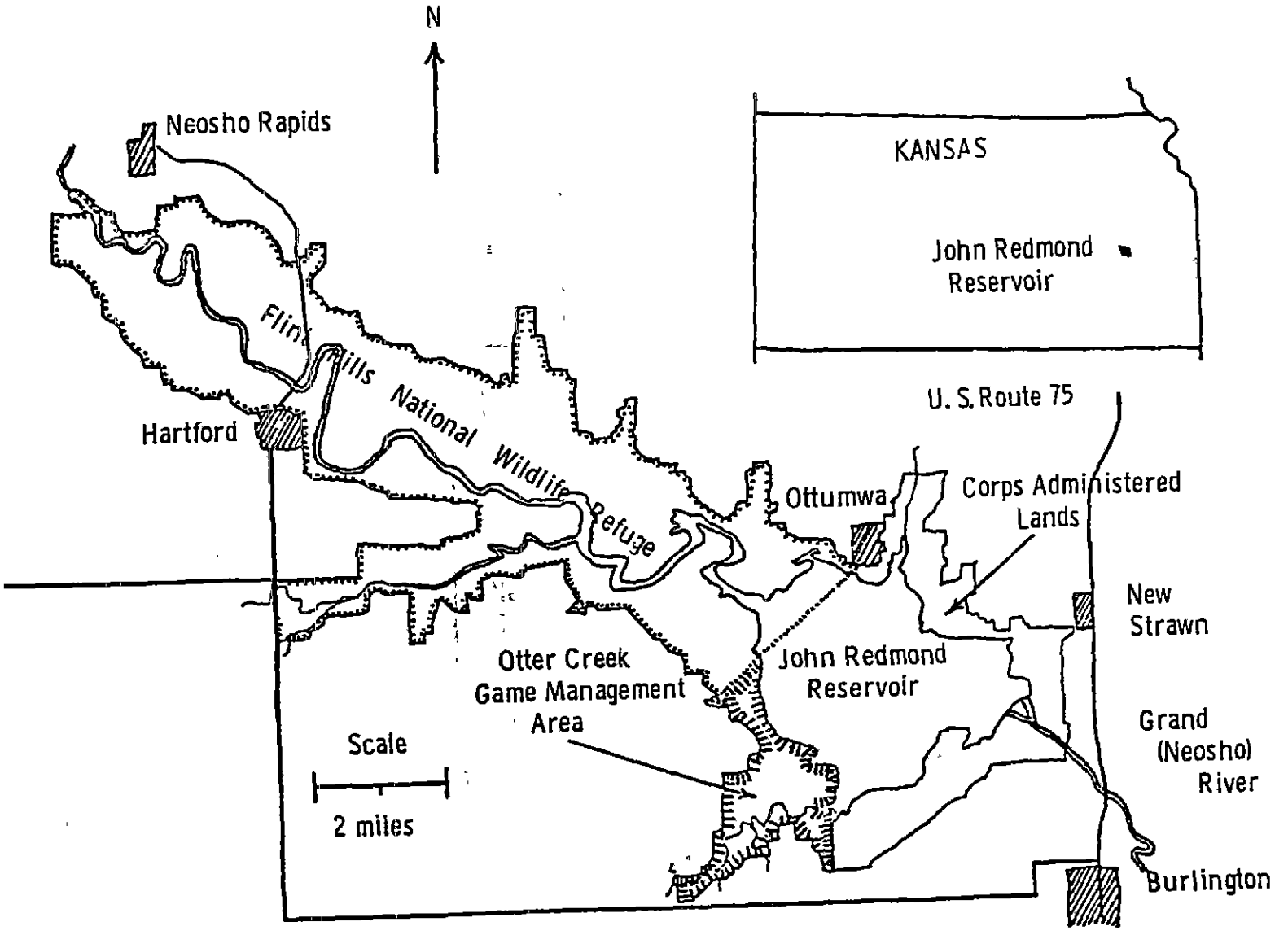
The Kansas Department of Wildlife and Parks have cooperated in the preparation of this report and endorse the contents of this report as indicated in the attached letter dated--------

DESCRIPTION OF THE PROJECT AREA

The proposed project is located above and below river mile 343 7 on the Grand (Neosho) River , about three miles northwest of Burlington in Coffee County, Kansas. John Redmond Lake was authorized by the Flood Control Act approved May 17, 1950, Public Law 81-516a· Project Document HD 442, 80th Congress, 2nd Session Project purposes include flood control, water supply, water quality, and recreation Closure of the embankment was completed in September 1963 and the project was completed for flood control operation in September 1964

John Redmond Dam is the lower unit in a system of three projects (Marion Dam on the Cottonwood River and Council Grove on the Neosho) designed primarily for flood control, water supply and water quality in the upper Neosho River Basin in Kansas At conservation pool, elevation 1039 feet the lake has a surface area of 9,280 acres and a shoreline of 59 miles. At flood pool, elevation 1068 feet the lake has a surface area of 31,660 acres controlling the runoff from a drainage area of 3,015 square miles. The Kansas Department of Wildlife and Parks has license to 1,472 acres of project lands (Otter Creek Game Management Area) for fish and wildlife management The U.S Fish and Wildlife Service has under cooperative agreement about 18,500 acres of project land and water areas for operation of the Flint Hills National Wildlife Refuge. The refuge is managed as part of the National Wildlife Refuge System and much of it is open to public hunting in season. Figure 1.

Figure 1. John Redmond - Wildlife Areas



The Neosho River upstream of John Redmond originates in Morris County and flows southeasterly for more than 300 river miles within Kansas. The Neosho river valley downstream from Council Grove Lake to the inlet to John Redmond Reservoir is about 36 miles long and ranges in width from about 0.3 miles near Council Grove to about 1.6 miles near the confluence with the Cottonwood River The valley downstream from John Redmond Reservoir to the Kansas-Oklahoma state line is approximately 180 miles long and ranges in width from about 0 4 miles near Iola to about 4 5 miles near LeRoy Stream slopes in the vicinity of Council Grove exceed 3 ft/mi but decrease to less than 2 ft/mi in the vicinity of Emporia Downstream from Emporia, the Neosho River channel slope averages about 1 2 ft/mi. The channel slope is controlled primarily by outcropping ledges of limestone and shale, which at low flows create a series of riffles and pools.

Alluvial deposits in the river valley consist mainly of unconsolidated stream-laid gravel, sand, silt, and clay together with occasional cobbles and boulders. The stream valley contains large amounts of chert gravel in the basal part of the alluvium in addition to considerable amounts of sand-size chert grains.

Stream banks vary in height from 15 to 30 feet, and usually support a growth of timber and undergrowth above the water line. Below John Redmond the river meanders in the sense that its location shifts, and its shape adjusts as the channel migrates as a whole down the valley. The meandering process, which is of concern to local interests, consists of eroding banks and deposited material on point bars to form bendways As material is eroded and deposited, the bendways increase in amplitude and gradually move down the valley. Cutoffs occur as the amplitude increases, so the river moves back and forth within certain limits called the meanderbelt

DESCRIPTION OF THE PROJECT PLAN

In 1975, the State of Kansas and the Federal Government entered into a water supply agreement at John Redmond Reservoir for an estimated 34,000 acre-feet of storage remaining after 50 years of sedimentation A recent Kansas Water office water supply and yield analysis indicated that the disproportionate sediment deposition has reduced the water supply capacity at design life to 25%. In order to make an equitable redistribution between the flood control and the conservation pools, the Tulsa District has been directed to study an equitable redistribution of storage between the flood control and conservation pools Consequently the District proposes to raise the conservation pool from elevation 1039 NGVD to elevation 1041 NGVD at John Redmond Reservoir The proposed volume of storage to be reallocated is 17,163 acre feet of storage or 3.18 percent of the flood pool

EVALUATION METHODOLOGY

Resource Category Designation

The U S. Fish and Wildlife Service's Mitigation Policy (Federal Register, Volume 46, No. 15, Pages 7644-7663, January 23, 1981) is used by the Service in the evaluation of impacts to land and water developments and in the subsequent recommendations to mitigate adverse impacts The policy establishes four resource categories, designation criteria, and mitigation planning goals for cover types that the Service anticipates will be impacted by the development of a project. These are the criteria that will be used in any subsequent report by the Fish and Wildlife Service for developing recommendations for mitigation or loss replacement for this project. These are presented below:

Resource Category	Designation Criteria	Mitigation Planning Goal
1	High value for evaluation Species and unique and Irreplaceable.	No loss of existing habitat value
2	High value for evaluation Species and scarce or Becoming scarce.	No net loss of in-kind habitat value.
3	High to medium value for Evaluation species and Abundant	No net loss of habitat value while minimizing Loss of in-kind habitat Value.
4	Medium to low value for Evaluation species	Minimize loss of Habitat value.

In applying the mitigation planning goals, the Mitigation policy directs that the following guidelines be followed:

Resource Category 1

The Service will recommend that all losses of existing habitat be prevented, as these one-of-a-kind areas cannot be replaced. Insignificant changes that do not result in adverse impacts on habitat value may be acceptable provided they will have no significant cumulative impact.

Resource Category 2

The Service will recommend ways to avoid or minimize losses. If losses are likely to occur, then the Service will recommend ways to immediately rectify them or reduce or eliminate them over time If losses remain likely to occur , then the Service will recommend those losses be compensated by replacement of the same kind of habitat value so that the total loss of such in-kind habitat value will be eliminated

Specific ways to achieve this planning goal include (1) physical modification of replacement habitat to convert it to the same type lost, (2) restoration or rehabilitation of previously altered habitat, (3) increased management of similar replacement habitat so that the in-kind value of the lost habitat is replaced, or (4) a combination of these measures By replacing habitat value losses with similar habitat values, populations of species associated with that habitat may remain relatively stable in the area over time. This is generally referred to as in-kind replacement.

Resource Category 3

The Service will recommend ways to avoid or minimize losses. If losses are likely to occur , then the Service will recommend ways to immediately rectify them or reduce or eliminate them over time If losses remain likely to occur, then the Service will recommend that those losses be compensated by replacement of habitat value so that the total loss of the habitat value will be eliminated.

In kind replacement of habitat value is preferable. However, if the Service determines that in-kind replacement is not desirable or possible, then other specific ways to achieve this planning goal include (1) substituting different kinds of habitat, or (2) increasing management of different replacement habitats so that the value of the lost habitat is replaced. By replacing habitat value losses with different habitats or increased management of different habitats, populations of species will be different, depending on the ecological attributes of the replacement habitat. This will result in no net loss of total habitat value but may result in significant differences in fish and wildlife populations This is referred to as out-of-kind replacement

Resource Category 4

The Service will recommend ways to avoid or minimize losses. If losses are likely to occur, then the Service will recommend ways to immediately rectify or reduce them over time If losses remain likely to occur, then the Service may make a recommendation for compensation, depending on the significance of the potential loss.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Resource Categories

The major cover types identified in the pool raise area were classified according to Standards for the Development of Habitat Suitability Index Models, 103 Ecological Services Model, U S Fish and Wildlife Service The cover types, along with definitions, are as follows

Cropland - Includes all lands that are used for the growth of agricultural crops that are generally planted and harvested annually. Alfalfa and cool season grasses (hayland) were included in this cover type for this project area.

Palustrine Wetland - Palustrine wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water For purposes of this classification, palustrine wetlands must have one or more of the following three attributes. (1) at least periodically, the land supports predominately hydrophytes; (2) the substrate is predominately undrained hydric soil, and, (3) the substrate is nonsoil and is saturated with water or covered by shallow at some time during the growing season of each year. From Cowardin, L.M., et al 1979 Classification of Wetlands and Deep Water Habitats of the United States U S. Fish and Wildlife Service, FWS/OBS-79/31

Grassland - Areas dominated by nonwoody vegetation, primarily native species which are not regularly mowed for hay.

Woodland - Forestland areas dominated by trees taller than 5 meters and having a canopy cover of at least 25 percent and riparian areas adjacent to creeks, streams, rivers and reservoir shoreline wherà vegetation is strongly influenced by the presence of water (Riparian areas have one or both of the following characteristics· 1) distinctively different vegetative species than adjacent areas, and 2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms (Riparian areas are usually transitional between wetland and upland)

Lacustrine - Includes all wetlands and deep water habitats situated in a topographic depression or dammed river channel and lacking trees, shrubs, and persistent emergents.

Riverine -Includes all wetlands and deep water habitats except those dominated by trees , shrubs, persistent emergents, emergent mosses, or lichens, which are located in a channel that contains flowing water

Resource categories and designation were determined for these cover types based on the value of the cover type to trust resources and replaceability and scarcity of the habitat on a local, regional and a national basis

The cover types in the John Redmond Pool Raise area were determined to have the resource category designations presented in Table 1.

Table 1. Evaluation of cover types in the John Redmond Pool Raise Project

Cover Types	Species Considered	Reasoning	Resource Category
Cropland	White-tailed deer, killdeer, bobwhite, racoon, mallard	Cropland is of medium value, is not scarce in the project area ; it could be replaced by not harvesting some crops adjacent to the project.	3
Grassland	Pheasant, bobwhite quail, meadowlark, horned lark, meadow voles	Medium value, due to grazing	3
Forest	White-tailed deer, turkey, squirrel, Coopers hawk, red-tailed hawk, warblers	As found on the Neosho River bottoms , it is scarce and difficult to replace , it is mostly destroyed and is in short supply.	2
Palustrine wetland	Red-winged black bird, racoon, muskrat, pheasant, coot, mallard, crappie, blue-winged teal, great blue heron, carp	Important reproduction and nursery area and is scarce in this section of the river It is integrated with riverine habitat and is nearly irreplaceable	2
Riverine	Neosho madtom, White bass, walleye, paddlefish, channel catfish racoon, beaver, waterfowl, gulls, terns	Important to many species of fish. It is in short supply, it is irreplaceable, it contains an important substrate for Neosho madtoms.	2
Lacustrine	Divers, coots, geese, walleye, white bass, drum	It is abundant, low productivity, but of medium value to its associated species	3

The overall wildlife values of terrestrial cover types in the John Redmond project area on a scale of 1-10 (1 lowest to 10 highest) as determined at previously studied Federal projects (Big Hill, Corbin, Douglass, and Upper Little Arkansas River Watershed) are as follows (Table 2):

Table 2 Range of Values

	Big Hill	Corbin	Douglass	Upper Little Ark	Avg
Cropland	3 0	1.5	-	2.7	2 4
Grassland	2.3	5 4	5 9	3.1	4.2
Woodland	6.6	6 4	8.4	4 3	6.4
Wetland	-	-	9 0	-	9 0

Because of their relative abundance, cropland, grassland, and lacustrine cover types were of medium value to species of concern. Grassland and cropland were limited in the project area, but they are abundant outside the project area and/or could be created. Under category 3 designation, the habitat value of these cover types could be replaced with an equivalent value of different cover type, but in-kind replacement would be preferred

Woodlands were determined to be of high value for the species of concern, particularly winter cover for white-tailed deer, and for providing migratory routes for passerine birds. Although woodland can be planted, there is limited area in proximity to the river where trees could be planted to reproduce the type of forest and riparian habitat that exists in the project area Therefore , whether replacement can be accomplished becomes a function of how much habitat is altered. Also, the proximity of free-flowing river with accompanying wetlands and gravel bars makes the woodland immediately adjacent to the waters edge a unique habitat. These two cover types were placed in resource category 2 Any loss of habitat value must be replaced in kind

Palustrine wetlands were determined to be of high value to species of concern, particularly migratory waterfowl (ducks and geese) and shore birds The emergent vegetation on the shore line of the lake is very similar to the isolated wetlands created on Flint Hills National Wildlife Refuge Although some emergent vegetation will be lost, due to an increase in water depth, additional emergents will develop as terrestrial habitat is inundated. Replacement is dependent on how much habitat is altered. Palustrine wetlands are resource category 2, and any loss of habitat value must be replaced in kind.

Since construction of Council Grove, John Redmond and Grand Lake reservoirs free-flowing segments of the Neosho River have become scarce. These segments are important to a number of indigenous fish species, including the Neosho madtom and the paddlefish The gravel bars associated with the free flowing segments are important habitat and spawning areas for indigenous and trust resource species. The free flowing Neosho River is placed in resource category 2 any loss should be replaced in kind.

Aquatic Ecosystem

John Redmond Lake

At multipurpose pool level John Redmond Lake provides a diverse and vital aquatic habitat Sediment encroachment, however, is creating problems for recreation use of the multipurpose pool and has greatly reduced the storage capacity and yield from storage Sediment has been deposited in the upstream portions of the reservoir as expected, but has also been distributed within the multipurpose pool as well and has significantly altered the depth and character of the aquatic habitat Mud flats or shallows occur throughout the middle and upper reaches and tributary streams of the lake These naturally shallow areas have grown in size and extent by the accelerated sedimentation.

The high flow- through of flood waters, sediment load and siltation has made it nearly impossible to maintain a sportfish population requiring two or three years of stable and manageable water conditions to grow individual fish to a harvestable size within John Redmond. With the opening of a quality fishery at Coffee County Lake fishing effort at John Redmond has declined.

Immediately after John Redmond Reservoir was impounded in 1963, the Department initiated a fish stocking program Game fish planted in the lake included crappie and channel catfish in 1963, largemouth bass, walleye, and bluegill in 1964; and striped bass in 1966. Early in this period (exact date unknown), white bass were also planted Stockings of saugeye, wipers and paddlefish continues Non-game species of the free flowing Neosho River fish community underwent rapid expansion following impoundment. They have continued to dominate the lake fishery to this day.

In the late winter and early spring of 1967, severe fish kills occurred over approximately 25 percent of the area of the reservoir's upper basin. Effluent from livestock feedlots located along the Neosho River upstream of the reservoir were identified as the cause of the mortalities Subsequent state legislation provided for more effective control of such wastes, and the problem has been abated

Current angling effort on John Redmond Lake is approximately 21,000 mandays while the stilling basin supports approximately 8,700 mandays of fishing.

Seasonal manipulation of the reservoir pool, both above and below conservation pool, has been an intricate component of fish and wildlife management at John Redmond Reservoir since about 1977. Recent efforts to implement a drastic drawdown, similar to the one implemented in 1978 or 1979 that was a success from a fisheries stand point, has met with resistance at the state level due to concerns of water supply dependability.

Because of the resistance to a major draw down and the opening of other quality sport fisheries within the area, the water level management plan for John Redmond has been modified to provide primary benefits to shore birds and waterfowl with only limited benefit to fisheries

Neosho River

This diverse and seemingly ever changing river environment supports a native and introduced assemblage of aquatic species Several species of fish presently occurring in the river that were introduced by man include the carp, northern pike, white bass, wiper, yellow perch, and walleye

The variety of bottom substraits in the river allows for a good diversity of benthic macroinvertibrates, with 20 to 27 families present. Freshwater mussels from the Neosho River accounted for 58% of the threeridge mussel (Amblema plicata) harvest from the State in 1999 and monkeyface (Quadrula metanevra) from the Neosho accounted for 67% of the state wide total mussel harvest. This diversity of habitat and food base allows a quality fishery to be maintained. The diversity of fish in turn serve as hosts to the glochidia of a diverse number of fresh water mussels The Department has classified the Neosho river as possessing a Value-Class II, high priority fishery resource (Moss and Brunson 1981).

There are over 29,100 angler days per year of angler use on the river between Council Grove and John Redmond, and 63,900 angler days of use between John Redmond and the Kansas-Oklahoma State line. Both reaches are considered to have an excellent sport fishery, especially for catfish The principal fishing areas are limited and generally restricted to adjacent towns, road crossings, low water or overflow dams and reservoir tailwaters.

Principal species of the Neosho river are listed in Tables 3, 4 and 5.

Table 3. Fish species of the Neosho River above John Redmond Reservoir

Spotted bass	Channel catfish
Green sunfish	Longear sunfish
Orange-spotted sunfish	White crappie
Carp	Drum
River carpsucker	Bluntnose minnow
Red shiner	Slenderhead darter
Neosho madtom	Gizzard shad

Table 4 Fish species of the Neosho River below John Redmond Reservoir.

Largemouth bass	White bass
Channel catfish	Flathead catfish
Green sunfish	Bigmouth buffalo
Drum	Smallmouth buffalo
Bluntnose minnow	Brook silverside
Golden shiner	Mosquito fish
Neosho madtom	Red shiner
Slenderhead darter	Slim minnow
Stonecat	Paddle fish
Spotted bass	Walleye
Blue suckers	Wipers
Gizzard shad	Sauger

Table 5 Fresh water mussel species of the Neosho River below John Redmond Reservoir

Pimpleback	Wabash pigtoe
Threeridge	Mapleleaf
Washboard	Threehorn wartyback
Pistolgrip	Monkeyface
Spike	Fragile papershell
Round pigtoe	Butterfly
Bleufer	Plain pocketbook
Wartyback	Neosho mucket
Pink papershell	Fawnsfoot
Yellow sandshell	Flutedshell
Ouachita kidneyshell	Giant floater
Rabbitsfoot	Creeper
Fawnsfoot	Deertoe
White heelsplite	

Species at Risk

The piping plover (Charadrius melodus) is a small shorebird which may be a seasonal spring and fall migrant through portions of Kansas, particularly along the Cimarron, Ninnescah, Arkansas, Kansas, and Missouri Rivers Plovers are associated with unvegetated shorelines, sandbars, and mudflats, utilizing aquatic invertebrates for food. Threatened status

The least tern (Sterna antillarum) utilizes similar unvegetated wetland habitat as do piping plovers, in the same geographic regions of Kansas, feeding primarily on small fish It occurs as a spring and fall migrant through the State, and also nests in central and southwest Kansas Endangered status.

The bald eagle (Haliaeetus leucocephalus) may be expected to occur along any river or at any reservoir in Kansas during winter. Eagles will utilize areas where large trees provide perch sites in proximity to open water, where they feed on fish and waterfowl A first nest was documented in 1989, there were no active nests in 2001. Threatened status.

The Neosho madtom (Noturus placidus) is a small catfish which depends on clean oxygenated gravel bars throughout the mainstem Neosho, Cottonwood, and Spring Rivers in southeastern Kansas, southwestern Missouri, and northeastern Oklahoma Threatened status

The Mead's milkweed (Asclepias meadii), a perennial broad-leaved plant, is associated with unbroken tallgrass prairie, generally occurring as small populations or scattered individuals Kansas counties containing confirmed Mead's milkweed populations include Allen, Anderson, Bourbon, Coffey, Crawford, Douglas, Franklin, Jefferson, Johnson, Leavenworth, Linn, Miami, and Neosho. Threatened status.

The western prairie fringed orchid (Platanthera praeclara) is a perennial plant generally occurring in swales or low edges of slopes in native tallgrass prairie Recent populations have been documented in Douglas, Jefferson, Leavenworth, and Osage counties Threatened status

The Butterfly (Ellipsara lineolata) is a freshwater riverine mussel preferring clean water with good current over gravel substrate. It's historic range included the Neosho, Spring, Fall, and Verdigris rivers Scattered individuals have recently been documented in the Verdigris and Neosho river, but distribution and numbers have been significantly reduced. State, threatened status.

The Flat Floater (Anadonta suborbiculata) is a thin shelled mussel that seems to prefer shallow areas of relatively permanent oxbow lakes having organically rich mud bottoms This preferred habitat is subject to water level changes due to fluctuations in run-off water and flood flows that recharge oxbow lakes Flat floaters appear to be able to repopulate suitable areas when favorable habitat conditions return. The current range of the Flat Floater in Kansas is restricted to the lower reaches of the Neosho and Marais des Cygnes rivers. State, endangered status.

The Neosho mucket (Lampsilis refinesqueana) mussel is an obligate riverine species preferring shallow clean flowing water in fine to medium gravel substrates. Historically found in the Marais des Cygnes, Cottonwood, Spring, Neosho, Verdigris, Fall, and Caney River systems. Currently appears to be extirpated from the Caney River and much reduced in numbers and distribution in the other river systems State, endangered status.

The Redspot Chub (Nocomis asper) is one of our largest native minnows It's range is restricted to streams within the Neosho and Spring River Basins They require streams with a fairly steady flow of clear water , inhabiting deep pools and runs with gravel bottoms They are most common in those streams having aquatic plants along their margins. State, threatened status.

The Rabbitsfoot mussel (Quadrula cylindrica) requires clear streams with gravel substrate and moderate, stable current Historically occurred in the Neosho, Spring and Verdigris rivers. Currently several known populations occur in the Neosho, Spring rivers State, endangered status, Federal Species of concern

The Ouachita kidneyshell (Ptychobranchus occidentalis) is another obligate riverine mussel preferring gravel substrate with clean flowing water Historically it occurred in the mainstem and major tributaries of the Verdigris, Neosho, and Spring rivers. It still occurs in many of these areas, but at mush reduced numbers. State, threatened status, Federal Species of concern.

The Western fanshell (Cyprogenia aberti) is an obligate riverine species found in mud, sand, gravel, and cobble substrate, generally associated with less than three feet of water. Historically found in low densities in the Fall, Verdigris, Neosho, and Spring Rivers Appears to have been extirpated from the Neosho River Scattered individuals have been documented in recent years in the Verdigris, Fall, and Spring rivers and Shoal Creek State, endangered status, Federal Species of concern.

The Blue Sucker (Hybopsis gracilis) prefers large rivers where they occur in swift deep chutes where substrate is rocky and free from silt. It is currently known only from the Missouri River mainstem, the Kansas River downstream of Bowersock Dam at Lawrence, and the Neosho River mainstem downstream from its confluence with the Cottonwood River. Federal Species of concern

The Paddlefish (Polyodon spathula) move out of Lake O' the Cherokees and up the Neosho River from mid-March through mid-May when water temperatures reach 60-65 degrees F These migrations are triggered by water elevations in the river rising a minimum of 3 to 5 feet. Paddlefish reintroduced to John Redmond similarly move into the Neosho above John Redmond and did spawn successfully in the high water year of 1993 It may be possible to utilize Marion and Council Grove reservoirs, and John Redmond reservoir downstream releases during wet years in such a manner that flood evacuation peaks are reduced in magnitude and duration, during periods of potential spawning activity, to increase available spawning habitat for this species. Federal Species of concern.

In addition to the preceding 17 species, the State of Kansas maintains a list of species in need of conservation (Appendix B). The following species may also be found within the basin area and may use riparian and project area lands and therefor should receive special consideration by the Corps in preparation of the environmental assessment

Neosho River Basin

1. Common Map turtle, State, threatened status
2 White-faced Ibis, State, threatened status
3 Snowy Plover, State, threatened status
4 Regal fritillary butterfly, Federal, Species of concern
5 Plains spotted skunk, State threatened status, Federal Species of concern
6 Ferruginous hawk, Federal, Species of concern
7. Cerulean warbler, Federal, Species of concern
8 Earleaf fox glove, Federal, Species of concern
9. Skinner's purple false foxglove, Federal, Species of concern.
10 Cleft sedge, Federal, Species of concern

Endangered Species

In accordance with Section 7 (c) of the Endangered Species act (16 U S.C. 1531 et seq.), it has been determined that the following federally listed species may occur in the project area: Neosho madtom (*Noturus placidus),* bald eagle (*Haliaeetus leucocepalus),* and western prairie fringed orchid (*Platanthera praeclara).*

Bald eagles generally arrive in the late fall and spend the winter around John Redmond Reservoir and surrounding areas. Eagle use on the Refuge is monitored from October through March and nesting attempts have been documented

In addition, the Neosho madtom is federally listed as threatened and the flat-floater mussel is listed as state endangered and are known to occur within the Neosho river drainage and within the Refuge boundary The Neosho madtom inhabits the gravel bars within the NWR in the vicinity of Hartford and below the Hartford bridge.

Terrestrial Ecosystem

Flint Hills National Wildlife Refuge

The refuge (Figure 2) was established under a cooperative management agreement with the Corps of Engineers to provide habitat for migratory waterfowl in the Central Flyway. The major management objective for Flint Hills NWR focuses on protecting the unique Refuge habitats essential for the survival of the diverse species that utilize the Refuge

Refuge habitats consists of approximately 4,572 acres of wetlands, 1,400 acres of open water, 5,999 acres of riparian wetlands on the Neosho River and associated creeks, 3,917 acres of

cropland, 3,200 acres of grassland, 2,400 acres of woodland, 2,255 acres of brushland, and 120 acres of administrative and recreational areas.

The various habitats present on the Refuge support a variety of species of mammals, birds, reptiles, amphibians and fish Mammals common to the Refuge are white-tailed deer, coyote, beaver, opossum, racoon, bobcat, cottontail rabbit, fox squirrel, and other small mammals River otters have been reported on the Refuge since their reintroduction several years ago on the Cottonwood River upstream of the Neosho River

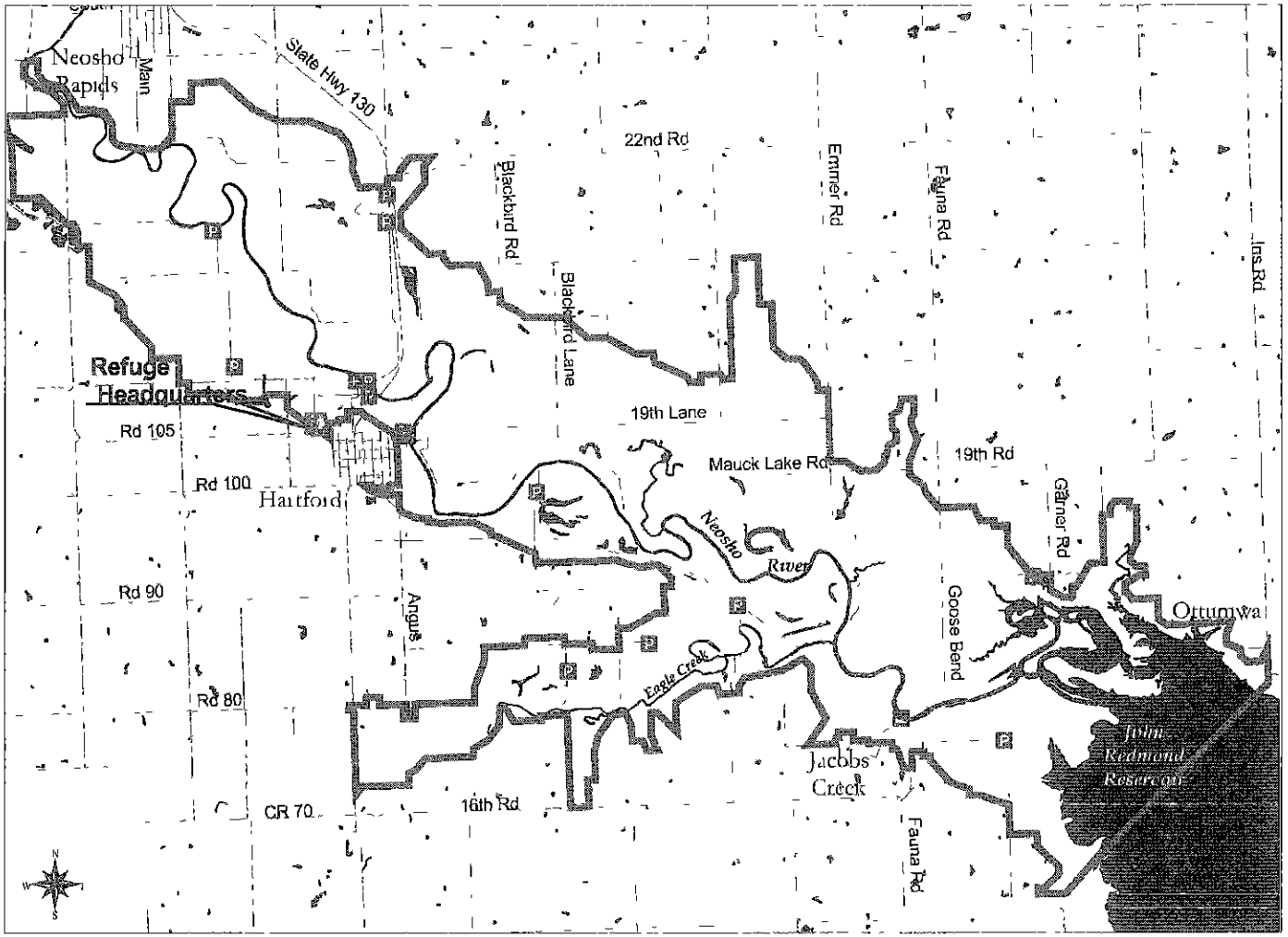
Bird species commonly seen on the refuge include an abundance of waterfowl such as Canada geese, snow geese, white-fronted geese, mallard, pintail and blue-winged teal Marsh and water birds on the Refuge include American white pelican, great (common) egret, snowy egret, great blue heron, little blue heron, green-backed heron, American bittern, double-crested cormorant, and pied-billed grebe Shorebirds, gulls, and terns seen on the Refuge include greater yellowlegs, dowitchers, ring-billed gull, Franklins gull, and Forester's tern Raptors include red-tailed hawk, northern harrier, Swainson's hawk, Cooper's hawk, great horned owl, and sharp-shinned hawk Other common birds are bobwhite quail, wild turkey, and eastern blue bird.

Fish found on the Refuge include those intrinsic to the Neosho River and those stocked in John Redmond Reservoir. Primary species sought by anglers include channel catfish, white bass, crappie, flathead catfish and carp

Waterfowl management has been the primary focus of many management strategies over the years. While wildlife management perspective has broadened, waterfowl continues to be a major focus and the numbers of waterfowl give an indication of the intrinsic value of the Refuge Table 6 includes the waterfowl counts from 1993 to 1997 and gives an indication of the vast numbers of birds that utilize the Refuge.

Flint Hills National Wildlife Refuge

Coffey and Lyon Counties, Kansas



Legend

- Refuge Boundary
- Parking Area
- Boat Ramp
- Refuge Headquarters

Map # 3 Base Map

Table 6.

Waterfowl Counts 1993-1997

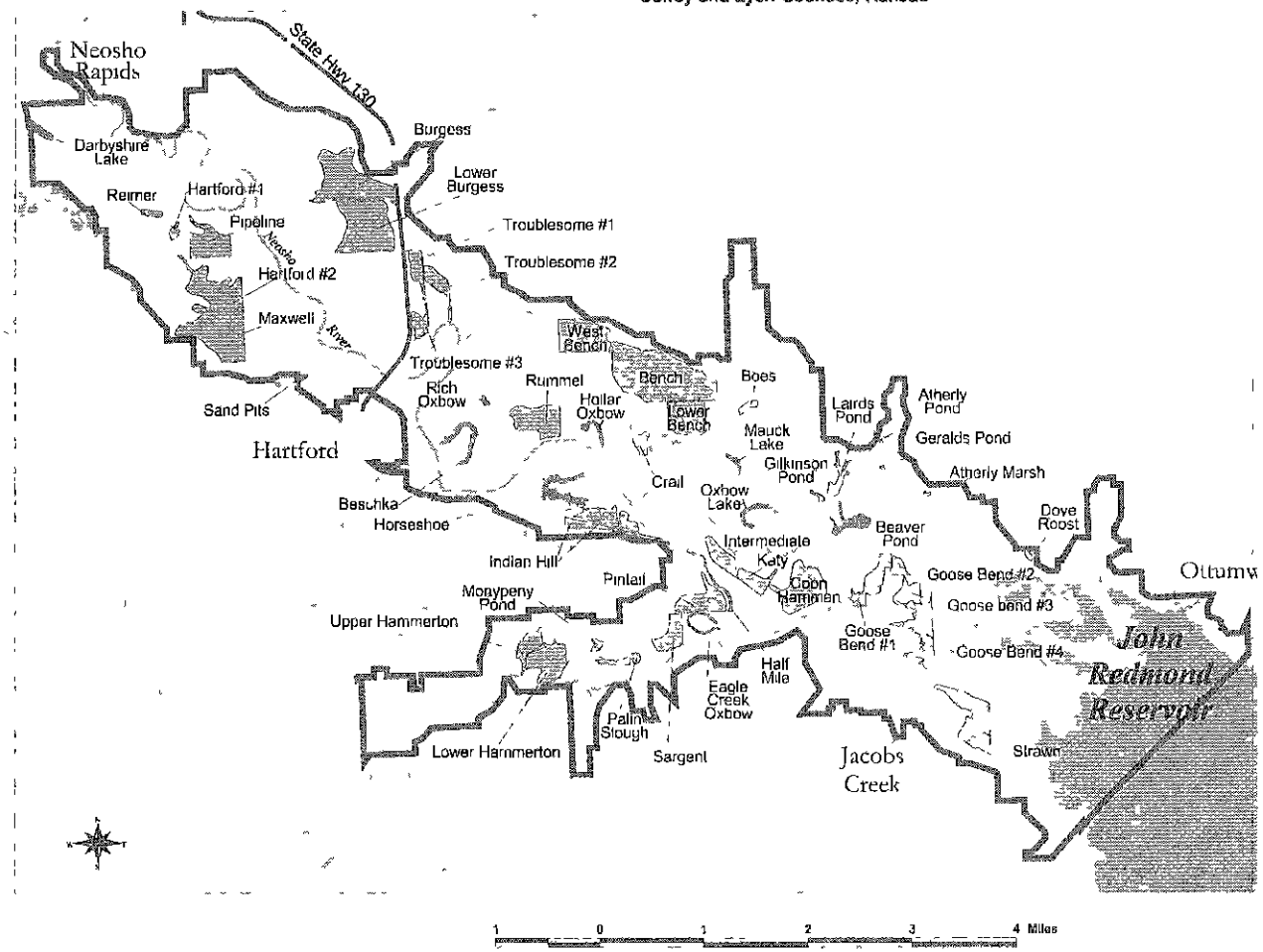
Year	Canada Geese	Snow Geese	White-fronted Geese	Ducks
1997	1,400	21,305	2,800	33, 535
1996	2,561	20,000	1,215	39,570
1995	3,000	9,100	4,000	48,750
1994	3,100	20,000	1,900	44,550
1993	2,500	31,000	650	16,400

(USFWS, 1997)

Flint Hills Refuge is located within the flood pool of John Redmond Reservoir When the reservoir is at normal conservation pool (1039 NGVD) , very little Refuge land is inundated. During abundant water periods, as much as 95 percent of the Refuge may be inundated by flooding from the rising pool level of John Redmond Reservoir Floods of this severity are not uncommon (1973, 1985, 1986, 1993, 1995, and in 1998) Most precipitation is received in spring and some degree of flooding can be expected, while fall flooding of the Reservoir is less common During drought periods, or other periods of low precipitation, pumping may be necessary to sustain wetlands and maintain wildlife habitat Wetland units depicted in Figure 3

Wetland Units of Flint Hills NWR

Coffey and Lyon Counties, Kansas



Wetland Type	Acres
8 CREATED	142 093
83 NATURAL	1933 972

Legend

Wetland Units

Created Wetland

Natural Wetland

Map # 5 Wetland Units Map

Otter Creek Wildlife Management Area

The 1,472 acre Otter Creek Wildlife Management Area was licensed to the Kansas Department of Wildlife and Parks in 1968, for the conservation and management of resident game as well as other wildlife species. To date, the area has not been developed to the extent planned. Farming is limited for lack of a cooperator willing to risk potential inundation on annual basis and an on-site game manager is not available to administer the area. Hunting pressure is divided about equally between waterfowl and upland game

FISH AND WILDLIFE RESOURCES WITH THE PROJECT

Terrestrial Ecosystem

A two foot pool raise behind John Redmond Dam would impact all of the cover types within the project area There would be losses in category 3 grassland and cropland and an increase in lacustrine habitat. Category 2 woodland and palustrine wetlands would be reduced in size and extent from that presently available To what extent newly inundated terrestrial habitat will convert to wetland is as yet undetermined With a 2 foot pool raise approximately 12.800 feet of the Neosho River and its associated gravel bars will be permanently inundated. Whether and where wetlands and gravel bars will reform over time is not predictable at this time due to uncertainties of potential water withdrawal projects above John Redmond and water withdrawls from the conservation pool.

Land between elevation 1039 and 1041 and their associated cover types are presented in Table 7.

Table 7 Habitat Change with an 2 Foot Increase in Conservation Pool*

FLINT HILLS REFUGE

Crop Land	-10 acres
Forest	-162 acres
Palustrine Wetland	-196 acres
Grassland	-17 acres

OTTER CREEK WILDLIFE AREA

Crop Land	-29
Forest	-22
Palustrine Wetland	-50
Grassland	-15

Corps of Engineers Managed Properties

Cropland	-12 acres
Forest	-11 acres
Palustrine Wetland	-26 acres
Grassland	-8 acres

Total Habitat Loss Entire Project

Cropland	-51 acres
Forest	-195 acres
Palustrine Wetland	-270 acres
Grassland	-40 acres
Total all Habitat Types	-556 acres

*We used the Kansas GAP Analysis Land Cover as our base map to calculate land cover impacts due to the conservation pool raise to 1041 feet NGVD This data base depicts 43 land cover classes for the State of Kansas. The database was generated using a two stage hybrid classification of multitemporal Landsat Thermic Mapper (TM) imagery. The Land cover was overlaid with covers depicting the 1039 foot conservation pool and the proposed 1041 foot conservation pool. ESRI's ArcView geoprocessing extension was used to clip the land cover for each pool level We then clipped the area of the pool raise into three areas based on boundaries depicted on the Flint Hills NWR Public Use Map and Regulations and the Tulsa District COE John Redmond Dam & Reservoir map and brochure. These areas were the Flint Hills NWR, the Otter Creek Wildlife Area, managed by the Kansas Department of Wildlife and Parks, and the rest of the reservoir. Acres of Land use for each area for each pool level were calculated using a script named CalAcres which was provided by the Tulsa District, Corps of Engineers, Hyrology-Hydraulics Branch as a part of the John Redmond GIS project

A terrestrial habitat evaluation utilizing average habitat values, from the 4 referenced reports (Table 2) and acres to be inundated is presented in Table 8

Table 8 Immediate terrestrial habitat value change due to a two foot pool raise behind John Redmond Dam.

Cover Type	AHU/acre	Acres	HU's
Cropland	3 0	-51	-153
Grassland	4 2	-40	-168
Woodland	6.4	-195	-1248
Wetland	9 0	-270	-2430

Environmental changes caused by the pool raise would include. inundating a new portion of the already limited free flowing Neosho River, adjoining lands (including gravel bars and wetland) and by flooding the transition zone where the river and the reservoir currently merge Generally, a two foot rise in pool elevation would inundate an additional 12,800 feet of the Neosho River Inundating an additional portion of the river would, one, displace wildlife species currently inhabiting or seasonally using these areas and second, further reduce the already limited amount of riverine habitat available for fish and wildlife species, requiring those types of habitat a river system has to offer, to complete their life cycle.

In addition to habitat losses the Jacob's Creek Boat launching ramp and parking lot, the Strawn dike and the Goose Bend dikes will be inundated by the increased pool elevation. Finding suitable areas for replacement of these physical features/facilities will be difficult given the finite and shrinking public land base within the flood pool.

Aquatic Ecosystem

A separate quantitative and qualitative habitat analysis for aquatic resources was not conducted . Sport fisheries and rough fish inhabiting the reservoir were expected to gain habitat units with an increase in lacustrine area and the loss of riverine habitat units would be quite small in comparison. However with a pool raise the conversion of riverine to lacustrian habitat can not be replaced

Although it is reasonably certain that a change in the conservation level of the reservoir would significantly alter the condition of lake's fishery, it is difficult to predict precisely what its condition would be after the conservation pool has been reestablished. In general, however, no negative impacts would be expected and a positive impact would be realized initially as established vegetation is inundated providing nursery habitat for juvenile fishes. The species composition of the lake would remain substantially the same. Relative abundance of fishes present would possibly change; total abundance would almost certainly.

The walleye population of John Redmond Lake is currently in only fair condition and there is no reason to expect a change to the worse if the conservation pool is raised Most of the reservoir's walleye currently spawn on the face of the dam. Raising the water level would increase the

amount of riprap that is available for spawning substrate Never-the-less, the fish would continue to actually spawn over riprap that is very near the surface (1 to 4 feet deep usually). Consequently, discharges which result in lowering the water level when eggs and nonmotile fry are present (late March to early May) would have a negative effect on the species

White crappie spawn throughout the shallow portions of the reservoir, usually during April or May The males come to the spawning ground and clean ill-defined nests; the preferred location is in a cove, protected from wave action and having a substrate of fine gravel that is free of silt. This preferred habitat should be readily available after the lakes elevation is increased. The nests are located at depths that range from 1 to 20 feet with most being 10 to 14 feet deep. The eggs which adhere to the nest's substrate, hatch in 2 to 4 days, and the fry remain on the nest for only a short while. The time elapsed between the start of hatching and departure of the fry can be as little as 4 days.

Discharges that result in lowering the lakes water level during the spawning period crappie can strand eggs and fry above the water line This impact would be particularly acute whenever the lake's water level decreases by several feet or more during a period of 2 weeks or less.

The white bass and channel catfish populations of John Redmond Lake are relatively insensitive to moderately fluctuating water levels The wipers do not reproduce in John Redmond and are primarily pelagic like their parent species. Consequently, they are not usually greatly affected by moderate fluctuations of water level

The forage base for the sport fishery is predominately gizzard shad The total, but not the relative number of gizzard shad in John Redmond should change when the pool level is raised. It is not certain what effect short-term moderate water level fluctuations around the higher elevation would have on the species.

The lakes rough fish population (bigmouth buffalo, common carp, smallmouth buffalo, and river carpsucker) would likely increase with the change in surface area, caused by raising the conservation pool level Whether their numbers would change relative to those of the sport fish is unknown These species would not be very much effected by short-term moderate fluctuations in water level after the lake reaches the new conservation pool elevation Temporary drawdowns of long duration and large magnitude would negatively affect the production of rough fish but could potentially enhance sport fish growth Declining water levels would concentrate prey fish and, thereby, allow increased foraging and growth by the lakes sport fish Lush stands of herbaceous vegetation would grow up in the denuded zone and, if then inundated during a subsequent growing season, could serve as substrate for fish food organisms. For such a beneficial effect to occur, it is essential that the vegetation remain inundated throughout most if not all of the growing season. Use of vegetation for food requires sufficient time for it to be colonized by algae, bacteria and invertebrates.

The current water level management plan at John Redmond lake takes advantage of the beneficial effect when regenerated plant materials are inundated. Fluctuation of the pool generally occurs above and below1039 NGVD or conservation pool. The basic plan recently recommended provides for gradual recharge from September through mid-October to 1041 NGVD with levels remaining constant through mid-January A winter drawdown to elevation

1039 NGVD to create storage for anticipated flood waters and to prevent erosion due to ice cover Conservation pool is maintained throughout the spring. A midsummer drawdown to elevation 1037 is accommodated over a four week period (June to 5 July) to release exposed mud-flats to revegetation. Revegetation takes place from 5-July to early September with water levels remaining constant A gradual fall recharge to elevation 1141 NGVD is expected to occur by mid-October but may not materialize due to insufficient fall rains When in effect, the current recommended water level management plan, would fluctuate the pool 2 feet above conservation pool and two feet below.

The beneficial effects of the water level management plan to the lakes fishery, shorebird and to waterfowl populations is well documented There is concern that this important fisheries and wildlife management tool may become increasingly difficult to implement with a permanent increase in the conservation pool Fluctuations above 1041 NGVD could potentially impact gravel bars occupied by the Neosho madtom and could put water on or over access roads, additional dikes and outlet works at constructed waterfowl impoundments Fluctuations could be done but they would have to be below 1041 NGVD

Secondary Impacts

A suite of computer programs collectively called SUPER, were used to model hydrological effects for both the existing and modified reservoir conditions. May through July flow-duration plots, maximum flow and minimum flow frequency plots, and comparative hydro graph plots for John Redmond and down stream control points were provided by the Corps to illustrate the effect of increasing conservation pool We agree, based on the information provided that only slight impacts in outflows from the reservoir can be expected

As a result of the increased conservation pool elevation, flood pool will be reduced by 17,163 acre feet (3 18% of the flood pool) Due to this loss in storage small and moderate flood storage events will inundate lands and facilities above 1041 NGVD on a more frequent basis and for longer duration than at present. Flow duration curves, developed for the 2 foot pool raise, indicate that elevation 1045 NGVD will be subject to inundation 10% of the time if the lake starts storage with the conservation pool at 1039 NGVD. If the lake starts storage at elevation 1041 NGVD, elevation 1045 NGVD is expected to be inundated 11-12% of the time Figure 4.

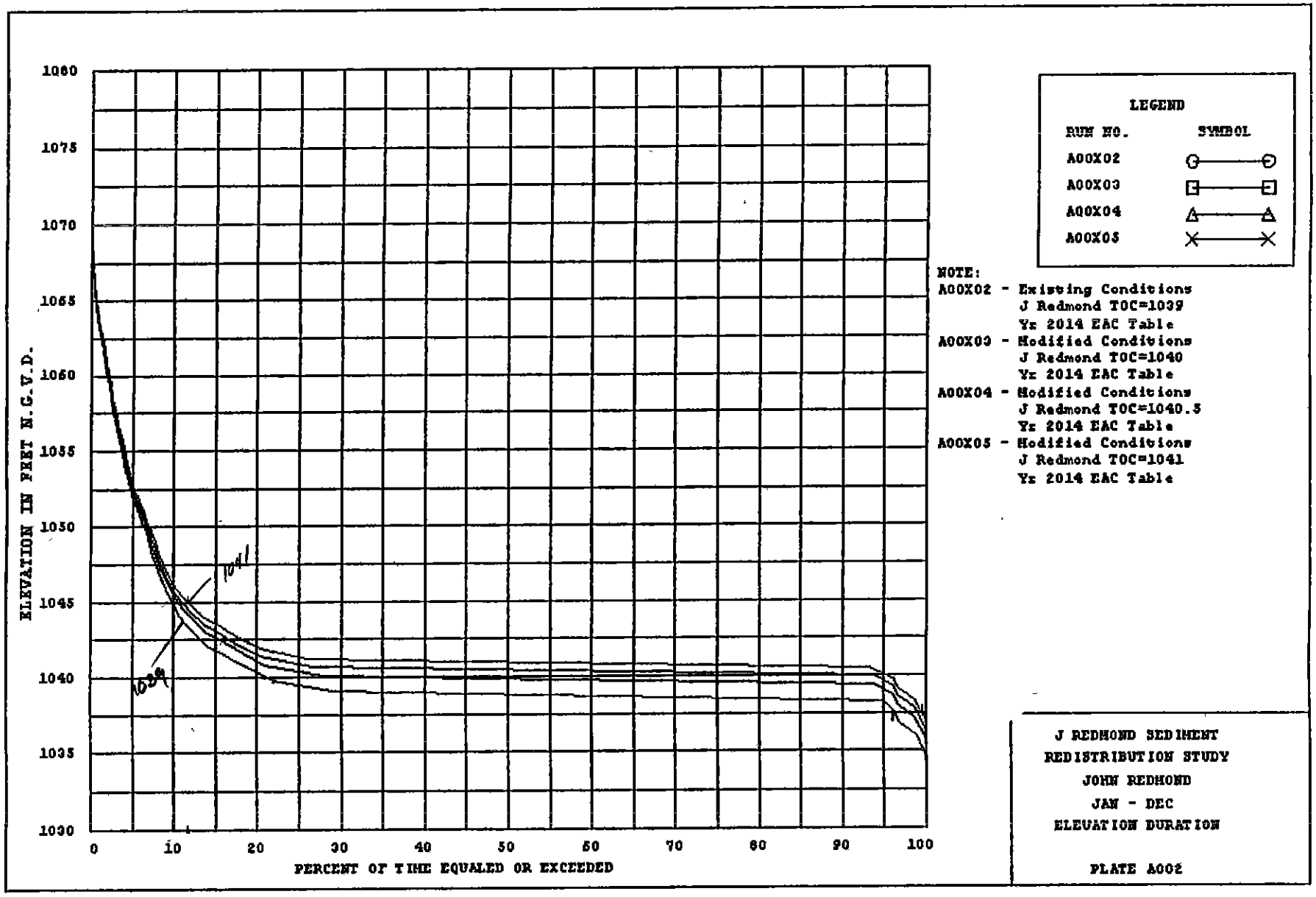


Figure 4 John Redmond Sediment Redistribution, Elevation Duration

From an operational standpoint a one percent change is minimal. From an endangered species perspective the condition of habitat availability is reduced therefore there is an affect to endangered species that require gravel bar habitat for their survival

Discussion

Reservoir operation is based upon the conflicting objectives of maximizing the amount of water available for conservation purposes and maximizing the amount of empty space available for storage of flood waters Conservation purposes at John Redmond include municipal, industrial, recreation, fish, wildlife, and water quality The conservation and flood control pools in John Redmond are fixed by a designated top of conservation (bottom of flood control) 1039 NGVD pool elevation. Planning, design and operating problems associated with flood control are handled separately from those associated with conservation By increasing conservation pool to 1041 NGVD there will be more water available for conservation purposes. Intuitively this should be beneficial to fish and wildlife however, Flint Hills National Wildlife Refuge and Otter Creek Wildlife Area are located on Corps property at the upstream end of this multipurpose reservoir project Increasing the conservation pool will inundate lands that are currently being managed for the benefit of fish and wildlife by the Service , the Department and the Corps The tradeoffs between conservation purposes and flood control are complex and this report is but one aspect of the overall management strategy that must be addressed by the Corps to develop the most beneficial use of storage capacity.

By and large the greatest changes in habitat, as a result of a pool raise, will be the conversion of palustrine wetlands and woodland to open water habitat within areas primarily managed to benefit fish and wildlife The areas potentially impacted by changes at John Redmond are not only important to fish and wildlife species inhabiting them These areas also provide a significant amount of outdoor public recreation such as, but not limited to, fishing, hunting, trapping, wildlife observation and photography, and environmental education and interpretation in an area where the amount of available public land is limited

Recommendations

In summary the Service recommends the following be incorporated in the reallocation plan to lessen the impact of this plan on fish and wildlife resources and a facilities constructed for wetland creation and management or for public access to reservoir resources.

1. The Jacob's Creek boat launching ramp and parking area be replaced/relocated above elevation 1041msl but within the same general area to accommodate angler and hunter access as a cost of the project.

2. The Corps of Engineers replace the Strawn flats and Goose Bend #4 dikes, outlet works and pumping facilities at a site, to be determined by the Service but within the NWR, as a cost of the project.

3. The Corps of Engineers initiate an Environmental Management Plan in the Neosho Basin integrating Reservoir Operations and management with conservation of and management of all natural resources within the basin with particular emphasis on providing protection and enhancement for species of concern.

4. An annual water level management plan be jointly developed by all agencies involved and implemented

5. Provisions be made for post-development impact evaluations (follow-up studies) for potential wetland development immediately above elevation 1041 NGVD

Additional land be acquired (does not mean purchase as the only option[1] for the project and be made available to the Service or the Department for wildlife management under terms of the existing cooperative agreement or license.

[1]Mitigation (Alternatives) Options

Mitigation Lands can be brought under wildlife management by several options, as follows

Option #1 Acquisition: Lands can be acquired, in fee, from willing sellers, at project cost, then retained in Federal ownership They would be managed under the existing cooperative agreement or lease The estimated land cost is approximately $1,000/acre.

Option #2 Lease of land Lands under flowage easement would be leased by the Corps of Engineers from owners for management by the Service or the Department. Wildlife management practices would be required on the land.

Option #3 Conservation Easements. Easements would resemble the Conservation Reserve Program Easements being purchased by the Natural Resources Conservation Service The Service would enforce the easements for tree plantings, wetland creation and buffers on the Neosho River above and below John Redmond Reservoir

Option #4. The 13,737 acre Kansas Army Ammunition Plant near Parsons, Kansas is nearing closure. The U S. Fish and Wildlife Service proposes to assume management of approximately 1,008 acres of mixed hardwood riparian forest and 515 acres of native bluestem prairie grassland that are being declared excess government property In addition to the grassland and forest the broad flood plains along Labette Creek and the Neosho River support or could support a variety of wetland vegetation.

The Service intends on accepting land from the Plant under Public Law 80-537 at which time it will become Service property administered by the Flint Hills NWR through a no-cost transfer from the U.S Army.

There are opportunities on the Plant site for increased management of riparian forest, wetland enhancements, or potential for wetland development/creation to benefit wildlife . The Service will accomplish these goals over the life of the project (perpetuity) on an incremental basis through our own budget initiatives There is an opportunity to accelerate management, and enhancements however, through initiation of mitigation measures deemed appropriate for losses incurred at John Redmond Reservoir.

Mitigation could take the form of small wetland enhancements, development or creation of wetlands at appropriate sites, forest stand improvements and assumption of operation and maintenance cost at this satellite facility. Operation and maintenance cost are assumed to be

approximately $21/acre/year for the 1008 acres of woodland on the site

The advantage to implementation of mitigation at this site are 1) No initial land cost, 2) Land is relatively free of flooding (not within the John Redmond flood pool), 3.) The site is within the Neosho river basin, 4) Service personnel would manage the resource as part of the Refuge System, 5.) Public access would be assured, 6) Management activities could commence upon land transfer, 7) Management of an existing woodland is preferable to planting trees in cropland and waiting for them to mature

Option #5 Wetland Creation on Refuge lands: The loss of the Strawn Marsh, dike and out let works and the Goose Bend Marsh, dike and outlet works and fringe palustrine wetlands within the 1039 and 1041 contour will by and large be accomplished by converting cropland within the refuge boundary to wetland The cost of wetland development is approximately $1,800/acre (U S Army Corps of Engineers 1997) At a bare minimum 243 acres will need to be replaced/ developed at a cost of approximately $435,000

Appendix A

STATE OF KANSAS
DEPARTMENT OF WILDLIFE & PARKS
Operations Office
512 SE 25th Ave
Pratt, KS 67124-8174
Phone (620) 672-5911 FAX (620) 672-6020

10 April 2002

Mr William H Gill, Field Supervisor
U S Fish and Wildlife Service
Kansas Field Office
315 Houston Street, Suite E
Manhattan, KS 66502-6172

Ref. D4.0201
Coffey
Track: 20000423

Dear Mr Gill:

We are responding to your request for our formal letter of concurrence regarding the final copy of the Fish and Wildlife Coordination Act Report for the John Redmond Reservoir water supply reallocation The reallocation consists of raising the conservation pool from 1039 NGVD to 1041 NGVD When carried out, the project will inundate 556 acres including 116 acres of Otter Creek Wildlife Area

We agree in principle with the recommendations made in the report to be considered in the Corps of Engineers Biological Assessment You addressed the species and habitats that we mentioned in a previous letter to the Tulsa District Corps of Engineers and our previous comments on the draft report We agree that the action likely should not significantly adversely affect those species mentioned in previous reviews beyond existing conditions We concur with your recommendations because you have addressed the species of concern, addressed habitat losses and mitigation recommendations, and have coordinated and included recommendations by Department personnel responsible for managing fish and wildlife resources and public lands in and around the reservoir

If you have any questions, please E-mail Chris Hase with our Environmental Services Section staff at chrish@wp state ks us or call him at extension 198 Thank you for the opportunity to make these comments.

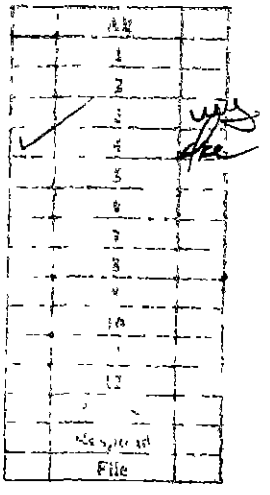
Sincerely,

Keith Sexson

Keith Sexson
Assistant Secretary for Operations

KS ch

xc KDWP, ESS
KDWP Reg. 5 F&W Sup., Tiemann
KDWP Reg 5 Pub. Land Sup , Blex
EPA, Schafer
KDHE, Mueldener



Appendix B

Species In Need of Conservation Known or Likely to Occur in
Coffey County, Kansas

Black Tern - *Chlidonias niger* (Linnaeus)

Blue Sucker - *Cycleptus elongatus* (LeSueur)

Bobolink - *Dolichonyx oryzivorus* (Linnaeus)

Cerulean Warbler - *Dendroica cerulea* (Wilson)

Fawnsfoot Mussel - *Truncilla donaciformis* (Lea)

Golden Eagle - *Aquila chrysaetos* (Linnaeus)

Gravel Chub - *Erimystax x-punctatus* (Hubbs and Crowe)

Prairie Mole Cricket - *Gryllotalpa major* (Sauss)

Red-Shouldered Hawk - *Buteo lineatus* (Gmelin)

Short-Eared Owl - *Asio flammeus* (Pontoppidan)

Spike Mussel - *Elliptio dilatata* (Rafinesque)

Wabash Pigtoe Mussel - *Fusconaia flava* (Rafinesque)

Wartyback Mussel - *Quadrula nodulata* (Rafinesque)

Washboard Mussel - *Megalonaias nervosa* (Rafinesque)

Whip-Poor-Will - *Camprimulgus vociferus* (Wilson)

115-15-2. Nongame species; general provisions

(a) The following are nongame species in need of conservation within the boundaries of the State of Kansas.

(1) Invertebrates

Cylindrical papershell mussel, *Anodontoides ferussacianus*
Snuffbox mussel, *Epioblasma triquetra*
Wartyback mussel, *Quadrula nodulata*
Spike (lady-finger) mussel, *Ellipitio dilatata*
Wabash pigtoe mussel, *Fusconaia flava*
Fat mucket mussel, *Lampsilis radiata conspicua*
Yellow sandshell mussel, *Lampsilis teres*
Washboard mussel, *Megalonaias nervosa*
Round pigtoe mussel, *Pleurobema coccineum*
Squawfoot mussel, *Strophitus undulatus*
Fawnsfoot mussel, *Truncilla donaciformis*
Deertoe mussel, *Truncilla truncata*
Ozark emerald dragonfly, *Somatochlora ozarkensis*
Gray petaltail dragonfly, *Tachopteryx thoreyi*
Prairie mole cricket, *Gryllotalpa major*

(2) Fish

Banded darter, *Etheostoma zonale*
Banded sculpin, *Cottus carolinae*
Black redhorse, *Moxostoma duquesnei*
Blue sucker, *Cycleptus elongatus*
Blacknose dace, *Rhinichtys atratulus*
Bluntnose darter, *Etheostoma chlorosomum*
Brassy minnow, *Hybognathus hankinsoni*
Gravel Chub, *Erimystax x-punctata*
Greenside darter, *Etheostoma blennioides*
Highfin carpsucker, *Carpiodes velifer*
Northern hog sucker, *Hypentelium nigricans*
Ozark minnow, *Notropis nubilus*
Plains minnow, *Hybognathus placitus*
River darter, *Percina shumardi*
River redhorse, *Moxostoma gracile*
River shiner, *Notropis blennius*
Slough darter, *Etheostoma gracile*
Speckled darter, *Etheostoma stigmaeum*
Spotfin shiner, *Cyprinella spiloptera*
Spotted sucker, *Minytrema melanops*
Stippled darter, *Etheostoma punctulatum*
Tadpole madtom, *Noturus gyrinus*

(3) Amphibians

Red-spotted toad, *Bufo punctatus*
Northern crawfish frog, *Rana areolata circulosa*

(4) Reptiles

Alligator snapping turtle, *Macroclemys temminckii*
Rough earth snake, *Virginia striatula*
Western hognose snake, *Heterodon nasicus*
Eastern hognose snake, *Heterodon platirhinos*
Timber rattlesnake, *Crotalus horridus*
Glossy snake, *Arizona elegans elegans*

(5) Birds

Bobolink, *Dolichonyx oryzivorus*
Cerulean warbler, *Dendroica cerulea*
Curve-billed thrasher, *Toxostoma curvirostre*
Ferruginous hawk, *Buteo regalis*
Golden eagle, *Aquila chrysaetos*
Short- eared owl, *Asio flammeus*
Henslow's sparrow, *Ammodramus henslowii*
Ladder-backed woodpecker, *Picoides scalaris*
Long-billed curlew, *Numenius americanus*
Mountain plover, *Charadrius montanus*
Chihuahuan raven, *Corvus cryptoleucus*
Black tern, *Chlidonias niger*
Black rail, *Laterallus jamaicensis*
Red-shouldered hawk, *Buteo lineatus*
Whip-poor-will, *Caprimulgus vociferus*
Yellow-Throated warbler, *Dendroica dominica*

(6) Mammals

Eastern chipmunk, *Tamias striatus*
Franklin's ground squirrel, *Spermophilus franklinii*
Pallid bat, *Antrozous pallidus bunkeri*
Southern bog lemming, *Synaptomys cooperi*
Southern flying squirrel, *Glaucomys volans volans*
Texas mouse, *Peromyscus attwateri*
Townsend's big-eared bat, *Plecotus townsendii pallescens*

APPENDIX G

Cultural Resources

Neosho 500-Meter Inventory Chart

The database includes 145 reported or documented sites and surveys within 500 meters of the Neosho River channel, from the John Redmond Reservoir in Kansas (Redmond Dam USGS Quad) to the Neosho entry at Grand Lake in Oklahoma (Miami SE USGS Quad). It includes those mitigated or reported as destroyed It also includes all General Land Office (GLO) sites that were indicated on the source maps.

Sites are organized by county, then quad map, then site number for ease of reference. Chart abbreviations are as follows·

SITE # Special abbreviations are:

> **RSS Survey** = Schmits, Larry J , (1973) *An Assessment of the Prehistoric Cultural Resources of the Neosho (Grand) River Valley and an Evaluation of the Impact of the Proposed Riverbank Stabilization Project* DACW56-73-C-0240. University of Kansas Museum of Anthropology, Lawrence.
> **OHHS-OT10** = Oklahoma Historical Society (1958) "Oklahoma Historic Sites Survey," *Chronicles of Oklahoma* 36·282-314 (OT10 refers to Ottawa County listing no. 19)

ELEV/ft Elevation of the site as indicated on the USGS quad map

EAC/ft Estimated elevation or vertical distance of the site above the Neosho channel

ASI? Is the site area subject to inundation?

DIST to NEOSHO/m Distance of the site in meters from the Neosho channel

INVEST FH? Was the site investigated first hand? Most citations refer to individual site or survey reports included in the Appendix Exceptions are

> **King (1993)** = King, Joseph E. (1993) *Spans of Time Oklahoma Historic Highway Bridges* Center for Historic Preservation & Technology, Texas Tech University
> **OHHS** = see citation above

RISK? Risk assessment takes into account all locational factors that may affect site preservation

PRIORITY Where preservation risk potential exists, sites are assigned "high" or "low" priority values, which also takes into account the known physical integrity and apparent significance of a site, or recommendations by principle investigators for further action

Site and Survey Reports

Site reports are organized numerically according to county:

AN = Allen County
CF = Coffey County
CG = Craig County
CH = Cherokee Countu
LT = Labette County
NO = Neosho County
OT = Ottawa County
WO = Woodson County

Survey reports follow the site reports and are organized numerically.
Specific site locations are not referenced in this inventory chart and may be found in the Confidential Appendix submitted with this report.

COUNTY	QUAD	SITE #	ELEV/ft	EAG/ft	AS?	DIST to NEOSHO/m	INVEST FH? *	EVIDENCE	DATE	RISK? **	PRIORITY
Coffey	Burlington	14CF12/RSS Survey	990	0-10	Yes	0	1973 (Schmits)	Occupation level in bank projectile point side scraper animal bone	Archaic	Yes	High
Coffey	Burlington	14CF13/RSS Survey	990	0-10	Yes	0	1973 (Schmits)	Occupation level in bank point base, burned earth charcoal	Archaic?	Yes **	High
Coffey	Burlington	14CF401	1010	20	No	120 50 from tributary	1983 (Rainbolt)	Flint chips, corner notch projectile, burned stone	E Ceramic	No	
Coffey	Burlington	14CF402	1016	26	No	450	1983 (Rainbolt)	3 projectile points, cores flint chips	Archaic M Ceramic	No	
Coffey	Burlington	14CF404	1016	26	No	250	1983 (Rainbolt)	2 projectile points chips burned stone	E & M Ceramic	No	
Coffey	Burlington	14CF1323/Survey B1305	1010	20	No	300	1981 Phase 3 in 1982 (Brogan)	Flakes, projectile points (one McKean), mano, burned stone	Archaic	No- mitigated & destroyed	
Coffey	Burlington	Survey B1311	1010	20	No	0-200	1986 Phase 2 (Lees)	None		No mitigated	
Coffey	Burlington	1878 GLO	1005	15	No	300	No	Structure, Denahy	Historic	No	
Coffey	Le Roy	14CF 8/RSS Survey	970	0 10	Yes	0	1973 (Schmits), collecting activity	2 stone-lined hearths in bank manos cores Langtry-type points	Late Archaic	Yes **	High
Coffey	Le Roy	14CF9/RSS Survey	970	0-10	Yes	0	1973 (Schmits)	Flakes and burned stone in bank	Unassigned	Yes	High
Coffey	Neosho Falls	14CF10/RSS Survey	960	0-10	Yes	0	1973 (Schmits)	Corner notched projectile/scraper drill bifaces, burned stone in bank	Unassigned	Yes	High
Coffey	Le Roy	14CF11/RSS Survey	970	0-10	Yes	0	1973 (Schmits)	Burned mussel shells and charcoal in bank	Unassigned	Yes- action recommended **	High
Woodson	Neosho Falls	14WO3/RSS Survey	960	10	Yes	0	1973 (Schmits)	Stemmed projectile point- fallen from top of bank?	Unassigned	Yes but no action recommended	
Allen	Iola	14AN6/RSS Survey	950	0-10	Yes	0	1973 (Schmits) collecting activity	3 occupation levels in bank much animal bone, points in collection	Unassigned	Yes **	High
Allen	Iola	14AN12	960	20	No	350	1984 (Rogers)	Bifaces scraper cores manos flakes	Archaic	No	
Allen	Iola	14AN308	940	10	No	300 50 from tributary	1971 (Reynolds)	Scrapers knives flakes glass, china, stoneware	Unassigned Historic	No	
Allen	Iola	14AN309/Survey B1399	945	15	No	400 75 from tributary	1971 Phase 2 1982 Phase 3 (Thies)	Pottery cores flakes grass impressed daub	M Ceramic/Pomona	No	
Allen	Iola	14AN329	940	20	No	20	No reported in 1972	Stemmed dart points and ground stone tools in private collection	Archaic?	Possibly	Low
Allen	Iola	14AN335/Survey B1389	950	15	No	200	1982 Phase 3 (Thies)	Endscrapers, point flint chips, biface, burned bone	M Ceramic/Pomona	No- deemed destroyed by plowing	
Allen	Iola	14AN339/Survey B01829	950	15	No	50	1994 Phase 2 (Thies)	Bone awl flakes cores projectile point	L Archaic or Woodland	No- mitigated & destroyed	
Allen	Iola	14AN340	945	15	No	400	1994 Phase 3 (Thies)	Daub mass exposed in borrow pit surface pottery and lithics	M Ceramic/Pomona	No	
Allen	Iola	Survey B01870	945-50	15-20	No	0-1600	1995 Phase 2 (Brechtel)	Line traversed AN 339 (destroyed) and AN 303 (N/A)	No other	No	
Allen	Iola	Survey B01917	945	5-10	No	0 200	1996 Phase 2 (Thies)	None		Mitigated	
Allen	Humboldt	14AN8/RSS Survey	910	0-10	Yes	0	1973 (Schmits)	Charcoal and burned earth lens in bank no artifacts	Unassigned	Yes but no action recommended	
Allen	Humboldt	14AN9/RSS Survey	920	0-10	Yes	0	1973 (Schmits), revised 1999 (Williams)	2 occupation levels charcoal and mussels shells since eroded	Unassigned	Yes, but site reported gone	
Allen	Humboldt	14AN304	930	10	No	300 20 from tributary	1971 (Reynolds)	Knife arrowpoint, flint chips, cores, scraper, pottery burned stone	M Ceramic	No	
Allen	Humboldt	14AN305	930	10	No	100	1971 (Reynolds)	Scrapers blades, flakes	Unassigned	Possibly	Low
Allen	Humboldt	14AN306	940	20	No	150	1971 (Reynolds)	Cores knive arrowpoint flakes animal bone, ground stone	Unassigned	No	
Allen	Humboldt	14AN307	930	10	No	200 50 from tributary	1971 (Reynolds)	Scraper flakes	Unassigned	No	
Allen	Humboldt	14AN341	940	20	No	200	1996 (Thies)	Flakes and burned stone	Unassigned	No	
Allen	Humboldt	14AN342	940	20	No	300	1996 (Thies)	Farmstead debris 1854-1900 birthplace of Walter Johnson!	Historic	No	
Allen	Humboldt	Findspot 1/Survey B1400	920	10	No	275, 20 from tributary	1986 Phase 2 (Logan)	Debris of white ware glass metal	Historic	No, and significance refuted	
Allen	Humboldt	Findspot 2/Survey B1400	920	10	No	200	1986 Phase 2 (Logan)	Debitage scatter	Unassigned	No, and significance refuted	
Allen	Humboldt	Findspot 3/Survey B1400	920	10	No	20	1986 Phase 2 (Logan)	Debitage scatter	Unassigned	Possibly but significance refuted	
Neosho	Chanute	14NO3	920	20	No	230	1965 (Chism)	Projectile points, knives mano, axe scrapers chopper blades	Archaic or E Woodland	No	
Neosho	Chanute	14NO10/RSS Survey	890	0-10	Yes	0	1973 (Schmits)	Three stratified occupation levels in bank mussel shells, charcoal	Unassigned	Yes	Low

COUNTY	QUAD	SITE #	ELEV/ft	EAC/ft	ASI?	DIST to NEOSHO/m	INVEST FH? *	EVIDENCE	DATE	RISK? **	PRIORITY
Neosho	Chanute	14NO11/RSS Survey	900	10	No	0	1973 (Schmitts) informant reports 19c farm	Surface scatter on top of bank flakes, nails glass china	Unassigned PH and Historic farm	Possibly **	High
Neosho	Chanute	14NO14	900	10	No	450 on waterway	1981(Rogers)	Notched flake core flint chips	Unassigned	Doubtful	
Neosho	Chanute	14NO15	905	15	No	300	1981(Rogers)	Points scrapers, flakes	Archaic	No	
Neosho	Chanute	14NO16	905	15	No	200	1981(Rogers)	Projectile points, graver, drill, flint chips	Archaic	No	
Neosho	Chanute	14NO17/Survey B01823	910	20	No	300	1981 (Rogers), Phase 2 1994 (Thies)	Projectile points, scrapers core, flint chips	Archaic	No, and not relocated Phase 2	
Neosho	Chanute	14NO18/Survey B01823	905-10	15	No	130	1981, 1994 Phase 2 (Thies) revisited 1999	1981 missing 1994 recovered nil 1999 1 point	Unassigned	No, and not relocated Phase 2	
Neosho	Chanute	14NO19	905	15	No	200	1984 (Rogers) revisited 1994 (Thies)	One biface flint chips and burned stone	Unassigned	No	
Neosho	Chanute	14NO20	910	20	No	200	1984 (Rogers)	Flint chips	Unassigned	No	
Neosho	Chanute	14NO21	900	10	No	100	1984 (Rogers)	Core retouched flake biface flint chips	Unassigned	Possibly	Low
Neosho	Chanute	14NO22	905	15	No	150	1984 (Rogers)	Flint chips burned rock	Unassigned	No	
Neosho	Chanute	14NO23	900	10	No	100	1984 (Rogers)	Flint chips burned rock	Unassigned	Possibly	Low
Neosho	Chanute	14NO24	900	10	No	100	1984 (Rogers)	Flint chips burned rock	Unassigned	Possibly	Low
Neosho	Chanute	14NO25	905	15	No	300	1984 (Rogers)	1 biface burned cobbles	Unassigned	Possibly	Low
Neosho	Chanute	14NO26	905	15	No	300	1984 (Rogers)	Projectile points, gravers, cores bifaces, flint chips	Archaic	No	
Neosho	Chanute	14NO27	900	10	No	120	1984 (Rogers)	Core scraper flint chips	Unassigned	Possibly	Low
Neosho	Chanute	14NO28	925	25	No	100	1984 (Rogers)	Projectile points, scrapers drills cores, manos, flint chips	Archaic E & M Ceramic	No	
Neosho	Chanute	14NO305	900	10	No	300 on waterway	No- reported in 1971	Private collection of projectile points and scrapers	Unassigned	Doubtful	
Neosho	Chanute	14NO308	930	40	No	150	No reported 1971	Expanding-stem dart point from private collection	Unassigned	No	
Neosho	Chanute	14NO310	905	15	No	450 on tributary	Reported 1971 visited 1972 (Reynolds)	Projectile points reported 1971 only flakes observed 1972	Unassigned	No	
Neosho	Chanute	14NO311/Survey B01823	900	10	No	100	Reported 1971, Phase 2 1994 (Thies)	Good assemblage of dart points and lithics in private collection	Archaic or Woodland	Possibly, follow-up recommended	High
Neosho	Chanute	14NO312	900	10	No	200 on tributary	Reported 1971, visited 1972 (Reynolds)	Scrapers cores, drill flakes burned rock	Unassigned	Doubtful	
Neosho	Chanute	14NO313	905	15	No	75	Reported 1971 visited 1972 (Reynolds)	Private collection has arrowpoints scrapers, drill, nil in 1972	Unassigned	No	
Neosho	Chanute	14NO314	900	10	No	450 on waterway	No- reported 1971	Dart points, scrapers, blades, drills in private collection	Unassigned	Doubtful	
Neosho	Chanute	14NO317	905	15	No	150	Reported 1971 visited 1972 (Reynolds)	Projectile points, blades drill in private collection, nil in 1972	Unassigned	No	
Neosho	Chanute	14NO318	900	10	No	250	No- reported 1971	Private collection has ground sandstone pieces	Unassigned	Possibly	Low
Neosho	Chanute	14NO320	900	10	No	50	No reported 1971	Private collection has notched dart points, celt, drill, blade	Unassigned	Possibly	Low
Neosho	Chanute	14NO321	900	20	No	50	No- reported 1971	Dart points, scrapers, axes, blades in private collection	Unassigned	No	
Neosho	Chanute	14NO322	900	20	No	30	No- reported 1971	Projectile points arrowpoint oval scrapers in private collection	Unassigned	No	
Neosho	Chanute	14NO327	900	20	No	200	No- reported 1971	Private collection, not described	Unassigned	No	
Neosho	Chanute	14NO328	900	20	No	150	No- reported 1971	Private collection, not described	Unassigned	No	
Neosho	Chanute	14NO375	910	10	No	50 on tributary	Reported 1971 visited 1974 (Reynolds)	Shell-tempered potsherd flint chips, private collection (unknown)	Unassigned/Neosho focus?	Possibly	Low
Neosho	Chanute	14NO406/Survey B01823	915	25	No	300	1974, Phase 2 1994 (Thies)	Projectile points blades, drills, scraper flint chips	Archaic or Woodland	No, and not relocated Phase 2	
Neosho	Shaw	14NO330	885	15	No	150	No- reported in 1971	Unknown, private collection	Unassigned	No	
Neosho	Shaw	14NO376	890	0-10	Yes	0	1976 (Reynolds)	2 hearths, bison bone lithics in channel cut		Yes	High
Neosho	Shaw	14NO396	900-10	20	No	450	1992 (Lees) area collected since 1930 s	1844 70 Canville Trading Post outstanding private collection	Historic	No	
Neosho	Shaw	14NO397- MISSING	890	10	No	100		FILE REQUESTED 8-10-01		Doubtful	
Neosho	Shaw	1878 GLO 1	885	5-10	No	150	None	Structure	Historic	Possibly	Low
Neosho	Erie	14NO6/RSS Survey	870	0-10	Yes	0	1973 (Schmitts)	2 occupation levels in bank one with hearths one with points	Archaic?	Yes **	High

COUNTY	QUAD	SITE #	ELEV/m	EAC/m	ASI?	DIST to NEOSHO/m	INVEST FH? *	EVIDENCE	DATE	RISK? **	PRIORITY
Neosho	Erie	14NO7/RSS Survey	870	0-10	Yes	0	1973 (Schmits)	6 occupation levels in bank cord roughened sherds, bone	Woodland? Other?	Yes **	High
Neosho	Erie	14NO8/RSS Survey	860	0-10	Yes	0	1973 (Schmits)	Occupation level in bank, animal bone, burned earth and charcoal	Unassigned	Yes	High
Neosho	Erie	14NO9/RSS Survey	860	0-10	Yes	0	1973 (Schmits)	Stone-lined hearth in bank	Unassigned	Yes **	Low
Neosho	Erie	14NO373	870	10	No	450, 50 from tributary	No- reported in 1971	Pottery, points, scrapers manos musket bone bead (collection)	Central Plains Phase, Historic	No	
Neosho	Erie	14NO374	870	10	No	200	No- reported in 1971	Same specs as 373 above (private collection)	Central Plains Phase Historic	Doubtful	
Neosho	Erie	Survey B306	880-70	0-10	Yes	0-150	1990 Phase 2 (Wulfkuhle)	None		No mitigated	
Neosho	South Mound	14NO334	890	50	No	300	No- reported 1971	Points, scrapers knives, cells, gun flint from private collection	Archaic and Historic	No	
Neosho	South Mound	14NO384	855	15	Yes	50 part in borrow pit	1980 (Witty)	Hearths and midden exposed with lithics and bone	E Ceramic/Cuesta Phase	Yes- borrow pit next to pond dam	High
Neosho	South Mound	14NO398	840	0-10	Yes	0	1994 partially excavated in bank (Thies)	Secondary burials with human bone 1 biface waste flakes	Archaic or Woodland	Yes, bank erosion will destroy	High
Labette	McCune	14LT1	850	20	No	150	1963 1982 (Thies)	Debitage, cores hammerstones, burned stone, leveled mound?	Unassigned	No, and deemed destroyed	
Labette	McCune	14LT11/RSS Survey	820	0-10	Yes	0	1973 (Schmits)	Charcoal burned earth, hearth in stream bank	Unassigned	Yes **	Low
Labette	McCune	14LT12/RSS Survey	820	0-10	Yes	0	1973 (Schmits)	Charcoal and mussel shell in stream bank	Unassigned	Yes **	Low
Labette	McCune	14LT330	825	10	No	125	1977 (Stein)	Flakes (and pottery in private collection?)	E Ceramic	Doubtful	Low
Labette	McCune	14LT600	830	0-10	yes	0	No- reported in 1982	2 glass beads in private collection	Historic	Yes	
Labette	McCune	Survey B83	820	0-10	Yes	0-200	1987 Phase 2 (Avery)	None		Mitigated	
Labette	McCune	Survey B1134	820-40	0-20	Yes	0-200	1982 Phase 2 (Thies)	None		Mitigated	
Labette	McCune	1878 GLO	850	30	No	475	None	Structure	Historic	No	
Labette	Oswego	14LT8/RSS Survey	810	0-10	Yes	0	1973 (Schmits)	Occupation level in bank scrapers, grinding slabs, diagnostic points	Archaic	Yes **	High
Labette	Oswego	14LT10/RSS Survey	810	0-10	Yes	0	1973 (Schmits)	2 occupation levels in bank w/ charcoal flakes and point on surface	Unassigned	Yes **	Low
Labette	Oswego	14LT346	810	20	No	200	1981(Downum)	Projectile points, scrapers, manos, pottery daub human tooth	M Ceramic/Pomona	No	
Labette	Oswego	14LT348	820-30	20-30	No	250	1981, 1984 (Rowlison)	Projectile points, scrapers, drills, pottery w/rouletting	Pomona or Historic Osage	No	
Labette	Oswego	14LT349	820	20	No	100	1981(Downum)	2 projectile points, flakes bifaces	Unassigned	No and site destroyed	
Labette	Oswego	14LT355	800	0-10	Yes	0	1991 Phase 2 (Weston)	Hearth at water level projectile point, scraper	L Archaic (C-14 3480±70 BP)	Yes testing recommended **	High
Labette	Oswego	14LT380	820	10	Yes	0	1998 Phase 2 (Thies) with pit excavation	Pottery daub Scallom like projectile point, burned stone	M Ceramic/Pomona	Mitigated & destroyed	
Labette	Oswego	Survey B1132	810	10	No	0-300	1982 Phase 2 (Brogan)	None		Mitigated	
Labette	Chetopa	1878 GLO	810	20	No	400	None	Structure	Historic	No	
Cherokee	Oswego	14CH60/RSS Survey	790	0-10	Yes	0	1973 (Schmits)	Occupation level in bank charcoal flakes 2 diagnostic points	Archaic	Yes **	High
Cherokee	Oswego	14CH61/RSS Survey	790	0 10	Yes	0	1973 (Schmits)	Occupation level in bank 2 scrapers, burned stone	Archaic?	Yes **	Low
Cherokee	Oswego	14CH62/RSS Survey	790	0-10	Yes	0	1973 (Schmits)	Thin occupation level in bank	Unassigned	Yes	Low
Cherokee	Oswego	14CH380	810	20	No	330, 25 from tributary	1981 (Downum) and collectors in 1970's	Projectile points debitage, scrapers, drills, burned stone	Archaic to Pomona?	No, but good potential for excavation	
Cherokee	Oswego	14CH385 Survey B451	800	10	No	450 near marsh	1990 Phase 2 (Wulfkuhle)	Debitage, some heat altered, burned rock (no diagnostics)	Unassigned	Doubtful	
Cherokee	Chetopa	14CH63/RSS Survey	790	0 10	Yes	0	1973 (Schmits)	Stone lined hearth in bank	Unassigned	Yes, but no action recommended	
Cherokee	Chetopa	14CH366	790	10	No	30	1980 (Stein), human teeth reported 1937	Fresno point mano scraper hematite, shell	M Ceramic/Pomona	Possibly	High
Cherokee	Chetopa	14CH367	830	40	No	300	1980 (Stein)	Flint chips	Unassigned	No	
Cherokee	Chetopa	1878 GLO	800	10	No	50	None	Structure	Historic	Possibly, but road there now	
Cherokee	Chetopa	1878 GLO 2	780	10	No	30	None	Structure	Historic	Possibly	Low
Craig	Welch N	34CG21	780	10	No	500	No- reported in 1983	2 human skulls and projectile points- plowed mound?	Unassigned prehistoric	No	
Craig	Welch N	1898 GLO	820	50	No	250	No	Structure	Historic	No	
Craig	Welch N	1898 GLO	810	40	No	350	No	Structure	Historic	No	
Craig	Welch N	1898 GLO	790	20	No	250	No	Structure	Historic	No	

COUNTY	QUAD	SITE #	ELEV/m	EAC/m	ASI?	DIST to NEOSHO/m	INVEST-FH? *	EVIDENCE	DATE	RISK? **	PRIORITY
Craig	Welch N	1898 GLO 3	770	0-10	Yes	0	No	Sawmill	Historic	Yes **	High
Craig	Welch N	1898 GLO 4	775	5-10	No	30	No	Structure	Historic	Possibly	Low
Craig	Miami NW	1898 GLO 5	760	0-10	Possibly	<20	No	Structure	Historic	Yes	High
Craig	Miami NW	1898 GLO 6	770	10	No	40	No	Structure	Historic	Possibly	Low
Craig	Miami NW	1898 GLO	760	0-10	Possibly	500, in lowland marsh	No	Structure	Historic	Doubtful	
Ottawa	Miami NW	34OT74	760	0-10	No	350 near oxbow lake	1993 (Mack)	Debitage ground stone	Unassigned prehistoric	Doubtful	
Ottawa	Miami NW	34OT75	765	15	No	500	1993 (Mack)	Debitage	Unassigned prehistoric	No	
Ottawa	Miami NW	ODT58E0062N4510004	765	15	No	0	1993 (King) 2001 (SHPO)	Pratt through type bridge 1901 NR eligible	Historic	Doubtful, assessment needed	High
Ottawa	Miami SW	Survey 141805	740-70	0-30	No	0-2200	1989 (Hartley)	None		Mitigated	
Ottawa	Miami SE	ODT58N4590E0160005	761	21	Yes	0	1993 (King) 2001 (SHPO)	Mixed truss-type bridge, 1916, NR eligible	Historic	Possibly assessment needed	High
Ottawa	Miami SE	34OT11	780	40	No	150	No but thoroughly reported in 1989	Cores, knives, scrapers lanceolate projectile (donated)	Unassigned prehistoric	No	
Ottawa	Miami SE	34OT38	830	90	No	100	1977 (Saunders and Burkhalter)	Corner-notch projectile point and flake debris	Probably Archaic	No	
Ottawa	Miami SE	34OT92	830	90	No	300	1999 (Ricker)	Cores flakes biface Gary-type projectile point preform	Probably Archaic	No	
Ottawa	Miami SE	1898 GLO 7	750-60	10-20	Yes	150 20 from tributary	No	Structure	Historic	Possibly	High
Ottawa	Miami SE	1898 GLO 8	760	20	Near	450, 75 from tributary	No	Structure	Historic	Possibly	Low
Ottawa	Miami SE	1898 GLO 9	760	20	Near	200	No	Structure	Historic	Possibly	Low
Ottawa	Miami SE	1898 GLO 10	760	20	Near	300 50 from tributary	No	Structure	Historic	Possibly	Low
Ottawa	Miami SE	1898 GLO	760	40	No	500	1958 (OK Historic Sites Survey)	Moses Poolar Trading Post and Post Office, 1862	Historic	No	
Ottawa	Miami SE	OHHS-OT10	740	0	Yes	0	1958 (OK Historic Sites Survey)	Poolar Ferry 1870 Old Military Trail crossing	Historic	Yes	High
Ottawa	Miami SE	1898 GLO	810	70	No	450	No	Structure J Parker	Historic	No	
Ottawa	Miami SE	1898 GLO	770	30	No	400, 150 from oxbow lake	No	Structure	Historic	No	
Ottawa	Miami SE	1898 GLO 11	760	20	Near	50	No	Structure	Historic	Possibly	Low
Ottawa	Miami SE	1898 GLO	770	30	No	50	No	Structure, J Garret	Historic	No	
Ottawa	Miami SE	1898 GLO	790	50	No	375	No	Structure, F M Connor	Historic	No	
Ottawa	Miami SE	1898 GLO 12	740	0	Yes	20	No	Berry Ferry	Historic	Yes	High
Ottawa	Miami SE	1898 GLO 13	750	10	Yes	350	No	Structure	Historic	Yes	High
Ottawa	Miami SE	1898 GLO 14	740	0	Yes	0	No	Structure	Historic	Yes	High
Ottawa	Miami SE	1898 GLO 15	740	0	Yes	0	No	Structure (100 m NE of above)	Historic	Yes	High
Ottawa	Miami SE	1898 GLO 16	750	10	Yes	200	No	Structure	Historic	Yes	High

*Notes. Survey reports are cited where appropriate, **Starred sites located in cutbank area*

Nominated JRL Sites

The nomination of JRL sites 14CF101, 14CF102, 14CF103, 14CF105, and 14CF311/313 to the NRHP will be based on evaluation guidelines Criteria A and B (36 CFR 60.4). Criterion A applies to properties associated with events that have made significant contributions to the broad patterns of history. Criterion B applies to properties that have yielded or are likely to yield information important to history or prehistory. The properties include undocumented archaeological deposits that may, in addition, support eligibility under Criterion C, properties that embody the distinctive characteristics of a type, period, or method of construction (Little et al. 2000:19)

Historic archaeology in Kansas generally, and in Coffey County specifically, has not received the attention or commitment of resources commensurate with prehistoric research. This assessment can only be amplified in the case of one historic adaptation type—rural settlement. Very few farmsteads in Kansas have been documented through excavation, the result being a lack of suitable comparanda for research in any given locality (Lees 1996:140-47) For this reason alone, further investigation of JRL sites might be warranted.

Research conducted in concert with the field evaluation suggests that the JRL farmstead sites have potential to yield information relevant to national, state, and local contexts. For example, while on campaign, Susan B. Anthony and her associates were, in 1867 and 1868, hosted in Ottumwa, the small town (no longer in existence) immediately north of the sites that served the rural community (Lane 1985.78; *Burlington Daily Republican*: July 4, 1868). Five local women have been identified as the first women to vote in the United States, some 45 years before the franchise nationwide (Atherly 1982.308). A local resident also received Exodusters, part of a planned black migration from the South, into his care during the Reconstruction (*Burlington Weekly Patriot*. May 15, 1979). More generally, the sites may contain important information concerning the expansion of white settlement into what was then known as Indian Territory.

At the state and local levels, at least one of these farmsteads (14CF102) represents the first permanent dwelling of one of the earliest settlers in the Otter Creek community, then in the timbered Neosho Valley. Unlike the sod-house frontier of western Kansas, the lifeways of these first residents, their homes, customs, and agricultural practices, have scarcely been documented. Extensive informant interviews, including direct descendants of properties under evaluation, have made it possible to produce detailed histories of the people who lived in these farms. Thomas Arnold, for instance, built 14CF102 for his residence and cooper trade, which initially supplied barrels for a nearby still. This activity in turn bears some relevance to the contentious history of prohibition in the state (Shortridge 1995:198). The interest and research generated by local historians, museums, and descendants of the JRL settlers underscores the importance of these resources to the present community.

These sites are part of what may be considered a historic archaeological district, in being part of a rural village, being united historically by physical development, and being a collection of habitation and limited activity sites (Little et al. 2000:43-44). With the exception of 14CF311/313, all the sites are believed to have been farmsteads in their initial phases. The sites represent different phases of community development. Limited excavations at 14CF101 and 14CF102 have been able to document structural change, and possibly function, of these sites over time. In total, the district represented by these individual sites provides an opportunity to trace, not only the history of the community, but the evolution of a cultural landscape and identity of place in this region of east-central Kansas (Veregge 1995:118).

References

Atherly, M.L. DeLong. 1988. *Angie Lives· Historical Sketches of Families from the Strawn, Kansas Area*. Published by Mary Lou DeLong Atherly.

Lane, E.B. 1985. "Pioneer Days in Strawn and Ottumwa." In *Early Day History of Coffey County*. Coffey County Geneological Society, Burlington, KS.

Lees, W B. 1996. "Historical Archaeology in the Central Plains." In *Archeology and Paleoecology of the Central Great Plains*, Jack L. Hofman (ed), pp. 140-149. Arkansas Archaeological Survey Research Series No 48 Fayetteville, AR.

Little, B., et al. 2000. *Guidelines for Evaluating and Registering Archaeological Properties* National Register Bulletin. U S Department of the Interior, Washington, DC.

Shortridge, J.R. 1995 *Peopling the Plains Who Settled Where in Frontier Kansas* Lawrence University of Kansas Press.

Veregge, N. 1995. "Sense of Place in the Prairie Environment: Settlement and Ecology in Rural Geary County, Kansas." *Great Plains Quarterly* 15:117-32.

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. William Banks
Archeologist
Historic Preservation Office
Kansas State Historic Preservation Office
6425 SW 6th Avenue
Topeka, KS 66615-1099

Dear Mr. Banks:

The purpose of this letter is to request your review of a draft report on a cultural resources inventory of approximately 107 miles of shoreline on U.S. Army Corps of Engineers (USACE) land at John Redmond Reservoir, Coffey County, Kansas.

As part of our compliance with Sections 106 and 110 of the National Historic Preservation Act, the Tulsa District, USACE, contracted with engineering-environmental Management, Inc., to undertake a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir, Coffey County, Kansas. The results of the survey are documented in the enclosed report. We would appreciate your review of the adequacy of this report before it is submitted as part of the formal consultation package to your office.

If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

HISTORIC PRESERVATION OFFICE
6425 SW 6TH AVE
TOPEKA, KS 66615-1099
785-272-8681 *FAX 785-272-8682

May 15, 2001

David L Combs
Department of the Army
Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

RE: John Redmond Reservoir, Cultural Resources Inventory Draft

Dear Mr. Combs:

Our staff has reviewed the draft submission the Cultural Resources Inventory report entitled *An Archaeological Survey of John Redmond Reservoir, Coffey County, Kansas*. Some editorial and content corrections have been made on the report itself. Overall, the report is well written and the findings and recommendations are well reasoned. Our staff concurs with the recommendations that sites 14CF101, 14CF102, 14CF103, 14CF104, 14CF24, 14CF319, 14CF369, and 14CF1327 undergo further evaluation. If you have any questions or need additional information concerning these comments, please contact Will Banks at (785) 272-8681, ext. 214.

Sincerely,

Ramon Powers
State Historic Preservation Officer

Richard Pankratz

Richard Pankratz, Director
Historic Preservation Office

KANSAS STATE HISTORICAL SOCIETY

◆

Historic Preservation Office

◆

6425 S.W. 6th Avenue
Topeka, Kansas
66615-1099
PHONE# (785) 272-8681
FAX# (785) 272-8682
TTY# (785) 272-8683

◆

KANSAS HISTORY CENTER

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Adair Cabin
Constitution Hall
Cottonwood Ranch
First Territorial Capitol
Fort Hays
Goodnow House
Grinter Place
Hollenberg Station
Kaw Mission
Marais des Cygnes Massacre
Mine Creek Battlefield
Native American Heritage Museum
Pawnee Indian Village
Pawnee Rock
Shawnee Indian Mission

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. John Barrett, Chairman
Citizen Potawatomi Nation
1901 South Gordon Cooper Drive
Shawnee, OK 74801

Dear Chairman Barrett:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding the results of a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir in Coffey County, Kansas.

As described in the enclosed report, engineering-environmental Management, Inc. of Escondido, California, was contracted by the Tulsa District, Corps of Engineers (COE) to undertake a cultural resources survey of approximately 107 miles of shoreline on COE managed land John Redmond Reservoir in Coffey County, Kansas. Numerous cultural resource sites were found or relocated as a result of this survey. In addition to your review of the report, we are requesting information that the Citizen Band Potawatomi Tribe is willing to share on any traditional religious or culturally significant properties located within the surveyed areas so that we may adequately identify and evaluate all cultural resources located on Tulsa District, COE lands.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Jerry Dilliner, Chief
Seneca-Cayuga Tribe of Oklahoma
P.O. Box 1283
Miami, OK 74355

Dear Chief Dilliner:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding the results of a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir in Coffey County, Kansas.

As described in the enclosed report, engineering-environmental Management, Inc. of Escondido, California, was contracted by the Tulsa District, Corps of Engineers (COE) to undertake a cultural resources survey of approximately 107 miles of shoreline on COE managed land John Redmond Reservoir in Coffey County, Kansas. Numerous cultural resource sites were found or relocated as a result of this survey. In addition to your review of the report, we are requesting information that the Seneca-Cayuga Tribe is willing to share on any traditional religious or culturally significant properties located within the surveyed areas so that we may adequately identify and evaluate all cultural resources located on Tulsa District, COE lands.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Gary McAdams, President
Wichita and Affiliated Tribes of Oklahoma
P.O. Box 729
Anadarko, OK 73005

Dear Mr. McAdams:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding the results of a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir in Coffey County, Kansas.

As described in the enclosed report, engineering-environmental Management, Inc. of Escondido, California, was contracted by the Tulsa District, Corps of Engineers (COE) to undertake a cultural resources survey of approximately 107 miles of shoreline on COE managed land John Redmond Reservoir in Coffey County, Kansas. Numerous cultural resource sites were found or relocated as a result of this survey. In addition to your review of the report, we are requesting information that the Wichita and Affiliated Tribes are willing to share on any traditional religious or culturally significant properties located within the surveyed areas so that we may adequately identify and evaluate all cultural resources located on Tulsa District, COE lands.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101st EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. David Old Bear, Sr., Chief
Sac and Fox of the Mississippi in Iowa
349 Meskwaki Road
Tama, IA 52339

Dear Chief Old Bear:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding the results of a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir in Coffey County, Kansas.

As described in the enclosed report, engineering-environmental Management, Inc. of Escondido, California, was contracted by the Tulsa District, Corps of Engineers (COE) to undertake a cultural resources survey of approximately 107 miles of shoreline on COE managed land John Redmond Reservoir in Coffey County, Kansas. Numerous cultural resource sites were found or relocated as a result of this survey. In addition to your review of the report, we are requesting information that the Sac and Fox of the Mississippi in Iowa are willing to share on any traditional religious or culturally significant properties located within the surveyed areas so that we may adequately identify and evaluate all cultural resources located on Tulsa District, COE lands.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Honorable Wanda Stone
Chairperson
Kaw Nation
Drawer 50
Kaw City, OK 74641

Dear Chairperson Stone:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding the results of a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir in Coffey County, Kansas.

As described in the enclosed report, engineering-environmental Management, Inc. of Escondido, California, was contracted by the Tulsa District, Corps of Engineers (COE) to undertake a cultural resources survey of approximately 107 miles of shoreline on COE managed land John Redmond Reservoir in Coffey County, Kansas. Numerous cultural resource sites were found or relocated as a result of this survey. In addition to your review of the report, we are requesting information that the Kaw Nation is willing to share on any traditional religious or culturally significant properties located within the surveyed areas so that we may adequately identify and evaluate all cultural resources located on Tulsa District, COE lands.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

DEPARTMENT OF ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

March 13, 2001

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Badger Wahwasuck, Chairman
Prairie Band Potawatomi Nation
14880 K Road
Mayetta, KS 66509

Dear Chairman Wahwasuck:

The purpose of this letter is to initiate consultation pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, regarding the results of a cultural resources survey of approximately 107 miles of shoreline at John Redmond Reservoir in Coffey County, Kansas.

As described in the enclosed report, engineering-environmental Management, Inc. of Escondido, California, was contracted by the Tulsa District, Corps of Engineers (COE) to undertake a cultural resources survey of approximately 107 miles of shoreline on COE managed land John Redmond Reservoir in Coffey County, Kansas. Numerous cultural resource sites were found or relocated as a result of this survey. In addition to your review of the report, we are requesting information that the Prairie Band Potawatomi Nation is willing to share on any traditional religious or culturally significant properties located within the surveyed areas so that we may adequately identify and evaluate all cultural resources located on Tulsa District, COE lands.

Thank you for your help with this request. If you have any questions, please contact Mr. Louis Vogele, Archeologist, at 918-669-4934.

Sincerely,

David L. Combs
Chief, Environmental Analysis and
Compliance Branch

Enclosure

KSR&C No. 01-03-198

KANSAS

STATE

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Cultural Resources Division

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6425 S.W. 6th Avenue
Topeka, Kansas
66615-1099
PHONE# (785) 272-8681
FAX# (785) 272-8682
TTY# (785) 272-8683

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Marais des Cygnes Massacre
Mine Creek Battlefield
Native American Heritage Museum
Pawnee Indian Village
Pawnee Rock
Shawnee Indian Mission

August 23, 2002

Larry D. Hogue, Chief
Planning Environmental and Regulatory Division
US Army, Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

RE: Draft Supplement to the Final EIS John Redmond Lake, KS

Dear Mr. Hogue:

The Kansas State Historic Preservation Office has received and reviewed the above referenced EIS. We cannot comment on the findings concerning Cultural Resources since we have not reviewed the Rust 2001b report. Our office requests that we be provided a copy of this report detailing the National Register eligibility evaluations of several archeological sites on the John Redmond Lake property.

If you have any questions regarding these comments, please contact Will Banks at (785) 272-8681, ext. 214.

Sincerely,

Mary R. Allman
State Historic Preservation Officer

Richard Pankratz

Richard Pankratz, Director
Cultural Resources Division

web

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

May 24, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Ms. Mary R. Allman
State Historic Preservation Officer
Historic Preservation Office
Kansas State Historical Society
6425 SW 6th Avenue
Topeka, KS 66615-1099

Dear Ms. Allman:

The purpose of this letter is to continue consultation under Section 106 of the National Historic Preservation Act of 1966 (as amended) concerning a proposed raise in the conservation pool level of John Redmond Reservoir, Coffey County, Kansas. In accordance with Section 106, Tulsa District conducted National Register evaluations of several archaeological sites during the summer of 2001. The results of these investigations are detailed in the enclosed report, "National Register Evaluations of Six Archaeological Sites at John Redmond Reservoir, Kansas," produced by engineering-environmental Management, Inc. (e^2M).

We agree with the author's recommendations that the following sites are eligible for listing on the National Register of Historic Places (NRHP), under Criteria A and D of 36 CFR Part 60, as contributing elements to the proposed Otter Creek Archaeological District: 14CF101, 14CF102, 14CF103, 14CF105, and 14CF311. We also agree with the author's recommendations that sites 14CF104, 14CF319, and 14CF369 are not eligible for listing on the NRHP.

We believe that the five National Register-eligible sites (14CF101, 14CF102, 14CF103, 14CF105, and 14CF311) will be partially or completely inundated by the proposed conservation pool raise at John Redmond Reservoir, and thus will be adversely impacted by this undertaking.

Finally, in the initial archaeological investigations (see "An Archeological Survey of John Redmond Reservoir, Coffey County, Kansas," 2001) conducted by e^2M, two additional sites, 14CF24 and 14CF1327, were identified as requiring further information to establish National Register eligibility. These two sites are situated well above the proposed conservation pool level (1041 ft. amsl), at elevations of 1050 ft. amsl and 1050-1055 ft. amsl, respectively. Although National Register eligibility for 14CF24 and 14CF1327 has not been established, we do not believe these sites will be adversely affected by the proposed undertaking.

Please review the enclosed report of National Register evaluations, and provide comment on our determinations of site eligibility and determinations of adverse effect. Thank you for your assistance. If you have any questions, please contact Mr. Ken Shingleton, archaeologist, at 918-669-7661.

Sincerely,

Stephen L. Nolen

for Larry D. Hogue, P.E.
Chief, Planning, Environmental,
and Regulatory Division

Enclosure

KANSAS

Kansas State Historical Society
Cultural Resources Division

KATHLEEN SEBELIUS, GOVERNOR

July 23, 2004

Larry D. Hogue
Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, OK 74128-4609

RE: John Redmond Reservoir – National Register eligibility evaluations

Dear Mr. Hogue:

The Kansas State Historic Preservation Office has received and reviewed the report entitled *National Register Evaluations of Six Archaeological Sites at John Redmond Reservoir, Kansas* by Engineering-Environmental Management, Inc. Overall, the topics covered in the report are well researched, and the report is well organized and well written, but there are some formatting and terminology consistency problems.

Our office concurs with your determination that sites 14CF104, 14CF319, and 14CF369 are not eligible for listing on the National Register of Historic Places. However, we do not concur with your determination that sites 14CF101, 14CF102, 14CF103, 14CF105, and 14CF311 are National Register eligible under Criteria A and D as contributing elements to the proposed Otter Creek Archaeological District. The eligibility field evaluations did not demonstrate in any case that the archeological record could provide additional or more detailed information on site use than already provided by the historical documentation. Additionally, a solid case is never made for why these sites should be considered eligible as a National Register district. The district boundaries also seem somewhat arbitrary. How does this group of sites differ from other previously investigated, and non-eligible sites, in that part of the state? If they do differ, and in our office's opinion they do not, how would further investigations significantly contribute to our understanding of farmstead archaeology in east-central Kansas from the late 1800s through the turn of the century? The research questions posed on page 18-1, in support of site mitigation excavations, are far too vague and, in many cases, likely impossible to answer given the known archeological record at these sites. Finally, the proposed mitigation excavation windows at each of these sites are so small that they are unlikely to contribute the information needed to answer the proposed research questions.

It is our office's opinion that sites 14CF101, 14CF102, 14CF103, 14CF105, and 14CF311 are not National Register eligible either individually or collectively as a district, so we cannot concur with the determination provided in your letter of May 24, 2004. It is our opinion that a determination of no historic properties affected is warranted for this undertaking. However, if the Tulsa District does ultimately determine these sites to be National Register eligible and offers a finding of adverse effect, we would suggest more in-depth historical research as mitigation rather than archeological field investigations.

Sincerely,

Terry W. Marmet,
Interim Executive Director and
State Historic Preservation Officer

Richard Pankratz

Richard Pankratz, Director
Historic Preservation Office

6425 SW Sixth Avenue • Topeka, KS 66615-1099
Phone 785-272-8681 Ext. 214 • Fax 785-272-8682 • Email wbanks@kshs.org • TTY 785-272-8683
www.kshs.org

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

July 2, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Don L. Klima, Director
Office of Planning and Review
Advisory Council on Historic Preservation
12136 West Bayaud Ave., Suite 330
Lakewood, CO 80228

Dear Mr. Klima:

This letter is to initiate consultation under Section 106 of the National Historic Preservation Act of 1966 (as amended), regarding a proposed raise in the conservation pool level of John Redmond Reservoir, Coffey County, Kansas. As currently planned, the pool elevation will be raised from 1039 ft. amsl to 1041 ft. amsl.

In accordance with Section 106 Tulsa District conducted cultural resources investigations beginning in 2000. After initial identification, a number of archaeological sites were evaluated for National Register eligibility. The enclosed reports document findings from these phases of investigation. Additionally, the enclosed correspondence will outline Tulsa District's consultation efforts to date with the Kansas State Historical Society and appropriate Native American tribes.

Although specific impacts to sites are difficult to identify, we believe that historic properties will be adversely affected in the conservation pool raise. These historic properties consist of five historic archaeological sites (14CF101-103, 14CF105, and 14CF311), which together comprise the proposed Otter Creek Archaeological District (see enclosed report). In order to resolve adverse effects, we propose a program of mitigation as appropriate for each archaeological site. A Memorandum of Agreement will be drafted and executed to facilitate the Section 106 process.

We request that you advise Tulsa District of the Advisory Council's expected role in the Section 106 consultation process for this federal undertaking. Any guidance or assistance you may provide will be greatly appreciated. If you have any questions, please contact Mr. Ken Shingleton at 918-669-7661.

Sincerely,

for Larry D. Hogue, P.E.
Chief, Planning, Environmental
and Regulatory Division

Enclosures

Preserving America's Heritage

July 28, 2004,

Larry D. Hogue, P.E.
Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, OK 74128-4609

REF: *Coffey County, John Redmond Reservoir, Conservation Pool Rise, KS.*

Dear Mr. Hogue:

We received your notification and supporting documentation regarding the adverse effects of the referenced project on a property or properties eligible for inclusion in the National Register of Historic Places. Based upon the information you provided, we do not believe that our participation in consultation to resolve adverse effects is needed. However, should circumstances change, please notify us so we can re-evaluate if our participation is required. Pursuant to 36 CFR 800.6(b)(iv), you will need to file the Memorandum of Agreement, and related documentation at the conclusion of the consultation process. The filing of this Agreement with the ACHP is necessary to complete the requirements of Section 106 of the National Historic Preservation Act.

Thank you for providing us with your notification of adverse effect. If you have any questions, please contact Margie Nowick at 969-5110 or via eMail at mnowicke@achp.gov.

Sincerely,

Nancy Kochan

Nancy Kochan
Office Administrator/Technician
Western Office of Federal
Agency Programs

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

December 7, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Ms. Mary R. Allman
State Historic Preservation Officer
Historic Preservation Office
Kansas State Historical Society
6425 SW 6th Avenue
Topeka, KS 66615-1099

Dear Ms. Allman:

The purpose of this letter is to continue consultation under Section 106 of the National Historic Preservation Act of 1966 (as amended) concerning a proposed raise in the conservation pool level of John Redmond Reservoir, Coffey County, Kansas. In accordance with Section 106, the U.S. Army Corps of Engineers, Tulsa District conducted National Register evaluations of several archaeological sites during the summer of 2001, and earlier in 2004 coordinated these results and our opinion of National Register eligibility with your office.

In a letter to Tulsa District dated July 23, 2004, the Kansas State Historical Society (KSHS) responded, disagreeing with our opinion of National Register eligibility for the following historic archaeological sites at John Redmond Reservoir: 14CF101, 14CF102, 14CF103, 14CF105, and 14CF311.

After re-evaluating available information, we agree with your office's opinion that none of these sites are eligible for listing on the National Register, nor are they eligible for listing as a district. We therefore agree with your opinion that a determination of "no historic properties affected" is appropriate for this federal undertaking.

If you have any questions please contact Mr. Ken Shingleton, Archaeologist, at 918-669-7661.

Sincerely,

Stephen L. Nolen
Chief, Environmental Analysis
and Compliance Branch

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, TULSA DISTRICT
1645 SOUTH 101ST EAST AVENUE
TULSA, OKLAHOMA 74128-4609

December 7, 2004

Planning, Environmental, and Regulatory Division
Environmental Analysis and Compliance Branch

Mr. Don L. Klima, Director
Office of Planning and Review
Advisory Council on Historic Preservation
12136 West Bayaud Ave., Suite 330
Lakewood, CO 80228

Dear Mr. Klima:

The purpose of this letter is to continue consultation under Section 106 of the National Historic Preservation Act of 1966 (as amended) concerning a proposed raise in the conservation pool level of John Redmond Reservoir, Coffey County, Kansas. In accordance with Section 106, the U.S. Army Corps of Engineers, Tulsa District conducted National Register evaluations of several archaeological sites during the summer of 2001, and earlier in 2004 coordinated these results and our opinion of National Register eligibility with the Kansas State Historical Society (KSHS).

In a letter to Tulsa District dated July 23, 2004 (copy enclosed), KSHS responded, disagreeing with our opinion of National Register eligibility for the following historic archaeological sites at John Redmond Reservoir: 14CF101, 14CF102, 14CF103, 14CF105, and 14CF311.

After re-evaluating available information, we agree with the KSHS opinion that none of these sites are eligible for listing on the National Register, nor are they eligible for listing as a district. We therefore agree with the KSHS opinion that a determination of "no historic properties affected" is appropriate for this federal undertaking.

If you have any questions please contact Mr. Ken Shingleton, archaeologist, at 918-669-7651.

Sincerely,

Stephen L. Nolen
Chief, Environmental Analysis
and Compliance Branch

Enclosure

APPENDIX H

Public Comment Period Correspondence

POSTCARD ANNOUNCEMENT

~Announcing~

PUBLIC MEETINGS
related to
The Draft Supplemental to the Final Environmental Impact Statement (SFEIS) for Reallocation of Water Supply Storage Project John Redmond Lake, Kansas,
in compliance with
The National Environmental Policy Act

The U.S. Army Corps of Engineers will host two public meetings to solicit comments and questions about the Draft SFEIS that analyzes the increase in water storage capacity for the conservation pool of John Redmond Lake and the potential effects to reservoir operation, resource management, and downriver flows. The Draft SFEIS is currently available for public review. The meetings will have no set or formal presentation. Interested persons may arrive anytime between 6:00 p.m. and 9:00 p.m., visit the information tables, and discuss the Draft SFEIS with Corps personnel. The meetings will be held at the following locations:

Burlington, Kansas
Coffey, Kansas, County Courthouse
110 South 6th Street
Burlington, KS 66839
Monday, July 29, 2002
6:00 p.m.-9:00 p.m.

Chetopa, Kansas
Chetopa School
430 Elm
Chetopa, KS
Tuesday July 30, 2002
6:00 p.m.-9:00 p.m.

NEWSPAPER ANNOUNCEMENT

~Announcing~

PUBLIC MEETINGS
related to
The Draft Supplemental to the Final Environmental Impact Statement (SFEIS) for Reallocation of Water Supply Storage Project John Redmond Lake, Kansas,
in compliance with
The National Environmental Policy Act

The U.S. Army Corps of Engineers will host two meetings to solicit comments and answer questions about the Draft SFEIS that analyzes the increase in water storage capacity for the conservation pool of John Redmond Lake and the potential effects to reservoir operation, resource management, and downriver flows. The Draft SFEIS is currently available for public review.

The meetings will have no set or formal presentation. Interested persons may arrive anytime between 6:00 p.m. and 9:00 p.m., visit the information tables, and discuss the study with Corps personnel. The meetings will be held at the following locations:

Burlington, Kansas
Coffey County Courthouse
110 South 6th Street, Burlington, KS
Monday, July 29, 2002
6:00 p.m.-9:00 p.m.

Chetopa, Kansas
Chetopa School
430 Elm, Chetopa, KS
Tuesday, July 30, 2002
6:00 p.m.-9:00 p.m.

FOR FURTHER INFORMATION CONTACT: For patent issues, Ms. Elizabeth Arwine, Patent Attorney, (301) 619–7807. For licensing issues, Dr. Paul Mele, Office of Research & Technology Assessment, (301) 619–6664, both at telefax (301) 619–5034.

SUPPLEMENTARY INFORMATION: A method of identifying and archiving a nucleic acid sequence.

Luz D. Ortiz,

Army Federal Register Liaison Officer.

[FR Doc. 02–16375 Filed 6–27–02; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of the Draft Supplement to the Final Environmental Statement for the Reallocation of Water Supply Storage Project, John Redmond Lake, KS

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Availability.

SUMMARY: The Tulsa District of the U.S. Army Corps of Engineers (USACE) has prepared a Draft Supplement to the Final Environmental Statement (DSFES) for the Reallocation of Water Supply Storage Project, John Redmond Lake, KS. The purpose of the project is to assess potential significant environmental impacts associated with water storage reallocation and a higher conservation pool elevation at John Redmond Lake.

DATES: The DSFEIS will be available for public review when this announcement is published. The review period of the document will be until September 11, 2002. To request a copy of the supplement, please call (918) 669–4396.

FOR FURTHER INFORMATION CONTACT: For further information regarding the DSFEIS, please contact Stephen L. Nolen, Chief, Environmental Analysis and Compliance Branch, U.S. Army Corps of Engineers, ATTN: CESWT–PE–E, 1645 South 101st East Avenue, Tulsa OK, 74128–4629.

SUPPLEMENTARY INFORMATION: John Redmond Dam was initially authorized as the Strawn Dam and Reservoir under the Flood Control Act of May 17, 1950, for flood control, water conservation, recreation, and water supply for communities along the Neosho River in southeastern Kansas. Congress subsequently changed the name in 1958 to John Redmond Dam and Reservoir.

To perform its authorized purposes, the lake contains three types of water storage pools. The upper pool provides 574,918 acre-feet of flood control storage and is reserved for flood control operations. The conservation pool provides 50,501 acre-feet of storage for water supply, water quality, and sediment. The inactive pool has filled with sediment. Water supply storage was projected to occur within the conservation pool when maintained at the surface elevation of 1039.0 feet National Geodetic Vertical Datum(NGVD). Studies have determined that sediment is accumulating in the conservation pool and is reducing the amount of water stored there. The amount of water storage reduction predicted by calendar year (CY) 2014 is approximately 25% or 8,725 acre-feet of water supply.

The USACE has been directed by Congress to conduct a study to reallocate water supply storage, an action that would fulfill the water supply agreement with the State of Kansas. This supplement addresses the proposed water supply storage reallocation project.

A Final Environmental Statement for operation and maintenance of John Redmond, Marion, and Council Grove Lakes, KS, was filed on December 17, 1976. This supplement addresses the environmental impacts of making an equitable redistribution of the storage remaining between the flood control pool and the conservation pool due to uneven sediment distribution.

Sediment in John Redmond Lake has been collecting mainly in the conservation pool, thereby reducing the conservation pool storage faster than was designed, while the flood control pool has not received as much sediment and has retained more storage than it was designed to retain. The reallocation does not guarantee the water storage volume contracted to the State of Kansas per an agreement in 1975, but makes an equitable redistribution of the remaining storage.

A total of four alternatives were identified and addressed in the DSFES. These include: no action, raise the conservation pool elevation by two feet, raise the conservation pool by two feet incrementally, and dredge the sediment from the conservation pool. The preferred alternative is to reallocate water storage in the conservation pool by two feet in a single pool raise. This would achieve the water storage obligation.

Environmental consequences of the proposed action identified in the DSFES include: (1) The loss of approximately 270 acres of wetland habitat, 40 acres of grassland, 51 acres of cropland, and 195 acres of woodland, and (2) impacts to 31 potentially significant prehistoric and historic archeology sites.

Mitigation for impacts to biological resources is proposed and is based upon recommendations of the U.S. Fish and Wildlife Service. A Memorandum of Agreement between the USACE, the Advisory Council on Historic Preservation, and the Kansas and Nebraska State Historic Preservation Offices is being drafted to determine appropriate actions and mitigation measures for cultural resources that may be discovered and/or affected during the course of the project. Appropriate mitigation measures may include preservation in place for future study, recovery or partial recovery of site data through excavation, a public interpretive display, or a combination of these measures.

The DSFES has been coordinated and approved by offices and directorates affected by or interested in the subject matter, including the Office of Counsel and Executive Offices.

Stephen R. Zeltner,

Lieutenant Colonel, U.S. Army Acting District Engineer.

[FR Doc. 02–16378 Filed 6–27–02; 8:45 am]

BILLING CODE 3710–39–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of the Draft Supplement to the Final Environmental Impact Statement for the Operation and Maintenance Program at Wister Lake and Poteau River, OK

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of availability.

SUMMARY: Notice is made of the availability of a Draft Supplement to the Final Environmental Statement (DSFES) for the Operation and Maintenance Program at Wister Lake and Poteau River, OK, prepared by the Tulsa District of the U.S. Army Corps of Engineers (USACE). The supplement describes and considers the potential environmental consequences resulting from operating the Wister Lake project with a conservation pool at 478.0 feet National Geodetic Vertical Datum (NGVD) and from raising the conservation pool from 471.6 to 478.0 feet (NGVD).

DATES: The DSFES will be available for public review when this announcement is published. The review period of the

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

AUG 20 2002

Jim Randolph
Planning, Environmental, and Regulatory Division
U.S. Army Corps of Engineers
Tulsa District
1645 South 101 East Avenue
Tulsa, Oklahoma 74128-4609

Dear Mr. Randolph:

RE: Review of the Draft Supplement to the Final Environmental Impact Statement (DSEIS) for Reallocation of Water Supply Storage Project: John Redmond Lake (JRL), Kansas

The Environmental Protection Agency has reviewed the Draft Supplemental EIS for the John Redmond Lake Reallocation of Water Supply Storage. Our review is provided pursuant to the National Environmental Policy Act (NEPA) 42 U.S.C. 4231, Council on Environmental Quality (CEQ) regulations 40 C.F.R. Parts 1500-1508, and Section 309 of the Clean Air Act (CAA). The DEIS was assigned the Council on Environmental Quality (CEQ) number 020271. This document supplements a Final EIS that was filed with the EPA on March 11, 1977.

A1

The EPA has rated this DSEIS as EC-2 (Environmental Concerns - Insufficient Information). A copy of EPA's rating definitions are provided as an enclosure. EPA has assigned this rating on the basis that the DSEIS does not provide evidence of analysis with respect to the State of Kansas' plans to address water quality impairments at JRL (siltation and eutrophication) via their Total Maximum Daily Load (TMDL) program.

EPA offers the following observations and recommendations for the Corps' consideration in the FSEIS.

A2

Table ES-1. Summary of Potential Significant Environmental Consequences and Mitigation Measures - In the absence of quality data concerning the chemical composition of lake sediments, EPA cannot agree with the characterization that a dredging alternative would result in *insignificant* consequences to assessed resources. A dredging alternative could re-suspend contaminants which include "PCB, atrazine, heavy metals including lead, mercury and arsenic in biota samples, and lead in sediment samples" DSEIS, Page 3-17, last paragraph. At certain concentrations, these contaminants could not only present a threat to aquatic biota within JRL, but once re-introduced into the water column, these contaminants could also be passed

through the spillway to present a health concern, or economic burden (monitoring or removal costs) to water consumers in the lower reaches of the Neosho basin. The Corps statement at 4.3 (Dredge Alternative), "The significance of these effects would be dependent upon the contamination level of the sediments," corroborates EPA's concern over this alternative absent any further investigation.

A3

P.3, and 4.11 Cumulative Impacts - The DSEIS states that the design life of the JRL project is to CY 2014 and that Kansas has entered agreement for water supply of 34,900 acre-ft. of annual storage. Given that a cumulative impacts analysis should cover past, present and reasonably expected future actions that have a bearing on this project, EPA believes that the Corps should evaluate the cumulative impact of siltation/sedimentation against the reasonably expected future demand for water supply storage, and Corps plans for meeting these demands beyond project design life.

A4

P. 32, Sec. 2.3. Last Paragraph - EPA agrees that sediments would "be re-deposited over time," however, the rate at which new sediments would be introduced into JRL is dependent upon the efficacy of soil conservation practices and sediment control Best Management Practices that have been implemented within the watershed.

A5

4.3 Hydrology and Water Resources - Consequences to water quality from any of the presented alternatives should be evaluated in concert with the Kansas Department of Health and Environment's (KDHE) TMDL for JRL. EPA recommends that the Corps assess compatibility of alternatives with the proposed TMDLs for JRL. The point of contact at the Kansas Department of Health and Environment is Mr. Tom Stiles at (785) 296-6170. Specifics on the impaired condition of this waterbody can be found at http://www.kdhe.state.ks.us/tmdl/neosho.htm.

A6

The EPA appreciates the quality and clarity of the DSEIS. If you have any questions about these comments or the rating, please contact Joseph Cothern, NEPA Team Leader, (913) 551-7148.

Sincerely,

U. Gale Hutton, Director
Environmental Services Division

Enclosure

cc: Mr. Tom Stiles, Kansas Department of Health and Environment

Draft Environmental Impact Statement Rating Definitions

Environmental Impact of the Action

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative. EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 56, Room 1003
P.O. Box 25007 (D-108)
Denver, Colorado 80225-0007

September 9, 2002

ER 02/567

Larry D. Hogue, P.E.
Chief, Planning Environmental and Regulatory Division
Environmental Analysis and Compliance Branch
U.S. Army Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Dear Mr. Hogue:

The Department of the Interior has reviewed the Draft Supplement to the Final Environmental Impact Statement (EIS) for the Reallocation of Water Supply Storage Project, John Redmond Lake, Coffey County, Kansas and has the following comments.

General Comments

A7

The Tulsa District of the Corps of Engineers has been actively working with the U.S. Fish and Wildlife Service (USFWS) in analyzing the impacts of the proposed action on fish and wildlife resources. However, additional analysis is necessary. The USFWS is pleased that the District has agreed to replace the Jacob's Creek Boat Ramp and will replace the Goose Bend #4 and Strawn dikes and outlet works that will be partially inundated by project implementation. The USFWS will continue to work with the Corps on implementation of those project mitigation features.

A8

The proposed action provides for a permanent 2-foot increase in the conservation pool at John Redmond Reservoir in Kansas. The USFWS maintains the Flint Hills National Wildlife Refuge, a 18,545 acre overlay refuge on the reservoir and the Kansas Department of Wildlife and Parks manages the 1,472 acres Otter Creek Wildlife Management Area on project lands. The proposed pool raise will inundate approximately 500 acres of land managed specifically for wildlife within these two areas. Fish and wildlife refuge and State game area land inundated by the pool raise is an irreversible and irretrievable commitment of resources, and should be so identified in the final EIS.

Endangered Species Act Comments

A9

The USFWS cannot agree that project implementation will not affect the bald eagle due to a lack of provision for riparian woodland replacement within the draft document. The USFWS,

however, anticipates favorable acceptance and implementation of riparian/woodland mitigation recommendation. The Corps acceptance of the USFWS recommendation should be incorporated into the final EIS.

Fish and Wildlife Mitigation Comments

A10 The USFWS's final Fish and Wildlife Coordination Act report is included in Appendix F and includes specific comments and recommendations of the Department relevant to this project. The draft EIS discusses mitigation of fish and wildlife habitat losses and the U.S. Army Corps of Engineers analysis, also included in Appendix F, concurred with the majority of the USFWS's recommendations. The draft statement did recognize, but did not address, a recommendation to acquire additional land for fish and wildlife management. The USFWS did not specify the number of acres to be acquired and presented several options for bringing lands into Federal and/or State management authority. The number of acres to be acquired was dependent upon the option or mix of options that may be utilized. Wetland losses are to be mitigated (Corps response to Recommendation 2) and will not require any acquisition; therefore, the only resource loss not addressed is the loss of riparian/woodland habitat. Approximately 195 acres of riparian and woodland habitat bordering the Neosho River within the Flint Hills National Wildlife Refuge or adjacent to the present conservation pool within the NWR and Otter Creek Wildlife Area will be inundated. Riparian/woodland habitat is considered resource category 2. Any loss of habitat value must be replaced in kind.

A11 Detailed measures to mitigate woodland losses should be addressed in the final EIS. The selection of the mitigation option and the implementation of the option should be closely coordinated with the USFWS and the Kansas Department of Wildlife and Parks.

Specific Comments

A12 Section 6.0 Applicable Environmental Laws and Regulations Page 6.1: The U.S. Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.) should be added to the list of applicable laws and regulations. The Act is the principal authority for incorporating fish and wildlife conservation measures in water development projects.

Summary Comments

A13 The District and their consultant should be commended for preparing a well organized and comprehensive EIS. If it had not been for the lack of specific mitigation for riparian/woodland losses, the document would have been exemplary.

A14 The Final Statement should incorporate specific mitigation measures for riparian/woodland loss.

A15 As this Department has a continuing interest in this project, we are willing to cooperate and coordinate with you on a technical assistance basis in further project evaluation and assessment.

For matters pertaining to mitigation of physical facilities on refuge lands, please contact the Refuge Manager, Flint Hills National Wildlife Refuge, P.O. Box 128, Hartford, Kansas 66854.

For technical assistance in matters pertaining to the Endangered Species Act or the USFWS's Final Fish and Wildlife Coordination Act Report, please contact the Field Supervisor, Kansas Field Office, 315 Houston Street, Manhattan, Kansas 66502 at (785) 539 3474 extension 105.

Thank you for the opportunity to review the draft statement.

Sincerely,

Robert F. Stewart
Regional Environmental Officer

KSR&C No. 01-03-198

KANSAS

STATE

HISTORICAL

A16

Cultural Resources Division

◆

6425 S.W. 6th Avenue
Topeka, Kansas
66615-1099
PHONE# (785) 272-8681
FAX# (785) 272-8682
TTY# (785) 272-8683

◆

KANSAS HISTORY CENTER

Administration
Center for Historical Research
Cultural Resources
Education / Outreach
Historic Sites
Kansas Museum of History
Library & Archives

HISTORIC SITES

Adair Cabin
Constitution Hall
Cottonwood Ranch
First Territorial Capitol
Fort Hays
Goodnow House
Grinter Place
Hollenberg Station
Kaw Mission
Marais des Cygnes Massacre
Mine Creek Battlefield
Native American Heritage Museum
Pawnee Indian Village
Pawnee Rock
Shawnee Indian Mission

August 23, 2002

Larry D. Hogue, Chief
Planning Environmental and Regulatory Division
US Army, Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

RE: Draft Supplement to the Final EIS John Redmond Lake, KS

Dear Mr. Hogue:

The Kansas State Historic Preservation Office has received and reviewed the above referenced EIS. We cannot comment on the findings concerning Cultural Resources since we have not reviewed the Rust 2001b report. Our office requests that we be provided a copy of this report detailing the National Register eligibility evaluations of several archeological sites on the John Redmond Lake property.

If you have any questions regarding these comments, please contact Will Banks at (785) 272-8681, ext. 214.

Sincerely,

Mary R. Allman
State Historic Preservation Officer

Richard Pankratz

Richard Pankratz, Director
Cultural Resources Division

web

STATE OF KANSAS

KANSAS WATER OFFICE
Al LeDoux
Director

Bill Graves, Governor

901 S. Kansas Avenue
Topeka, Kansas 66612-1249

785-296-3185
FAX 785-296-0878

September 18, 2002

Mr. Larry D. Hogue, P.E.
Chief, Planning Environmental and Regulatory Division
Department of the Army
U.S. Army Corps of Engineers, Tulsa District
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Dear Mr. Hogue:

Thank you for the opportunity to review and comment on the Draft Supplement to the Final Environmental Impact Statement for the Reallocation of Water Supply Storage Project, John Redmond Lake, Kansas.

A17 The Kansas Water Office is supportive of the Corps of Engineers efforts to reallocate storage from the flood control pool to the conservation pool to account for uneven sediment distribution. This reallocation is required as a condition of our contract with the federal government.

A18 Water supply storage in John Redmond Lake is vital to the citizens and industries of the Neosho Basin in Kansas. I believe that the report correctly reflects the demand that is placed upon this storage and the limited alternatives that exist for its users.

A19 I am concerned that the reallocation of storage may be used as a reason for improvement or development of mitigation projects that are not directly related to the reallocation of storage. The need for the reallocation is brought about by an original sediment distribution estimate between the conservation and flood pools that does not match the actual situation. Storage available for water supply has been depleted by sediment deposition to an extent that the State's water supply agreement has been infringed upon. As this incorrect estimation was made by personnel of the federal government, it is not appropriate for citizens of the State of Kansas to pay for mitigation efforts that arise from that miscalculation.

If you should have any questions, please feel free to contact me at the number listed above.

Respectfully,

Al LeDoux
Director

AL:EDL:kf

cc: Senator Pat Roberts
Senator Sam Brownback
Representative Jim Ryun
State Senator Jim Barnett
State Senator Derek Schmidt
State Representative Stanley Dreher
State Representative Peggy Long
Cottonwood and Neosho Basins Water Assurance District No. 2
Mike Hayden, Secretary of Wildlife and Parks
Neosho Basin Advisory Committee Chair

COFFEY COUNTY FIRE DISTRICT #1

113 N. 5th Street, Burlington, Kansas 66839
316-364-2305 Fax:316-364-3108

July 29, 2002

To: U.S. Corps of Engineers, Tulsa District

Dear Sirs:

A20

This letter is being sent to you regarding the concrete boat ramp in Ottumwa KS, in Coffey County at the John Redmond Reservoir.

Please be advised that Coffey County Fire District #1 would encourage any and all efforts to maintain a fire suppression water fill point in that area.

If you have any questions or concerns please do not hesitate to contact me at the Coffey County Fire District #1 Administrative office 620-364-2305.

Sincerely,

Bill Walker, Administrator
Coffey County Fire District #1

WOLF CREEK
NUCLEAR OPERATING CORPORATION

Otto L. Maynard
President and Chief Executive Officer

SEP 9 2002
WM 02-0032

Mr. Larry D. Hogue, P. E.
P.E. Chief, Planning Environmental and Regulatory Division
U. S. Corps of Engineers
1645 South 101st East Avenue
Tulsa, Oklahoma 74128-4609

Subject: Comments on Draft Supplement to the Final Environmental Impact Statement for the Reallocation of Water Supply Storage Project, John Redmond Reservoir

Dear Mr. Hogue:

Wolf Creek Nuclear Operating Corporation (WCNOC) has reviewed the Draft Supplement to the Final Environmental Impact Statement for the Reallocation of Water Supply Storage Project at John Redmond Reservoir and is submitting the following comments:

A21

1. WCNOC supports the U. S. Corps of Engineers' preferred option to increase the conservation pool at John Redmond Reservoir two feet in a single pool rise. This should help ensure sufficient water storage so that the State of Kansas can fulfill water supply contract obligations.

A22

2. In Section 2.1, reference to the operators of Wolf Creek Generating Station (WCGS) is incorrect. WCGS is operated by WCNOC, both of which are owned by Kansas Gas and Electric Company ("KGE", now a subsidiary of Wester Energy, Inc.), Kansas City Power & Light Company ("KCPL", now a subsidiary of Great Plains Energy, Incorporated) and Kansas Electric Power Cooperative Inc. KGE and KCPL have contracted with the State of Kansas for water supply in John Redmond Reservoir to use for WCGS electricity production purposes.

A23

3. WCNOC agrees that the benefits provided by water level manipulation of John Redmond Reservoir are important for fish, wildlife and water quality. Development of a modified water level management plan with the proposed raise in conservation pool elevation should be considered. However, water level manipulations that unreasonably hamper the ability of the State of Kansas to fulfill its obligations for contracted water supply should be avoided.

WCNOC appreciates this opportunity to comment on the water storage reallocation proposal. If you have any questions, please contact Mr. Karl A. (Tony) Harris, Manager Regulatory Affairs at (620) 364-4038.

Sincerely,

Otto L. Maynard

OLM/rlr

cc: Al LeDoux — Kansas Water Office
Terry McCormick — Westar Energy
David Pope — Division of Water Resources
William H. Koegel — KCPL
Donald A. Spreitzer — KCPL
Harold L. Hahn — KEPCo

US Army Corps of Engineers®

John Redmond Lake Reallocation Study

Questions, Comments, or Suggestions

The Corps of Engineers is interested in addressing your concerns and questions regarding this study. The Corps encourages suggestions as well. Your input is an important part of the Corps study process. Please write your questions, comments, or suggestions on the space provided below. If you would like to be kept informed about this study please provide your name and address. Feel free to use the back of this form or add pages if needed. You may also take this form with you and return it to the address below.

P1

I am concerned about the change of the elevation of John Redmond Lake. I have approx 201 acres of easement land, about 94 A. Cropland & 7 acres grass. When the Corps purchased the land the elevation was to be 1033, now they are wanting to raise the level to 1041. The Corps of Engineers paid about $1,000 per acre for easement. That amount was gone after the 1st flood. We pay taxes on the land the same rate as anyone else on higher land. With lots of trash to pick up. I think we should have an adjustment. Either buy more land or pay more damages on easement land

Optional Information:

Name: JACK FREUND **Affiliation:**
Address: 616 W 5th P.O. BOX 285 **City:** LEBO **State:** KS
Zip: 66856 **Phone:** (620) 256-6257 **E-mail:**

Easement is in the W ½ SEC. 16 19-14 and W ½ of SW ¼ SEC 17 & 08 19-14 Coffey Co. KS.

Point of Contact

Mr. Stephen L. Nolen
U.S. Army Corps of Engineers, Tulsa District
1645 S. 101st East Avenue
ATTN: CESWT-PE-E
Tulsa, OK 74128-4629
Phone: (918) 669-7660 Fax: (918) 669-7546
e-mail: STEPHEN.L.NOLEN@usace.army.mil

7/29

US Army Corps of Engineers®

John Redmond Lake Reallocation Study

Questions, Comments, or Suggestions

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P4

Bank Stabilization: There needs to be something done (besides just studying and talking) to stabilize the banks of the Neosho River. The method of water release from the John Redmond Dam has caused drastic caving & erosion since its implementation in 1964. The rock weirs are not the answer. Raising the conservation pool, in my opinion, cuts down on the capacity to regulate the flood control, which was why John Redmond was built. Too much concern is given to hunters and recreation instead of the farmers, land-owners and others that work along the river.

Optional Information:

Name: Chauncey Shepard **Affiliation:** Neosho Basin Advisory Comm. & KAWS
Address: 24810 Massey Rd **City:** McCune **State:** KS
Zip: 66753 **Phone:** 620-632-4941 **E-mail:** rockyroads@grapevine.net

Point of Contact

Mr. Stephen L. Nolen
U.S. Army Corps of Engineers, Tulsa District
1645 S. 101st East Avenue
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Tulsa, OK 74128-4629
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P5

I oppose any increase in the conservation pool at J.R. There is no benefit to flood control the in this reallocation of the water level

Optional Information:

Name: [illegible] Affiliation:
Address: 8198 SW Star Rd City: Chetopa State: KS
Zip: 67336 Phone: 620 597 2829 E-mail:

Point of Contact

Mr. Stephen L. Nolen
U.S. Army Corps of Engineers, Tulsa District
1645 S. 101st East Avenue
ATTN: CESWT-PE-E
Tulsa, OK 74128-4629
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e-mail: STEPHEN.L.NOLEN@usace.army.mil

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John Redmond Lake Reallocation Study

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P6

I am not for raising John Redmond to hold more water - I have 700 acres Underwater when it floods taking my crops and pasture -

I dont want to furnish ground to store Water while profit is made by doing so -

Water stored on my land 12 to 14 days ruins everything for me - GRDA needs to let water out as it comes from G.R. neiher dam should be full the raining season so they could handle more water

Optional Information:

Name: Henry Bell **Affiliation:** Farmer
Address: 9532 SW Star Rd **City:** Chetopa **State:** KS
Zip: 67336 **Phone:** 620 597 2680 **E-mail:**

Point of Contact

Mr. Stephen L. Nolen
U.S. Army Corps of Engineers, Tulsa District
1645 S. 101st East Avenue
ATTN: CESWT-PE-E
Tulsa, OK 74128-4629
Phone: (918) 669-7660 Fax: (918) 669-7546
e-mail: STEPHEN.L.NOLEN@usace.army.mil

To: U. S. Corps of Engineers, Tulsa District

Subject: Concrete boat ramp in Ottumwa, Coffey County, KS

The concrete boat ramp in Ottumwa, Ks in Coffey County has NOT been cleared or maintained for many years. At this time, Coffey County Road and Bridge Dept. maintain the road and circle at the boat ramp. So, at this time, the citizens of Ottumwa and the following towns of Hartford, Lebo, New Strawn, and Jacobs Creek and surrounding friends are requesting permission from the Tulsa Corps of Engineers to clean and open this concrete boat ramp which has 2 or 3 feet of silt on it. We wish to maintain it ourselves and relieve you of having to maintain it.

P7

This is how Old Strawn boat ramp at Jacobs Creek is maintained by the citizens of Jacobs Creek. We would like to obtain this permission because we have a lot of fishermen with boats and a lot of hunters in the winter that cannot use this lake which ALL parties do pay taxes, licenses and different fees to use this lake and don't have access to it on the Ottumwa side.

Because of the fact that there are NO fire hydrants in the town of Ottumwa, this boat ramp is crucial to the town and surrounding area. Therefore, by not properly maintaining this boat ramp, you have created a major fire hazard in the Ottumwa area by not allowing the fire trucks access to the ramp and therefore, WATER! So, if this ramp is cleaned and maintained by the citizens of Ottumwa and friends OR the Corps of Engineers, it makes it a much needed availability of water for Coffey County Fire Dept. and allows the trucks to pump water out of the lake to supply the necessary water for any fire.

If this request is denied, we would appreciate your coming out to clean it and open it so that we can use the Ottumwa boat ramp on this lake.

Listed below are some names of the concerned citizens and frields of the area:

Mike Reed
Cheryl Reed
Ray L Barber
David J. Payton
Robert L. Montgomery
Jo Ann Payton
Squire Payton
[illegible]
Debra S. Sieber
Rusty R Chanton
[illegible]
Domile R. Shaw
Bill Gasiley
Paula Simon
Jim Simon
Cheryl West
Dale Gillam
Ron Cox

Fred [illegible] Jr.
Virginia Hansen
Lisa Raggdale
[illegible]
Sheldon M Walgren
Ben E. Ernst
Joanne Highight
George R Graff
Frankie Jonas
Robert W. Stephens
R Fisher
James C Chesfed
Milton Hess
James H. Webster
Robert Ruggle
Shari Loveland

open it so that we can use the Ottumwa boat ramp on this lake.

Listed below are some names of the concerned citizens and frields of the area:

Rose Mary Payton	[illegible]
Ronald Payton	
Paul Payton	
Josie Friend	
Octavia Payton	
Shawn Harris	
Mark Harris	
[illegible]	

FINAL REPORT FOR THE

WATER SUPPLY STORAGE REALLOCATION

JOHN REDMOND DAM and RESERVOIR, KANSAS

VOLUME III

United States Army Corps of Engineers; Tulsa District
1645 South 101 East Avenue
Tulsa, OK 74128-4609

February 2013

US Army Corps
of Engineers ®
Tulsa District

REPORT FOR THE

WATER SUPPLY STORAGE REALLOCATION

JOHN REDMOND DAM AND RESERVOIR, KANSAS

February 2013

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EXECUTIVE SUMMARY

REPORT FOR THE WATER SUPPLY STORAGE REALLOCATION AT JOHN REDMOND DAM AND RESERVOIR, KANSAS

John Redmond Dam and Reservoir is located on the Neosho River in Coffee County, Kansas. The reservoir is the lower unit in a system of three projects in the upper Neosho River Basin in Kansas.

The reallocation study and subsequent report is in response to Congressional Senate Report 106-58 to study raising the conservation pool at John Redmond Dam and Reservoir to meet the terms of two existing water supply agreements with the state of Kansas. Storage available for water supply purposes in John Redmond has been steadily depleted by sediment redeposition such that there is infringement on State of Kansas water supply agreements.

The Kansas Water Office (KWO) had entered into water agreements with the Wolf Creek Nuclear Power Plant (WCNPP) based on the 1975 water supply Contract DACW56-75-C-0029 with the United States. The KWO had to assure the Wolf Creek Nuclear Power Plant that it would have a guaranteed amount of water supply before the nuclear plant would be built.

Supplemental Agreement No. 1 to Contract No. DACW56-75-C-0029 signed July 21, 1978, modified and added "ITEM 1" to ARTICLE 1 – WATER SUPPLY STORAGE. Item 1 stated:

> *"When, in the opinion of the Contracting Officer, the findings of such survey indicate a project purpose will be affected by unanticipated sedimentation distribution, there shall be an equitable redistribution of the sediment reserve storage space among the purposes served by the Project including municipal and industrial water supply. Adjusted pool elevations will be rounded to the nearest one-half foot."*

The total sediment deposited in the reservoir through year 2014 is now estimated to be approximately 95,000 acre-feet. This is almost twice the level of 51,000 acre-feet of sediment storage projected in year 1976. The projected sediment storage is now about 16.1 percent of the total storage of John Redmond Reservoir.

Based on the evaluation of several alternatives, the preferred alternative is to increase the top of the conservation pool elevation from 1039.0 feet National Geodetic Vertical Datum (NGVD) to 1041.0 feet NGVD to meet current water supply agreements and water quality demands.

Raising the conservation pool two feet into the flood control pool will result in an estimated 3.2 percent reduction in flood storage. An analysis of downstream flow-duration and frequency curve-duration data showed little measurable increases in flood stages at downstream locations of John Redmond Reservoir.

The Corps of Engineers with consultation with the US Fish & Wildlife Service (USFWS) evaluated and recommended six environmental mitigation/replacement measures. Replacement measures for this reallocation report refer to actions that the State of Kansas has paid for and completed, that have been implemented in conjunction with the proposed reallocation. The recommendations are:

1. Strawn boat ramp and Parking Area Replacement
2. Replacement of Strawn Flats and Goose Bend #4 Dikes, Outlet Works, and Pumping Facilities
3. Neosho Basin Management Plan
4. Annual Water Level Management Plan.
5. Post-Development Impact Evaluation Studies for Wetland Development above elevation 1041.0 feet NGVD.
6. Replacement of 243 acres of Wetlands and 166 acres of Riparian Woodlands in the Flint Hills National Wildlife Refuge

Total projected cost of replacement measures is $194,792, for which the State of Kansas has completed payment for replacement features as of 2012, satisfying all of their obligations as described in the Supplement to the Final Environmental Statement (SFES).

Authority for the reallocation of storage is provided by Public Law 85-500, Water Supply Act of 1958. Engineering regulation guidance stipulates that Congressional approval would normally be needed for storage reallocation that would involve major structural or operational changes. However, 15% of total storage capacity allocated to all authorized project purposes or 50,000 acre-feet, whichever is less, may be reallocated for water supply at the discretion of the Commander, United States Army Corps of Engineers. Due to the atypical nature of this reallocation, HQ has determined that the Reallocation Report and Agreement Amendments will be forwarded to the ASA (CW) for approval.

Since its initiation, this reallocation study has been delayed for a number of years directly related to levee safety issues associated with the Hartford levee at John Redmond Reservoir. These issues, which prohibited a conservation pool raise, have now been resolved by repairs to the levee.

This reallocation would allow the Federal government to meet the intent of its initial 1975 agreement with the KWO for water supply contracts.

REPORT FOR THE
WATER SUPPLY STORAGE REALLOCATION
AT JOHN REDMOND DAM AND RESERVOIR, KANSAS

February 2013

1.0 PURPOSE

The reallocation study and subsequent report is in response to Congressional Senate Report 106-58 to study raising the conservation pool at John Redmond Dam and Reservoir, Kansas. Regarding John Redmond Dam and Reservoir, Senate Report 106-58 stated:

> *The Committee has included an additional $525,000 for the Corps to study raising the conservation pool at John Redmond Dam and Reservoir, KS.*

The State of Kansas requested the study because the existing water supply storage will be inadequate to meet current and future water supply demands. In 1975, the State of Kansas and the Federal government entered into a water storage agreement for an estimated 34,900 acre-feet of water supply storage remaining after 50 years of sedimentation. The total conservation pool was estimated to contain 62,500 acre-feet of storage after 50 years of sedimentation. Storage available for water supply purposes in John Redmond has been steadily depleted by sediment deposition. The deposition of sediment has impacted the amount of water that the storage can yield.

Current estimates indicate that sediment has been collecting in the conservation pool, thereby reducing the conservation pool and water supply storage. Due to a significantly larger amount of sediment accumulating in the upper end of the lake, the current estimated amount of conservation storage that would be available in year 2014 is 40,100 acre-feet. A redistribution of the storage remaining between the flood control and conservation pools is needed to make an equitable redistribution between project purposes. Based on the evaluation of several alternatives, the preferred alternative is to increase the top of the conservation pool elevation from 1039.0 to 1041.0 feet National Geodetic Vertical Datum (NGVD).

This study considers reallocation of storage under Engineer Regulation (ER) 1105-2-100. Authority for the reallocation of storage is provided by Public Law 85-500, Water Supply Act of 1958. Engineering Regulation guidance stipulates that Congressional approval would normally be needed for reallocation that would involve major structural or operation changes. Fifteen percent of total storage capacity allocated to all authorized project purposes or 50,000 acre-feet, whichever is less, may be reallocated for water supply at the discretion of the Commander. Since 17,200 acre-feet of flood control storage is being reallocated (3.28% of existing flood storage), the proposed reallocation can be approved by the Commander. Due to the atypical nature of this reallocation, the Reallocation Report, and the Final Supplement to the Final Environmental Statement will be forwarded to the ASA (CW) for approval and signature on the Record of Decision.

Since its initiation, this reallocation study has been delayed for a number of years directly related to levee safety issues associated with the Hartford levee at John Redmond Reservoir. These issues, which prohibited a conservation pool raise, have now been resolved by repairs to the levee.

2.0 BACKGROUND OF JOHN REDMOND DAM AND RESERVOIR PROJECT

2.1 Project Authorization, Location, and Pertinent Data

The Flood Control Act of 17 May 1950 (Public Law 81-516, House Document 442, 80th Congress, 2nd Session) authorized the construction of Strawn Dam and Reservoir. Public Law 85-327, dated 15 February 1958, renamed the project "John Redmond Dam and Reservoir." The project was authorized for flood control, water supply, water quality, recreation purposes, and is also operated for wildlife objectives. Construction was initiated in June 1959, and the project was placed in full flood control operation in September 1964. All major construction was completed in December 1965.

The conservation pool of John Redmond Reservoir was initially at elevation 1036.0 feet NGVD. Supplement No. 3 to Design Memorandum No 4, John Redmond Dam and Reservoir, Kansas, outlined future conservation pool increases from elevation 1036.0 to 1039.0 when ultimate development of the reservoir was achieved. Ultimate development was implemented at John Redmond Reservoir in January 1976. Table 1 outlines actions related to conservation pool elevations of John Redmond Reservoir.

Table 1: Actions and Conservation Pool Elevations by Year

Year	Action	Conservation Pool Elevation, Feet (NGVD)
1950-1958	Flood Control Act passed (Public Law 81-516); approved construction of Strawn Dam (John Redmond Dam and Reservoir).	1033.0 to 1039.0
1959-1965	Construction period	1036.0
1975	Agreement with Kansas Water Office (KWO) for 55.84% of available water between elevations 1020.0 and 1039.0 feet for water supply storage. Total 27,450 acre-feet under contract.	1036.0
1976	Ultimate operational plan implemented to raise conservation pool to elevation 1039.0 feet	1039.0
1996	Water supply contract with the KWO for additional undivided 20.34% interest of usable water between elevations 1020.0 and 1039.0 feet. Estimated to be 10,000 acre-feet. (Total 37,450 acre-feet)	1039.0
2005	Proposed operating plan to raise the conservation pool to elevation 1041.0 feet.	1041.0

John Redmond Dam and Reservoir, is located on the Neosho River in Kansas. The reservoir is located at river mile 343.7 on the Neosho River, about 3 miles northwest of Burlington in Coffee County, Kansas. John Redmond is the lower unit in a system of three projects that also includes Marion Dam on the Cottonwood River and Council Grove Lake on the Neosho River (Figure 1). John Redmond Dam and Reservoir is designed primarily for flood control, water supply and water quality in the upper Neosho River Basin in Kansas (Figure 2). Figure 2 compares the existing and proposed conservation pool elevation based on the reallocation of flood control storage to water supply storage. Pertinent data for John Redmond Dam and Reservoir is outlined in Table 2.

Figure 1: Neosho River Basin in Kansas

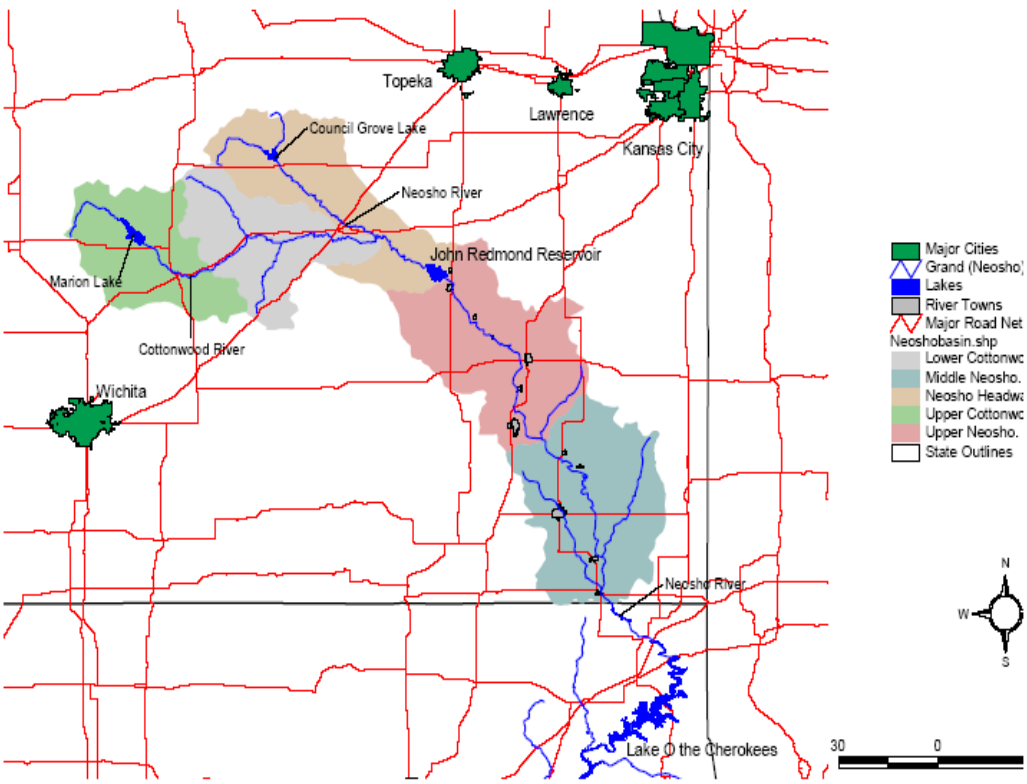


FIGURE 1-1. LOCATION MAP FOR JOHN REDMOND DAM, LAKE, AND THE NEOSHO RIVER TO THE GRAND (LAKE O' THE CHEROKEES) RESERVOIR

Figure 2: John Redmond Dam and Reservoir Project Map

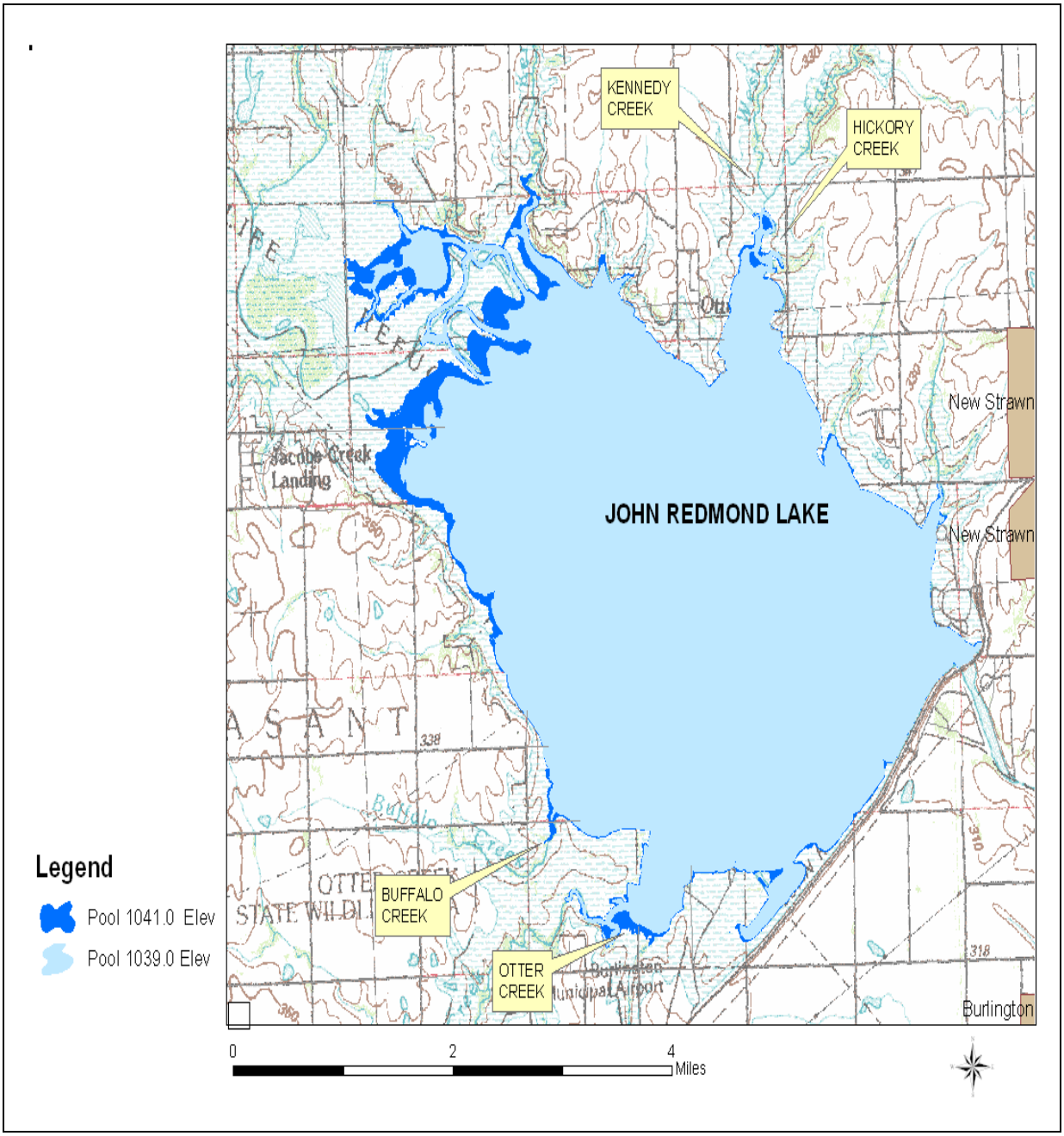


Table 2: John Redmond Reservoir and Dam Pertinent Data

Dam Location	
State:	Kansas
County:	Coffey
Nearest Community:	Burlington
River:	Grand (Neosho) River
Mile:	343.7
Latitude:	North 38.3
Longitude:	West 95.7
Upstream Federal Projects:	Marion Reservoir Council Grove Lake
Federal Projects Downstream:	Fort Gibson Lake McClellan-Kerr Arkansas River Navigation System
Other Non-Federal Projects:	Grand Lake O' the Cherokees (Pensacola Dam) Lake Hudson
Drainage Area:	3,015 square miles
Downstream Area:	7,283 square miles
Authorization, Project Purposes, and History of Construction	
Authorizing Legislation:	Flood Control Act of 1950, Public Law 81-516, Project Document HD 442 80th Congress, 2nd Session
Project Purposes:	Flood Control, Water Supply, Water Quality Control, Recreation, Wildlife
History of Construction:	
Construction Began:	June 1959
Closure of Embankment:	September 1963
Full Flood Control Operation:	September 1964
Major Construction Completed:	December 1965

Type of Structure	
Rolled impervious earth fill embankment and a gated ogee weir, with concrete spillway located in the left abutment	
Total Dam Length, consisting of-	21,704 feet
Embankment, earth-filled	20,740 feet
Two bulkhead sections, concrete non-overflow	300 feet
Concrete Spillway, including piers and abutments	664 feet
Spillway and Outlet Works	
Spillway	Net operating width 560 feet
Tainter Gates	Fourteen 40- by -35 foot high
Low-flow pipes	Two 24-inch-diameter with 130 cfs discharge capacity
Spillway capacity, maximum pool (elevation 1074.5)	578,000 cfs
Top of flood control pool (elevation 1068.0)	428,000 cfs
Bank-full capacity of channel below dam	15,000 cfs

Lake Data

Feature	Elevation	Area	Capacity	Equivalent Runoff
	(feet)	(acres)	(acre-feet)	(inches)
Top of Dam	1081.5	-	-	-
Top of Gates and Flood Control Pool	1068.0	34,331	574,918	3.36
Flood Control Storage	1039.0-1068.0	-	524,417	3.68
Top of Conservation Pool	1039.0	8,084	50,501	0.38
Conservation Storage	1020.0-1039.0	-	50,501	0.38
Spillway Crest	1033.0	4,801	9,980	0.01
Bottom of Conservation Pool	1020.0	0	0	-
Proposed Conservation Storage	1041.0	-	67,700	-

Source: Tulsa District Pertinent Data Book, March 2004, lake data based on year 2000 resurvey

2.2 Operational History

Construction of John Redmond Reservoir was completed for flood control operation in September 1964. All major construction was completed in December 1965. Immediately after construction was completed, the top of conservation pool elevation was changed from 1033.0 to 1036.0 feet NGVD. The initial reservoir design documented future changes to the conservation and flood storage pool elevations. Ultimate development of the reservoir was initiated on January 1, 1976. Ultimate development of the reservoir provided for a change in the conservation pool from 1036.0 to 1039.0 with 82,700 acre feet of storage.

Leases have been signed with the U.S. Fish and Wildlife Service (USFWS) and the Kansas Department of Wildlife & Parks (KDWP). The KDWP has license to 1,472 acres of project lands (Otter Creek Game Management Area) for fish and wildlife management. The USFWS is under cooperative agreement for about 18,500 acres of project land and water areas for operation of the Flint Hills National Wildlife Refuge (FHNWR). The refuge is managed as part of the national wildlife refuge system and much of it is open to public hunting in season.

John Redmond has been in operation since 1965, providing 47 years of flood damage reduction benefits through 2011. The total value of flood damages prevented at July 2012 price levels is $780,475,210; average annual damages approximately $16,600,000. Flood damage prevented is based on development downstream of the project in the 1960's. However, the development in the floodplain downstream of John Redmond is primarily rural and little development has occurred over the years. Recreational use of the lakes at Corps facilities was approximately 148,500 visitors in 2011.

Table 3: Historical Flood Damages Prevented by John Redmond

Year	Flood Damages Prevented ($1,000)'s	July 2012 ENR	ENR	ENR Update Factor	Flood Damages Prevented Current Prices ($1,000)'s
FY 1965	$ 1,592.90	9291.4	971	9.5689	$ 15,242.30
FY 1966	$ 194.00	9291.4	1019	9.1182	$ 1,768.92
FY 1967	$ 1,954.10	9291.4	1074	8.6512	$ 16,905.33
FY 1968	$ 234.00	9291.4	1155	8.0445	$ 1,882.41
FY 1969	$ 1,332.00	9291.4	1269	7.3218	$ 9,752.68
FY 1970	$ 2,505.00	9291.4	1381	6.7280	$ 16,853.70
FY 1971	$ 942.00	9291.4	1581	5.8769	$ 5,536.05
FY 1972	$ 133.00	9291.4	1753	5.3003	$ 704.94
FY 1973	$ 3,763.00	9291.4	1895	4.9031	$ 18,450.42
FY 1974	$ 10,760.00	9291.4	2020	4.5997	$ 49,492.80
FY 1975	$ 4,401.00	9291.4	2212	4.2005	$ 18,486.19
FY 1976	$ 409.00	9291.4	2401	3.8698	$ 1,582.75
FY 1977	$ 1,937.00	9291.4	2576	3.6069	$ 6,986.58

Year	Flood Damages	July 2012 ENR	ENR	ENR Update Factor	Flood Damages
FY 1978	$ 1,540.00	9291.4	2776	3.3470	$ 5,154.45
FY 1979	$ 3,427.00	9291.4	3003	3.0940	$ 10,603.27
FY 1980	$ 3,150.00	9291.4	3237	2.8704	$ 9,041.68
FY 1981	$ 1,042.00	9291.4	3535	2.6284	$ 2,738.79
FY 1982	$ 12,520.00	9291.4	3825	2.4291	$ 30,412.63
FY 1983	$ 3,360.00	9291.4	4066	2.2851	$ 7,678.09
FY 1984	$ 1,968.00	9291.4	4146	2.2411	$ 4,410.39
FY 1985	$ 7,200.00	9291.4	4195	2.2149	$ 15,947.10
FY 1986	$ 8,867.00	9291.4	4295	2.1633	$ 19,182.04
FY 1987	$ 7,583.00	9291.4	4406	2.1088	$ 15,991.08
FY 1988	$ 5,921.00	9291.4	4519	2.0561	$ 12,174.02
FY 1989	$ 2,375.00	9291.4	4615	2.0133	$ 4,781.60
FY 1990	$ 6,175.00	9291.4	4732	1.9635	$ 12,124.77
FY 1991	$ -	9291.4	4835	1.9217	$ -
FY 1992	$ 3,914.00	9291.4	4985	1.8639	$ 7,295.19
FY 1993	$ 60,446.00	9291.4	5210	1.7834	$ 107,798.07
FY 1994	$ 3,278.20	9291.4	5408	1.7181	$ 5,632.22
FY 1995	$ 27,685.00	9291.4	5471	1.6983	$ 47,017.44
FY 1996	$ 6,855.40	9291.4	5620	1.6533	$ 11,333.85
FY 1997	$ 6,246.31	9291.4	5826	1.5948	$ 9,961.71
FY 1998	$ 1,964.36	9291.4	5920	1.5695	$ 3,083.04
FY 1999	$ 73,410.47	9291.4	6059	1.5335	$ 112,574.03
FY 2000	$ 97.25	9291.4	6221	1.4936	$ 145.25
FY 2001	$ 2,934.60	9291.4	6343	1.4648	$ 4,298.69
FY 2002	$ 8,313.51	9291.4	6538	1.4211	$ 11,814.65
FY 2003	$ 2,863.75	9291.4	6694	1.3880	$ 3,974.94
FY 2004	$ 14,202.76	9291.4	7115	1.3059	$ 18,547.23
FY 2005	$ 33,451.79	9291.4	7446	1.2478	$ 41,742.40
FY 2006	$ 26.69	9291.4	7751	1.1987	$ 31.99
FY 2007	$ 18,753.40	9291.4	7967	1.1662	$ 21,870.88
FY 2008	$ 15,872.70	9291.4	8310	1.1181	$ 17,747.25
FY 2009	$ 26,008.52	9291.4	8570	1.0842	$ 28,197.85
FY 2010	$ 12,548.77	9291.4	8802	1.0556	$ 13,246.50
FY 2011	$ 273.47	9291.4	9171.73	1.0130	$ 277.04
Total					**$ 780,475.21**

2.3 Water Supply Agreements

The water supply storage at John Redmond Reservoir is under agreement with the State of Kansas and the Kansas Water Resources Board (KWRB) (now Kansas Water Office (KWO)). The total storage available in the conservation pool based on the 2000 year sediment survey was 50,501 acre-feet. The KWO has two water supply agreements for a total of 37,450 acre-feet of storage. The remaining conservation pool is allocated to water quality and future sediment storage.

Agreement No: DACW56-75-C-0029, signed October 8, 1975, authorized 55.84% of the total storage space in the conservation pool (between elevations 1020.0 and 1039.0) for water supply at John Redmond Dam and Reservoir. This agreement was signed based on a total of 62,500 acre feet of storage remaining at the end of the 50 year project sediment life, providing approximately 34,900 acre feet of water supply storage. Supplemental Agreement No.1 to Contract No. DACW56-75-C-0029 signed July 21, 1978, modified and added "ITEM 1" to ARTICLE 1 – WATER SUPPLY STORAGE. Item 1 states:

> *"Sediment surveys will be made by the Contracting Officer during the term of this agreement at intervals not to exceed fifteen (15) years unless agreed to in writing by both parties. When, in the opinion of the Contracting Officer, the findings of such survey indicate a project purpose will be affected by unanticipated sedimentation distribution, there shall be an equitable redistribution of the sediment reserve storage space among the purposes served by the Project including municipal and industrial water supply. The total available remaining storage space in the Project will then be divided among the various Project features in the same ratio as was initially utilized. Adjusted pool elevations will be rounded to the nearest one-half foot."*

In 1985, a Memorandum of Understanding was signed between the U.S. Army Corps of Engineers and the State of Kansas to establish a cooperative partnership for water supply and water quality operating guidelines on Corps of Engineers reservoirs in Kansas. The terms of the memorandum of understanding called for conservation pool reallocations from water quality to water supply. Water quality release guidelines were also set up to ensure sufficient water quality during drought periods. Terms of the agreement called for the Corps of Engineers to conduct reallocation and National Environmental Policy Act (NEPA) compliance studies as required, and to pursue Congressional approval for future reallocations, if required.

In 1996, a reallocation and environmental assessment report was completed on storage at John Redmond Reservoir, Marion Reservoir, Council Grove Lake, and Elk City Lake in Kansas. In 1996 the initial agreement based on the latest sediment survey, provided 27,450 acre feet of storage for John Redmond. This was for 55.84% of the current estimate of available conservation storage (49,160 acre feet volume at the time of the agreement). The Corps recommendation from this 1996 report was to reallocate an additional 20.34% of usable storage space between elevations 1020.0 and 1039.0. After adjustment for sediment deposits for water storage, 10,000 acre-feet was estimated to be available for water supply. DACW56-96-WS-0003 signed June 26, 1996 reallocated this additional 20.34% (estimated at 10,000 acre-feet) for water supply from water quality for John Redmond Reservoir.

The KWO has a contract with the Wolf Creek Nuclear Generating Plant below John Redmond Dam. The State has also formed a water assurance district with downstream communities for use of the reallocated water quality storage. This storage was purchased to assure that downstream releases would provide water supply when needed. There are 45 active senior and junior water right holders downriver from John Redmond Dam and Reservoir. Table 4 outlines the existing water supply contracts between the USACE and the KWO.

Table 4: Existing Water Supply Storage Contracts as of February 2013

	Approval Date	% Of Water Supply to Usable Conservation Pool	Estimated Storage (acre-feet)	Total User Estimated Storage (acre-feet)
KWRB	10/08/75 (Modified (07/21/78)	55.84	27,450	27,450
KWO	06/26/96	20.34	10,000	10,000
Total		**76.18**	**37,450**	**37,450**

2.4 Sedimentation History

Sedimentation is a natural occurrence that is accounted for in all Corps of Engineers reservoir designs. Flood control, water supply, water quality, recreation, and wildlife habitat are all affected by sedimentation as the reservoir ages. A loss of 36,800 acre-feet of flood storage and 14,200 acre-feet of conservation storage to sediment were estimated when the reservoir was constructed for a total of 51,000 acre-feet of sediment deposition over a 50-year period.

On October 8, 1975, the USACE signed an agreement with the KWO for 55.84% of the conservation storage in the reservoir. At that time, 34,900 acre-feet of storage was estimated for the life of the contract. Surveys since 1975 have revealed a greater depletion of conservation storage with sediment encroaching on water supply and water quality storage. While flood control storage has been affected by increased sedimentation, the greater impact has been the loss of storage in the conservation pool.

In 1976, John Redmond reached the final ultimate development phase as planned. At that time, the conservation pool was raised from elevation 1036.0 to 1039.0. Sedimentation surveys were conducted in 1963 and 1974 to measure and predict future effects that sedimentation would have on the reservoir. In 1976, the total sediment through year 2014 was projected to be 30,800 acre-feet for the flood control pool and 20,200 acre-feet for the conservation pool. The total sediment volume did not change, but 6,000 acre-feet was redistributed from the flood pool to the conservation pool when the conservation pool was raised from 1036.0 to 1039.0

As the conservation pool storage has declined, there has been insufficient water supply storage available to satisfy the KWO's existing water supply agreements with its customers. On June 26, 1996, a water supply agreement between the Corps of Engineers and the KWO was signed

for an additional 10,000 acre-feet. This agreement reallocated 10,000 acre-feet from water quality storage to water supply storage. The KWO had entered into water agreements with Wolf Creek Nuclear Power Plant based on the 1975 water supply contract with the Corps of Engineers. The KWO needed to provide Wolf Creek Nuclear Power Plant a reliable water supply before the nuclear plant would be built. Reallocation is required to ensure water supply agreements between the Corps of Engineers and the KWO are honored so that the KWO can maintain its water agreements with its assurance districts.

Sedimentation issues continue to reduce flood control and conservation storage benefits inequitably. Table 5 shows the historical changes in flood control and conservation storage of the reservoir as a result of this sedimentation. It shows that sedimentation has not impacted flood control storage to the same degree as it has the conservation pool. Based on the 2000 sedimentation survey, the flood control storage will have been reduced from the designed 562,100 acre feet to 511,700 acre feet by year the 2014. This represents a reduction in flood control storage of about 9%. Based on the same 2000 survey, the conservation storage will have been reduced from the designed 82,700 acre feet to 40,100 acre feet by the year 2014. This represents a reduction in conservation storage of over 50%. The 9% projected reduction in flood control storage is significantly disproportionate to the 50% projected reduction in conservation pool storage. The proposed 2-foot conservation pool rise from elevation 1039.0 to 1041.0 feet will result in a loss of 16,318 acre-feet of flood storage through year 2014.

With the proposed conservation pool raise, Table 5 indicates that by year 2014, 55,456 acre-feet of sediment will be deposited in the flood pool and 39,500 acre-feet in the conservation pool below elevation 1041.0. The total sediment deposited in the reservoir in year 2014 is now estimated to be approximately 95,000 acre-feet. This is almost twice the level of 51,000 acre-feet projected in year 1976 and 16.5% of the total storage of John Redmond Reservoir. If the sediment storage was equally redistributed using a weighted average approach based on storage volumes; 91% of the sediment storage (86,410 acre-feet in year 2014) could justifiably be applied against flood control and 9% (8,546 acre-feet in year 2014) against conservation storage.

Table 5: Storage Allocation History

	POOL ELEVATION (feet)	STORAGE (acre-feet)	SEDIMENT DISTRIBUTION (acre-feet)
AUTHORIZED INITIAL ALLOCATION – 1963			Projected Sediment Accumulation 1963 - 2014
Flood Control Storage -1963			
Initial	1033.0-1068.0	608,300	
After 50 years-(2014)	1033.0-1068.0	571,500	36,800
Conservation Pool -1963			
Initial	1033.0	36,500	
After 50 years (2014)	1033.0	22,300	14,200
REALLOCATION – 1976 Ultimate Development as Designed			Projected Sediment Accumulation 1963-2014
Flood Control Storage -1976			
Initial	1039.0-1068.0	562,100	
After 50 years-(2014)	1039.0-1068.0	531,300	30,800
Conservation Pool -1976			
Initial	1039.0	82,700	
After 50 years (2014)	1039.0	62,500	20,200
Resurvey – 1993			Sediment Accumulation 1963-1996
Flood Control Storage -1993			
Surveyed	1039.0-1068.0	565,297	2,733
Conservation Pool -1993			
Surveyed	1039.0	57,705	21,046
RESURVEY - 2000			Sediment Accumulation 1963-2000
Flood Control Storage -2000			
Surveyed	1039.0-1068.0	524,417	43,613
Conservation Pool -2000			
Surveyed	1039.0	50,501	28,250
WITHOUT REALLOCATION - 2000			
Flood Control Storage -2014			
Projected	1039.0-1068.0	511,729	56,301
Conservation Pool -2014			
Projected	1039.0	40,096	38,655

	POOL ELEVATION (feet)	STORAGE (acre-feet)	SEDIMENT DISTRIBUTION (acre-feet)
PROPOSED REALLOCATION – 2005 (Top Cons Pool = 1041 ft)			Sediment Accumulation 1963-2005
Flood Control Storage -2005			
Surveyed	1041.0-1068.0	507,254	39,382*
Conservation Pool -2005			
Surveyed	1041.0	67,664	32,481*
PROPOSED REALLOCATION – 2014 (Top Cons Pool = 1041 ft)			Sediment Accumulation 1963-2014
Flood Control Storage -2014			
Projected	1041.0-1068.0	495,411	55,456
Conservation Pool -2014			
Projected	1041.0	56,414	39,500
* These numbers reflect approximately 4,231 ac-ft of sediment that will be transferred from Flood Control Storage to the Conservation Pool between elevations 1039.0-1041.0 due to a pool raise.			

In summary, the proposed sediment reallocation is needed to reduce the significant impact to the conservation pool from higher than anticipated sediment volumes. Redistribution is needed to meet existing water supply agreements. With the conservation pool raised to elevation 1041.0, existing water supply contracts will be able to be maintained as was initially intended.

3.0 ECONOMIC ANALYSIS

3.1 Water Supply Demand Analysis

3.1.1 The KWO completed an assessment of long-term water supply availability for public water supply systems in the basin in 2002. They found that additional quantities of water would be needed for 34 public water supply systems to meet their projected 2040 demands (1998 data). The KWO has estimated that there is a 2% chance of drought in any given year, based on the continuous drought of record for years 1952-1957. The entire state of Kansas has been in drought conditions since 2010. Water supply sources throughout the state are well below normal conservation storage, including John Redmond Reservoir. While specific projections of future droughts are uncertain, the importance of increasing storage and regaining what has been lost to sedimentation processes is a key component of future water planning in the state.

Congress directed the USACE to look at raising the conservation pool and providing solutions for redistribution of the conservation and flood control pool as a result of uneven sediment deposition within the reservoir. The uneven sediment distribution has reduced the available water supply of John Redmond Reservoir and is infringing upon the existing water supply agreements between the Corps of Engineers and the KWO. Economic losses would be experienced from reduction in committed water supply especially during drought periods. John Redmond Reservoir provides the primary source of cooling water for the Wolf Creek Generation Station in nearby Burlington, Kansas. Kansas Water Office also uses its storage in John

Redmond to supply drought contingency flows to Wolf Creek Power Station (WC) and Cottonwood/Neosho River Basins Assurance District No. 3 (CNRB). Wolf Creek has contracted natural flow rights for 53,916 acre-feet a year, which equates to 48.13 average million gallons per day (MGD), from the Neosho River. Wolf Creek has a marketing contract with KWO to draw water from John Redmond in the event that natural flows fall below 250 cubic feet per second. Wolf Creeks peak actual usage form John Redmond occurred in 2002 at an average of 34.09 MGD.

The CNRB includes 21 cities, wholesale water suppliers, and industrial water users. John Redmond serves as a critical source of municipal and industrial water for the CNRB. CNRB serves an estimated population of 141,000 people. Population growth by the year 2060 is estimated to be 159,000 persons. The total water demand for this population is an estimate 15,000 acre feet with an average rate of growth in the next 50 years to be 1.4 percent. The District has contracted at John Redmond with natural flow rights for 3,500 Acre Feet per year, which equates to and 3.12 MGD. CNRB has contracted with KWO for 7.12% of available yield from the conservation pool.

Wolf Creek Generating Station in Coffey County, Kan., is an essential component of the local economy. Kansas City Power & Light Co. owns the plant and employs 1,028 persons according to the Nuclear Energy Institute. The plant provides power to about 29 percent of the State of Kansas. Along with the economic value of plant's energy output, the plant generates tax revenues and secondary jobs and income. Operation of the 1.2 megawatt facility increased Coffey County's economic output by $7.9 million and Kansas' economic output by $79.9 million in 2003. Adding the direct value of the plant's electricity generation brings the county's economic output attributable to Wolf Creek to $607.9 million in Coffey County and $680 million in Kansas. Without a reliable source of water for safe operations, reduction of conservation storage at John Redmond would impact the output of the plant consequently having an adverse impact on both the local and regional economy.

The population and economic conditions of the Neosho River Basin has not experienced much substantial growth over the past three decades. Changes in agriculture and the overall world economy have resulted in flatting and, in many instances a decrease, in job opportunities, income, and economic expansion. Many communities have lost population. This trend would most likely be accentuated by reduction of available water. With diminished availability of water due to lost conservation storage in John Redmond, the overall economic conditions of the basin would worsen for those living in the basin.

3.2 Analysis of Water Supply Alternatives

3.2.1 No Action - Maintain Current Operation

Under the no action alternative, the dam and reservoir would be operated as it is currently and there would be insufficient water supply storage at the design life to meet contractual agreements

between the Corps of Engineers and the KWO. The no-action alternative is not a viable option as it does not support the equitable redistribution of sediment reserve storage to achieve project purposes, as contemplated in the water supply agreements.

3.2.2 Groundwater

Groundwater has been found to be limited in the basin. It is not a viable alternative as a source of municipal and industrial water supply.

3.2.3 Surface Sources

Water supply storage totaling 37,450 acre-feet is provided by the John Redmond Reservoir water supply contracts through year 2014 as outlined in Table 4. There are no other surface water supply sources of any consequence in the study area. Construction of a new reservoir, while not seriously considered for this reallocation, may be a future alternative worth considering as John Redmond Reservoir reaches the end of its designed life.

3.2.4 Dredging of John Redmond Reservoir

The dredging of John Redmond Reservoir would result in an increase of storage capacity of the dam thereby increasing the amount of storage for flood control and water supply. A wide range of both beneficial and adverse impacts are possible for dredging alternatives, depending upon the method of dredging selected, dredge material disposal options, and resource category under evaluation. In addition, the significance of impacts would vary widely depending upon the scenario under evaluation. Evaluation of this full range of impacts is provided in Table 2-1 of the SFES (Appendix 8.1). It is possible that sediment contains lead from waterfowl hunters, and pesticides and fertilizers from runoff of agricultural lands. Dredging activities could possibly disturb these sediments, thereby exposing buried or settled contaminants. This may also adversely affect water quality total maximum daily loads (TMDL) standards for water quality as well as eutrophication in John Redmond Reservoir.

Dredging for the purpose of restoring the original storage capacity is not a viable option for federal participation at this time because of potential economic and environmental costs. Dredging of John Redmond Reservoir is estimated to cost about $49 million for restoring 8,275 acre-feet of storage. Additional costs could vary depending on methods used to dredge the material. If John Redmond Reservoir sediment is found to contain chemical residue, the cost of disposal could increase. However, because of the lack of other water supply sources and KWO interest, dredging may need to be reconsidered in the future. At the present time, the KWO has initiated the process to pursue a dredging option at John Redmond as a state-funded and implemented action.

3.2.5 Raising Conservation Pool Elevation from 1039.0 in 0.5-foot increments for pool elevations 1039.0, 1040.0, 1040.5, and 1041.0

There is no discernible difference in discharge duration or exceedance frequency of maximum discharge between these elevation levels. Raising the conservation pool in incremental increases would not fully recover water supply lost because of sedimentation. Sediment deposit volume within the conservation pool is estimated to be 28,250 acre-feet since 1976. Using findings from

the 2000 sediment resurvey, capacities projected for target year 2014 estimates that conservation storage from reallocation would only increase by about 7,700 acre-feet for elevation 1040.0 and 12,000 acre-feet for elevation 1040.5

3.2.6 Raising Conservation Pool Elevation from 1039.0 to 1041.0

Raising the water level of the conservation pool by 2 feet would provide sufficient additional storage to satisfy the terms of existing water supply agreements without significantly impacting flood control. Impacts to water quality and recreation would be mitigated. The KWO has provided funds to the US Fish and Wildlife Service directly for replacement costs related to this mitigation. Raising the conservation pool in one single pool raise is the preferred alternative.

3.3 Economic Impact on Other Project Purposes

3.3.1 Economic Effect

The economic effect of the John Redmond Reservoir reallocation includes those effects associated with flood control, conservation storage, and recreation. No other economic effects such as employment are evident.

3.3.2 Bulkhead Replacement

Operational maintenance of the reservoir required a new bulkhead since the top of the existing bulkhead is at elevation 1040 and the proposed top of conservation pool will be raised to elevation 1041.0. The bulkhead is required to have 2.0 feet of freeboard above the top of conservation pool. In 2012, the District made modifications to the bulkhead, using funds provided under the American Recovery and Reinvestment Act. With these modifications, the bulkhead can accommodate the pool rise associated with the reallocated storage.

3.3.3 Replacement Cost Allocation

The proposed pool raise will necessitate the replacement of facilities and habitat as detailed in Section 5.3.10 and the SFES. As is the case with all M&I storage reallocations that raise the conservation pool, the M&I user, as the beneficiary, must pay for the impacts of the pool raise. Any benefits that accrue to other project purposes are considered incidental. The KWO, as beneficiary, has already provided full funding to the US Fish and Wildlife Service, who has perform the replacement work. The State of Kansas has paid 195 thousand dollars (rounded) for the replacement of all recreation facilities associated with an anticipated pool rise.

3.3.4 Hartford Levee

The Hartford Levee is located upstream of John Redmond and was installed to prevent upstream flood damage due to the operation of John Redmond Dam. Dam Safety compliance, as contained in Engineering Circular 1110-2-6064, was reviewed with this reallocation to see if the proposed reallocation could possibly impact the Hartford Levee.

A change in the conservation pool from elevation 1039.0 to 1041.0 feet does affect the pool filling frequency of the lake but only for the most frequent events. The study shows that the

flood pool fills at about a 20-year frequency and has not changed due to the recommended pool change. Likewise, lower frequency events will not be effected up through and including the 100-year.

The Hartford Levee analysis considered the full range of frequency pool elevations and river discharges. The focus of the analysis for levee certification is to determine the level of protection of the levee based on the base flood level of the 100-year event. Since the frequency curve for the lake would change only minimally, especially in the range of the 100-year event, and since the analysis shows that the pool is below elevation 1044.0 for 90 percent of the time, and the minimum tailwater assumption used in the analysis was 1041.0, then the current frequency curve for the Hartford Levee is correct. The 100-year elevation of the exterior of the Hartford Levee based on the frequency analysis of the pool elevation and river stage is 1071.9. The corresponding top of levee elevation for this river stage is 1076.0.

The reallocation modification to the conservation pool from elevation 1039.0 to elevation 1041.0 will not significantly increase life safety risk associated with John Redmond Dam or Hartford Levee. Based on the reduction in risk due to construction of the inverted filter and the associated repair to the toe drain system and the associated construction of the relief well collector system, the life safety risk associated with the Hartford Levee is minimal. The results of the Periodic Assessment for Hartford Levee and the inverted filter completion report were presented to the Dam Senior Oversight Group (DSOG) in July 2012. The DSOG recommended the Dam Safety Action Classification (DSAC) be revised from a DSAC II to a DSAC IV for Hartford Levee; Mr. James Dalton, USACE Dam Safety Officer concurred with this rating in July 2012 and officially revised the DSAC rating by memorandum dated October 22, 2012.

3.3.5 Flood Control

Raising the conservation pool 2 feet into the flood control pool will result in an estimated 3.18% reduction in flood storage volume. The USACE maintains existing flowage easements within the reservoir.

An analysis of downstream flow-duration and frequency curve data showed little measurable increases in flood stages at most downstream locations (Table 6). The flow frequency analysis was performed using SUPER, the Southwest Division reservoir system simulation program. SUPER modeled a 56-year period of record (years 1940-1995), with local hydrology based on observed gage data within the basin. The stages were calculated using available stream gage rating data.

Table 6: Downstream Stage and Discharge For Pool Elevations 1039.0 and 1041.0*

GAGE	POOL AT 1039.0		POOL AT 1041.0		STAGE DIFFERENCE (feet)
	DISCHARGE (cfs)	STAGE (feet)	DISCHARGE (cfs)	STAGE (feet)	
BURLINGTON					
Storm Return Interval (Years)					
83	143,142	42.29	144,072	42.34	**0.05**
33	19,193	25.55	20,234	26.48	**0.93**
20	17,249	23.78	17,587	24.09	**0.31**
10	16,445	23.04	16,461	23.06	**0.02**
5	15,369	22.04	16,291	22.9	**0.86**
2	14,026	20.78	15,114	21.8	**1.02**
1	12,020	18.86	12,016	18.86	**0.00**
IOLA					
Storm Return Interval (Years)					
83	289,238	40.80	290,285	40.82	**0.02**
33	68,702	32.76	69,170	32.82	**0.06**
20	62,628	31.99	63,120	32.05	**0.06**
10	46,229	29.57	46,635	29.64	**0.07**
5	43,866	29.17	44,328	29.25	**0.08**
2	39,114	28.32	39,114	28.32	**0.00**
1	38,932	28.29	38,931	28.29	**0.00**
PARSONS					
Storm Return Interval (Years)					
83	358,266	37.53	359,319	37.55	**0.02**
33	102,061	31.16	102,452	31.18	**0.02**
20	63,990	28.98	64,018	28.98	**0.00**
10	63,606	28.95	63,608	28.95	**0.00**
5	60,214	28.71	60,831	28.76	**0.05**
2	54,654	28.29	54,649	28.29	**0.00**
1	51,480	28.06	51,480	28.06	**0.00**

TABLE 6 (Continued)

GAGE	POOL AT 1039.0		POOL AT 1041.0		STAGE DIFFERENCE (feet)
	DISCHARGE (cfs)	STAGE (feet)	DISCHARGE (cfs)	STAGE (feet)	
COMMERCE					
Storm Return Interval (Years)					
83	223,682	31.17	224,700	31.2	**0.03**
33	108,058	25.79	108,057	25.79	**0.00**
20	107,220	25.74	107,693	25.77	**0.03**
10	84,650	24.3	84,650	24.3	**0.00**
5	78,819	23.87	78,823	23.87	**0.00**
2	78,432	23.85	78,432	23.85	**0.00**
1	77,485	23.77	77,511	23.78	**0.01**
* Analysis done using SUPER, the Southwest Division reservoir system simulation program.					

The only measurable stage difference between pre and post reallocation occurs near the city of Burlington and most significant increases are for flood events that are within the channel capacity or below the National Weather Service (NWS) established flood stage of 27.00 feet. There was no measurable change in stream gage values at Iola, Parsons, and Commerce. The project regulating discharge for the Burlington gage location is 23.0 ft as set by the Corps for normal flood control operations. The NWS flood stage is set at 27.0 ft, at which some minor agricultural flooding begins on the east side of the Neosho River. Out of bank urban flooding in the Burlington area occurs around a stage of 29.0 feet. The first floor elevations of improvements in the low lying areas near Burlington are at this stage. Based on the above data, the potential flood control benefits lost are minor after considering additional hydraulic modeling results which refine earlier hydrologic modeling to illustrate inundation impacts.

A structure count for each floodplain was completed for the pre (1039ft.) and post (1041ft.) reallocation floodplains. Coffey County, KS assessor's office provided GIS layers with parcel information. Replacement minus depreciation values were obtained through the assessor's office. Coffey County, KS was the only county included in the analysis, because Coffey County is the only area with a measureable difference between the pre- and post-conditions. The city of Burlington, KS is located within five miles downstream of the dam. Further downstream, the area is primarily rural land. There is a difference of less than one foot between the pre and post reallocation floodplains for the more frequent within banks flows and the pre and post reallocation floodplains converge to essentially no difference at the 100 year event. Table 7 shows the floodplain inventory in Burlington, KS at the different events and Table 8 shows the structure values in the 100 year floodplain. Figure 3 shows a map of Burlington, KS at the 100–year event.

Table 7: Floodplain Inventory in Burlington, KS

Event	Pre-Reallocation Conservation Pool (elevation 1039.0)					Post-Reallocation (elevation 1041.0)				
	Residential	**Commercial**	**Industrial**	**Public**	**Total**	**Residential**	**Commercial**	**Industrial**	**Public**	**Total**
1-year	5	4	0	0	**9**	5	4	0	0	**9**
2-year	5	4	0	0	**9**	5	5	0	0	**10**
5-year	5	5	0	0	**10**	6	5	0	0	**11**
10-year	6	5	0	0	**11**	6	5	0	0	**11**
20-year	6	5	0	0	**11**	6	5	0	0	**11**
33-year	6	6	0	0	**12**	6	6	0	0	**12**
83-year	96	51	2	2	**151**	96	51	2	2	**151**
100-year	372	105	6	3	**486**	372	105	6	3	**486**

Figure 3: Map of Burlington, KS 100 - year event

Table 8: Burlington, KS Structure Values

Burlington, KS Structure Values in the 100-yr Floodplain ($1,000's)				
Residential	Commercial	Industrial	Public	**Total**
$32,224.97	$9,816.98	$4,568.72	$3,120.02	**$49,730.69**

A windshield survey was completed in Burlington and Le Roy, KS. During the survey the structure types were verified with the assessors' data and first floor elevations were determined. A first floor elevation was determined for each structure type (residential, commercial, industrial, public, and mobile home). One economic reach was made for the study, Coffey County, and this reach extends from below the dam to the county line. A description for this reach and its associated gage stations can be found in Table 9 below.

Table 9: Economic Reach Description

Reach	Beginning Station	Ending Station	Description
Coffey County	306.033	342.7	Below Dam to County Line

Hydrologic Engineering Center- Flood Damage Analysis software (HEC-FDA) 1.2.4, which was developed by the U.S. Army Corps of Engineers Hydraulic Engineering Center, was used to calculate flood damages to structures and their contents. HEC-FDA uses a cross section within each reach, the structures first floor elevation, and depth-damage relationship to determine the amount of damage that occurs at certain water surface elevations. Expected annual damages were determined for the pre and post reallocation alternatives. A loss in flood control benefits of $23,260 was determined. The $23,260 represents the annual benefits lost, and an increase of only 2.6% in expected annual damages from without reallocation to with reallocation. The increase in damages is a result of slightly greater depths in the floodplains between the pre and post reallocation floodplains. The post five year event has one more structure then the pre reallocation floodplain. Table 10 below summarizes the results.

Table 10: Expected Annual Damages

Plan	**Expected Annual Damages ($1,000's)**
Pre-Reallocation (elevation 1039.0)	884.24
Post-Reallocation(elevation 1041.0)	907.5
Damage Reduced	**-23.26**

Risk based analysis is required in flood damage studies. The economic model that was used for evaluations, HEC-FDA, allows for uncertainty to be entered into the model. HEC-FDA uses Monte Carlo simulations, which is a numerical analysis procedure that computes the expected

value of the damages, while accounting for the uncertainty in the parameters that were used to determine flood damages. The future with and without-project alternatives were evaluated using HEC-FDA with risk and uncertainty for property values, contents values, and first floor elevations. These results are included in Table 11. Flood inundations were developed for all flood levels noted in Table 7 that cause "out of bank" flooding. Hydraulic information was provided for analysis in the program FDA to support incremental damages between the with and without pool raise conditions. Risk and uncertainty for the backwater analysis has been developed consistent with ER 1105-2-100; however, regardless of the uncertainty within the model, the computation of the difference in water levels computed in the hydraulic model will be very precise since the only element changing within the model is the discharge.

Table 11: Probability of Damage Reduced

Probability that Damage Reduced Exceeds Indicated Values ($1,000's)			
Probability	**0.75**	**0.5**	**0.25**
Damage Red.	-8.62	-13.45	-24.36

Recreation benefits should be slightly enhanced with the 2-foot raise in the conservation pool. This is because raising the water level of the conservation pool would result in additional water which would result in better water quantity and quality downriver. This would benefit downriver fishing. The newly flooded shoreline vegetation would enhance fishery and waterfowl habitats as well, providing a short-term economic benefit for waterfowl and fishing recreation activities.

3.3.6 Conservation Storage

Raising the conservation pool from 1039.0 to 1041.0 will result in an estimated increase of 17,200 acre-feet of additional conservation storage. It would provide sufficient storage to meet KWO's water supply requirements, satisfy the terms of existing water supply agreements, and maintain storage for water quality requirements. Without the conservation pool raise, economic losses could be experienced from reductions of committed water supply.

3.4 Approved Cost Allocation

There is no allocation of first costs for the reallocated storage since KWO has fully paid the updated costs of storage under the two water supply agreements and its undivided share of conservation storage will not increase. The purpose of the reallocation is to partially offset the disproportionate distribution of sediment in the conservation pool, in accordance with the terms of the existing water supply agreements, and maintain the usable storage space for each project purpose to be generally in line with project design.

4.0 DERIVATION OF USER COST

There is no change in user costs associated with the proposed reallocated storage. The proposed reallocation study has been initiated so that existing water agreements between the Corps of

Engineers and the KWO can be maintained through year 2014. However, KWO will fund the costs of replacement measures and facility modifications needed to implement the reallocation.

4.1 Revenues Forgone and Cost Account Adjustments

There are no hydropower capabilities at John Redmond Reservoir; therefore, there would be no revenues forgone or cost account adjustments.

4.2 Cost of Storage Analysis

There are no storage costs to calculate since KWO has fully paid the updated costs of storage under the two water supply agreements and its undivided share of conservation storage will not increase. The purpose of the reallocation is to partially offset the disproportionate distribution of sediment in the conservation pool, in accordance with the terms of the existing water supply agreements, and maintain the usable storage space for each project purpose to be generally in line with project design.

5.0 OTHER CONSIDERATIONS

5.1 Test of Financial Feasibility

The second most likely alternative considered was dredging the reservoir. The projected cost for the dredging alternative was $49 million. The no-action alternative cannot guarantee the fulfillment of existing water supply contracts. The proposed storage reallocation is the best alternative.

5.2 Cost Account Adjustments

There are no cost account adjustments because there is no hydropower at John Redmond Reservoir.

5.3 Environmental Considerations

To comply with the National Environmental Policy Act (NEPA) of 1969, a Supplement to the Final Environmental Statement (SFES) was prepared. As required under the Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations (CFR) 1502.14(e)), a preferred alternative is identified in Chapter 2.0, "Description of Proposed Action and Alternatives." For purposes of the NEPA analysis, direct environmental consequences/impacts, both positive and negative, were analyzed for the water storage reallocation.

Potential environmental impacts are measured against the existing 1039.0 conservation pool elevation. This "baseline" is used to compare the changes in the conservation pool level to assess impacts on the existing environment. Raising the conservation pool will affect nine resource areas. Resource areas considered were: (1) geology and soils; (2) hydrology and water resources; (3) biological resources; (4) air quality; (5) aesthetics; (6) prime or unique farmlands;

(7) socioeconomic resources, (8) cultural resources; and (9) hazardous, toxic, and radiological wastes. Consideration of potential benefits gained and lost is discussed below.

5.3.1 Geology and Soils

Reallocation to the raised pool elevation of 1041.0 would result in minor increased flooding of approximately 405 acres of potentially unique or prime farmland soils upstream of the John Redmond Reservoir. This acreage is already impacted by flood events at the current conservation pool elevation (1039.0) and the current seasonal pool elevation (1041.0). The impact to unique or prime farmland downstream of John Redmond Reservoir as a result of reduced flood control is considered insignificant. For the long term, there would be an insignificant adverse effect on this resource within the conservation pool and downriver of John Redmond Reservoir.

5.3.2 Hydrology and Water Resources

The 3.18% reduction in flood control storage would result in a long-term minor effect on flooding above and below the reservoir. Above the reservoir, minor flooding effects would be experienced on project lands. The SFES indicates that no impacts to private lands would occur. The USACE holds fee title to approximately 29,801 acres of land associated with John Redmond Reservoir (JRR), and has flowage easements on an additional 10,502 acres. The District's analysis of downstream flow-duration and frequency curve-duration data shows little measurable increases in flood stages at downstream locations.

The SFES also indicates that an increase in the conservation pool would improve water quality by slightly reducing the concentrations of contaminants and suspended sediment in the reservoir. This would also result in a slightly reduced sediment transport through the reservoir. However, the loss of sediment transport within the river system will be correspondingly made equalized by increased erosion of the stream bed downstream of John Redmond Reservoir. Improved water quality and sedimentation transport would be considered negligible.

The reduction in flood control capacity at John Redmond Dam is currently minimized to the extent possible by the Corps of Engineers reservoir operating procedures. Because of the reservoir operating procedures currently in place, the adverse impact downriver is considered insignificant. Additional flowage easements are not required. Flood release notification guidelines will also be used to provide information on future downstream releases to the public.

5.3.3 Biological Resources

The USACE holds fee title to approximately 29,801 acres of land associated with JRR, and has flowage easements on an additional 10,502 acres. The USACE manages JRR (9,710 acres at the current conservation pool level of 1039.0 feet above mean sea level) and 3,160 acres of adjacent land. USACE leases 18,500 acres to the USFWS and 1,472 acres to the Kansas Department of Wildlife and Parks. Effects on biological resources of the proposed action would result in the inundation of woodland, cropland, grassland, and wetland resulting in loss of existing vegetation. The impacts on biological resources appear to be minor in the long term. Replacement measures are included to offset these impacts. Biological resources impacts are as follows:

- Shoreline vegetation would be inundated, including wetland habitat totaling approximately 270 acres. Backwater effects on the moist soil units managed by Flint Hills National Wildlife Refuge (FHNWR) would increase. This loss would be considered significant.
- Disturbance, alteration, or destruction of wildlife and plant species. This loss would be considered adverse but insignificant.
- Loss of wildlife habitat over the life of the project. This loss would occur for 2-5 years until new habitat is created.
- Aquatic habitat would be slightly improved with the additional water surface area. There would be positive, but minor improvements to fisheries and aquatic wildlife.

5.3.4 Air Quality

There would be no adverse or beneficial effect to air quality.

5.3.5 Aesthetics

There would be an inundation of woodlands, scrublands, grasslands, and wetlands, resulting in drowned vegetation. Approximately 195 acres of woodland would be affected in the conservation pool. This action would be considered a short-term insignificant negative effect.

5.3.6 Prime or Unique Farmland

Approximately 405 acres of potentially farmable acreage would be inundated. Since this reallocation involves land already in the Corps of Engineers' ownership, and subject to frequent inundation, the farmland acreage is exempt from the Farmland Protection Policy Act. This farmland is already compromised as it currently floods at least three months annually. Downriver, there will be negligible increased flooding.

5.3.7 Socioeconomic Resources

Raising the pool to elevation 1041.0 would increase the frequency of flooding of some roads and facilities on the Flint Hills National Wildlife Refuge. Because the roads are routinely inundated at the 1041.0 foot level and above during rainfall impoundments, replacement of roads and facilities is anticipated to be relatively minimal. The effect of raising the pool would pose a long-term, but insignificant effect.

Raising the pool would result in a slightly greater temporary loss of Strawn boat ramp and parking area facilities. Some recreation facilities could be temporarily affected.

Raising the pool would routinely inundate an additional 556 acres of dry land within John Redmond Reservoir, or about 2% of the land which is fee owned by the Corps of Engineers. All impacted lands are fee owned by the federal government. A total of 722 acres would be inundated of which 166 acres consists of ponds and streams. The 556 acres consists of 51 acres

of cropland, 40 acres of grassland, 195 acres of woodland, and 270 acres of aquatic wetland. Raising the pool would result in insignificant short-term adverse effects to recreation resources.

Downriver from John Redmond Reservoir there would be no discernible adverse economic impact or land use effects. The District's analysis of downstream flow-duration and frequency curve-duration data shows little measurable increases in flood stages at downstream locations. Some flooding of agricultural lands and pecan orchards will likely continue during high flow conditions; however, these effects should be minimal.

Area and county roads, including the bridge on SH 130, will not be affected by the reallocation. Access roads within the affected Federal lands would be flooded more frequently. These long-term effects would be insignificant.

5.3.8 Cultural Considerations

In accordance with Section 106 of the National Historic Preservation Act of 1966 (as amended), the U.S. Army Corps of Engineers, Tulsa District, in consultation with the Kansas State Historic Preservation Office (SHPO), conducted cultural resources investigations at John Redmond Reservoir in 2000 and 2001. These efforts sought to assess and possibly locate the condition of up to 67 archaeological sites previously identified within the area of potential effects of the pool raise. In addition, four additional previously unrecorded archaeological sites were identified in this investigation. Many of the previously recorded sites were not re-located; many were determined to have been either destroyed or heavily impacted by various activities. Eight sites were recommended for further examination to determine eligibility for listing on the National Register of Historic Places (NRHP).

In 2001, the U.S. Army Corps of Engineers, Tulsa District initiated subsurface investigations at six of the eight sites. At the conclusion of these investigations, five of the eight sites were determined eligible for listing on the NRHP as a historic site. Two of the eight sites were not eligible without conducting further work.

In 2004, the U.S. Army Corps of Engineers, Tulsa District coordinated National Register eligibility determinations for the five sites with the Kansas SHPO. The Corps of Engineers additionally determined that these five sites would be adversely affected by the raise in conservation pool at John Redmond Reservoir. However, the Kansas SHPO disagreed with Tulsa District's determination of eligibility for the five sites and associated historic district and the determination of adverse effect. The Corps of Engineer subsequently re-evaluated the issue and agreed with the opinion of the Kansas SHPO of not eligible for listing on the NRHP for the five archaeological sites and associated historic district. Therefore, the proposed pool raise will have no effect on historic properties.

In summary, the U.S. Army Corps of Engineers, Tulsa District has complied with the requirements of Section 106 of the National Historic Preservation Act of 1966 (as amended) for the conservation pool raise at John Redmond Reservoir. No mitigation is required for cultural resources.

5.3.9 Hazardous, Toxic, Radioactive Wastes

There is no anticipated effect from the proposed reallocation.

5.3.10 Replacement Measures

Six measures were recommended by the U.S. Fish and Wildlife Service to replace the physical structures and man-made improvements that would be inundated by the pool raise. The U.S. Army Corps of Engineers evaluated the mitigation/replacement measures and issued its recommendation for John Redmond Reservoir replacement measures and concurred with the USFWS recommendations. All replacement facilities are now in place in anticipation of the pool raise, consequently there are no adverse impacts to recreation benefits.

Under Corps planning policy regulations, a formal Habitat Evaluation Procedures (HEP) and incremental analysis to formulate mitigation measures is typically required. As agreed upon by all parties involved, mitigation for impacts as a result of the pool raise involved replacement of manmade structures and facilities. As such, the typical HEP analysis was not completed in this study. A more general qualitative approach was taken where specific replacement measures involved replanting of previously constructed moist soil units/wetlands on the Flint Hills National Wildlife Refuge at a ratio of one acre impacted to one acre replaced (1:1). The State of Kansas is responsible for these replacement measures as a part of the project costs, and has already provided full funding for replacement costs, and replacement construction is complete.

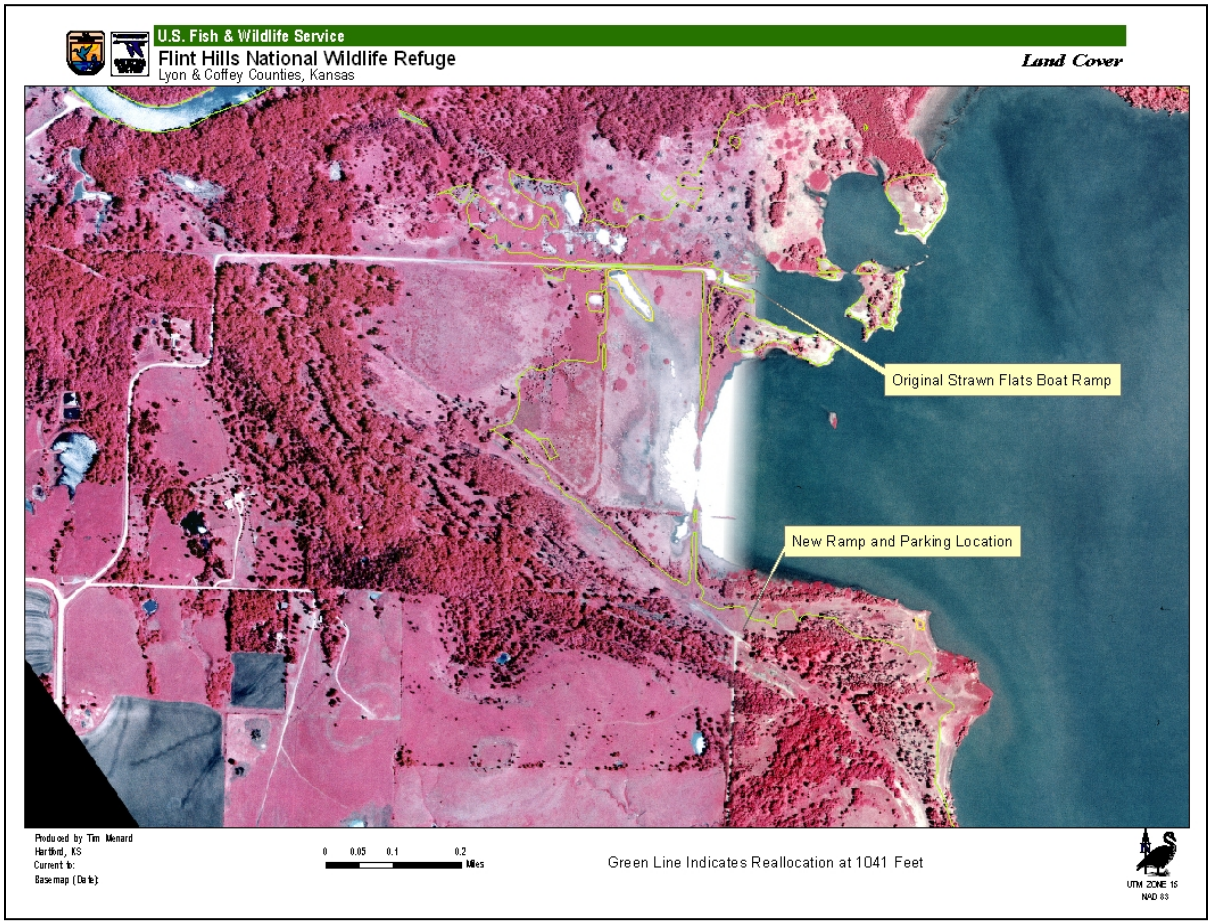
The other replacement measures that the Kansas Water Office has agreed to fully pay for and replace through state and local funding are:

1. Boat Ramp and Parking Area Replacement

   The existing Strawn Flats boat ramp and parking lot on the FHNWR would be inundated by the proposed pool raise. Replacement of the facilities to a suitable area nearby can was accomplished south of the existing location in the Fitch Hill area (Figure 4). The new location is above 1041 NGVD and was recently identified as the best location for replacement after a site visit by interested parties on 1 February 2008. Garner Road, which currently provides access to the area, is a county-owned and maintained public roadway, thereby rendering this location most feasible. The replacement cost of the boat ramp and parking lot was $10,722, and has been provided by KWO to the US Fish and Wildlife Service.

   Current primary users of the Strawn Flats Boat Ramp (which would be inundated by the pool raise) are fishermen and waterfowl hunters. The USFWS estimates that around 1,000 boating visits to the lake are made annually via this ramp facility. There is one other ramp located on the south side of the lake that may be used as an alternate launch facility. However, access to Strawn Flats from this alternate ramp involves a 3- to 4-mile trip across the lake, often under treacherous wind and wave conditions. Replacement of this ramp facility was therefore imperative to continued access and use of lake resources in this area.

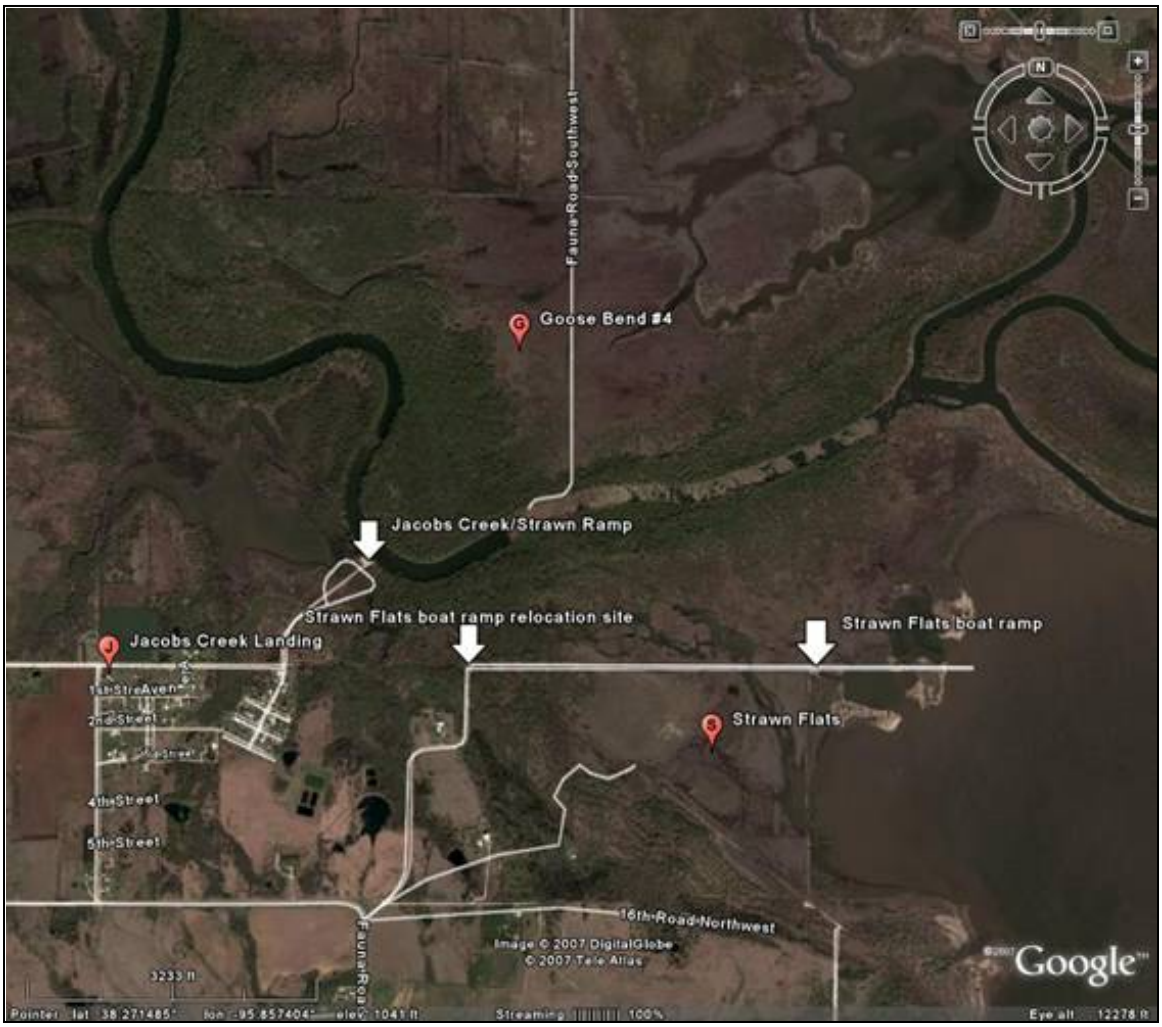
Figure 4: Original Strawn Flats Boat Ramp and proposed relocation area



2. <u>Replacement of Strawn Flats and Goose Bend #4 Dikes, Outlet Works, and Pumping Facilities</u>

   The existing Strawn Flats and Goose Bend #4 dikes, outlet works and pumping facilities (Figure 5) would be inundated and subject to damaging increased wave action/erosion. The USFWS proposed to raise the existing dikes and pump site two feet to maintain operability of the facility. Therefore, this measure was accomplished with modification to existing facilities and relocation and complete reconstruction would not be required. These dikes, outlet works, and pumping facilities are critical to refuge operations for wildlife and habitat management. They therefore require modification to ensure their continued operation and protection when the proposed pool rise is complete. The cost to raise the dikes and pump site was $30,000, and the KWO provided funding to the US Fish and Wildlife Service for this work.

Figure 5: Strawn Flats and Goose Bend #4



3. <u>Replacement of Wetlands and Riparian Woodlands</u>

The Corps of Engineers recommended that 243 acres of wetland / moist soil units and 166 acres of riparian woodlands would need to be replaced on the Flint Hills National Wildlife Refuge. The specific location was be jointly determined by the Corps of Engineers, the U.S. Fish and Wildlife Service, and the Kansas Department of Wildlife and Parks. The 243 acres of wetlands were replaced 'one-for-one' at various locations within the refuge (areas shaded in blue in Figure 6) which can generally be described as the Hartford Units. Replacement of wetlands will maintain the current level of habitat for waterfowl, shorebirds, and other water birds, and will complement existing wetlands surrounding the Hartford area. These units are critical for the benefit of migrating waterfowl, and for the mission supporting establishment

of the turkey and deer hunting. These units within the refuge improve water quality from the Neosho River by filtering out sediments before water is released from the refuge back to John Redmond Lake. Replacement locations are abandoned agricultural fields in low lying areas on FHNWR. The low areas were excavated out at a 9:1 slope and designed to be flooded during high water periods. Replacement of wetland units are critical to continued operation of the FHNWR and its mission.

The USFWS proposed to replace the 166 acres of lost riparian woodlands along existing riparian borders at various locations on the refuge. Riparian woodlands provide important habitat for a variety of fish and wildlife species and have positive benefits to receiving water quality. Their replacement is therefore critical to refuge management. Three hundred bur oak and pecan tree seedlings were be planted and treated with herbicide. The total cost for both wetland and riparian woodland replacement is shown in Table 12, and has already been provided to the US Fish and Wildlife Service by the KWO. Table 13 presents a summary of the environmental impacts for the proposed action of a pool raise from elevation 1039.0 to 1041.0.

4. Neosho Basin Management Plan

The Neosho Basin Management Plan will be updated by the Kansas Water Office with input from the Corps of Engineers reservoir operations. Plan and development cost would be a responsibility of the Kansas Water Office.

5. Annual Water Level Management Plan

The Corps concurs that an annual water level management plan that is compatible with the new conservation pool and its operations is needed. Development of the plan would need to be drafted by the KWO and the Kansas Department of Wildlife and Park (KDWP) and would be a modification of previous water level management plans. Plan costs would be the responsibility of State and local groups. New water management plans would need to be evaluated against authorized project purposes and approved by the Corps of Engineers

6. Post-Development Impact Evaluation Studies for Wetland Development above Elevation 1041.0

The Corps of Engineers concurs that a post-development Impact Evaluation Study is needed. Plan cost and development would be a responsibility of State and local groups. Impacts will be measured over a five year period.

Figure 6: Wetland Replacement Areas (243 acres total)

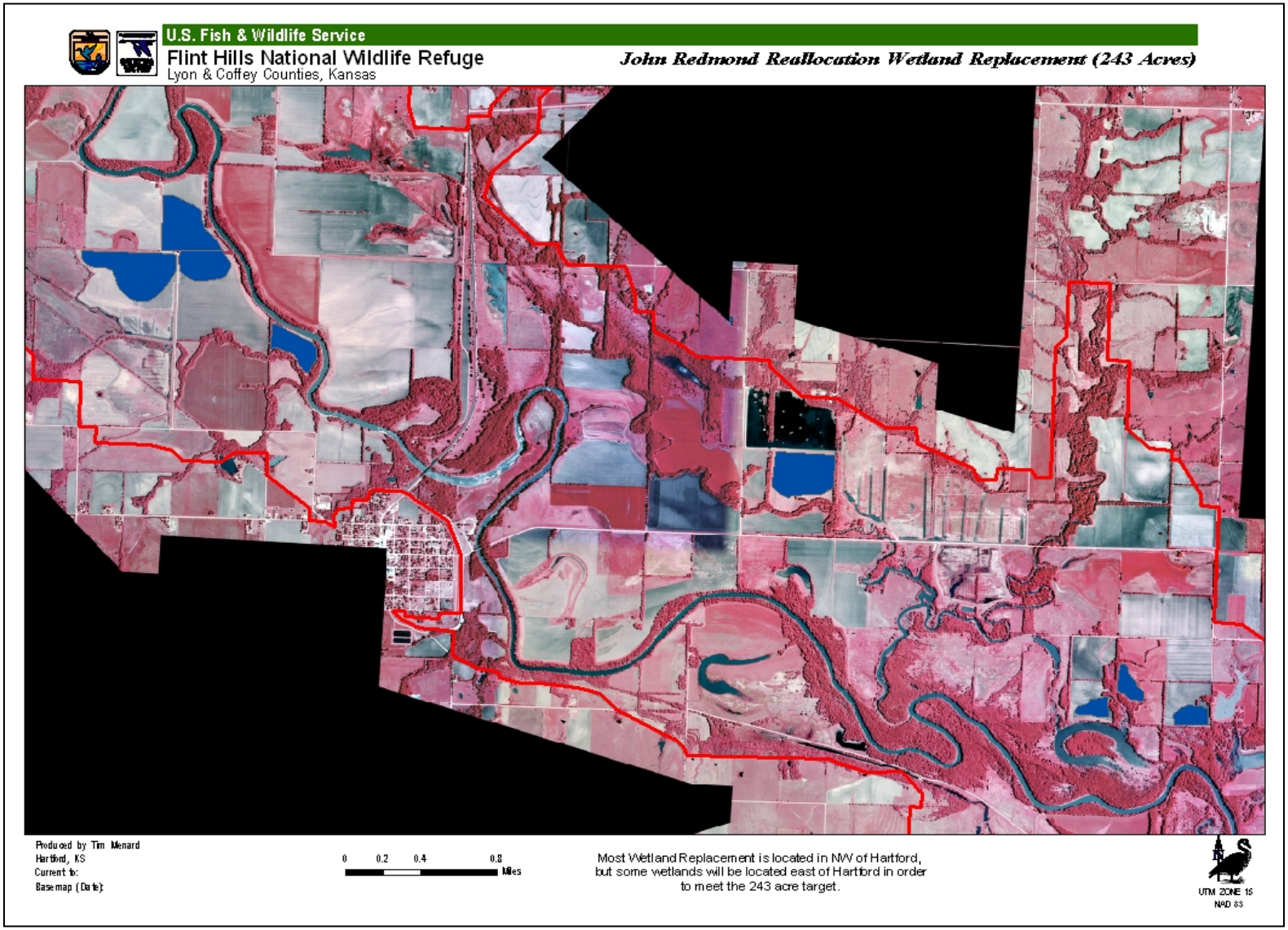


Table 12: Cost for Replacement of Features Affected by John Redmond Pool Raise

John Redmond Pool Rise Replacement Costs	USFWS Original Quoted Estimate	USFWS Actual Costs		2009 Agreement	2010 Addendum	2012 Addendum
Boat Ramp and Parking Area Replacement	$ 125,000	$ 10,722				$ 10,722
Strawn Flats and Goose Bend #4 Dikes, Outlet Works and Pumping Facilities	$ 46,500	$ 41,520				$ 30,000
Replacement of Riparian Woodlands and Wetlands						
Replacement of Wetlands						
Hartford NE Wetlands		$ 30,152		$ 30,152		
Hartford 2 Wetlands	$ 245,356	$ 48,204			$ 48,204	
Bench 3 Wetlands		$ 23,988				$ 23,988
Hartford 5 Wetlands		$ 16,744				$ 16,744
Replacement of Riparian Woodlands	$ 53,400	$ 34,982		$ 34,982		
Total	**$ 470,256**	**$ 206,312**		**$ 65,134**	**$ 48,204**	**$ 81,454**
Total KWO Costs Under 2009 Agreement and Addendums				**$ 194,792***		
* Replacement feature completion was completed by the KWO in 2012 (as referenced in Appendix II), satisfying all of their obligations as described in the SFES.						

Table 13: Environmental Impacts of Pool Raise and Replacement Measures

Resource	Potential Impacts of Action
Geology and Soils	Inundation of approximately 405 acres of potentially farmable land upstream within John Redmond Reservoir, which USACE owns in fee. USACE holds fee title to approximately 29,801 acres of land associated with JRR and has flowage easements on an additional 10,502 acres. Only 51 acres currently is reported as cropland on USACE owned land. Farmland is exempt from the Farmland Protection Policy Act since it is already of Corps owned land and is routinely inundated. Inundation would result in insignificant adverse effects. *Mitigation Measures: No mitigation.*
Hydrology and Water Resources	Minimal change in water flow releases. Takings Analysis not required. No additional real estate interest is needed because there will be minimal change in downstream flooding. No change to groundwater elevation. Minor loss in flood control storage (16,300 acre-feet or 3.18% of flood pool) Significant beneficial effect in available water conservation storage. *Mitigation Measures: No mitigation.*
Biological Resources	Of the 556 acre inundation; 270 acres is wetland terrestrial wildlife habitat. The acreage affected is fee owned by USACE and does not include privately owned land. Minor temporary loss of wildlife habitat over 2-5 years. Aquatic habitat slightly improved with positive effect on fisheries and aquatic wildlife. Increase in inundation frequency of the original floodplain adjacent to John Redmond Reservoir Lake. *Mitigation (replacement) measures: replace 243 acres of wetland area and 166 acres of riparian woodland area. Replace Strawn Flats ramp and parking area and Goose Bend Dikes outlet works, and pumping facilities. All replacement measures agreed to by the Kansas Water Office have been completed.*
Air Quality	No change in air quality.

TABLE 13 (Continued)

Resource	Potential Impacts of Action
Aesthetics	195 acres of woodland below conservation pool would be inundated. *Mitigation Measures: See Replacement of Biological resources.*
Prime or Unique Farmland	Insignificant adverse flooding of 405 acres of potentially farmable farmland which is exempt from Farmland Protection Policy Act. Downriver, there will be negligible increased flooding with 3.18% reduction of flood control storage. *Mitigation Measures: No mitigation.*
Socioeconomic Resources	Minimal potential flooding of some roads and facilities on the Flint Hills National Wildlife Refuge. Inundation of 556 acres of land surrounding John Redmond Reservoir. No discernible adverse economic impact or land use effects downstream of John Redmond Reservoir. With reallocation from the flood control pool, there is potential for increased downstream flood risks. However, hydrological and economic analyses of the impacts indicates those changes to be minimal. Inundation of Strawn Flats boat ramps and parking lot. *Mitigation Measures: See Mitigation (replacement) of Biological Resources*. There are no recreation impacts. Informational and public awareness programs for downriver entities will be developed as part of normal project operations by USACE and State of Kansas.
Cultural Resources	No National Register-eligible sites within the 1041.0 elevation conservation pool. Section 106 compliance complete. *Mitigation Measures: No mitigation measures.*
Hazardous, Toxic, Radioactive Wastes	No known issues. *Mitigation Measures: No mitigation.*

5.3.11 ADMINISTRATION GOALS. The identification and evaluation of alternatives for this reallocation study were guided by the Corps' 26 March 2002 Environmental Operating Principles (EOPs), and the USACE Campaign Plan.
The Environmental Operating Principles are:

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all Corps activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet our corporate responsibility and accountability under the law for activities undertaken by the Corps, which may impact human health and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic, and social knowledge to understand the environmental context and effects of Corps actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in Corps activities.

Throughout the reallocation study, the views of agencies, groups, and individuals were sought through a public review process of study alternatives and results. Analyses sought to find both an economic solution for a critical water supply need for the State of Kansas as well as environmental sustainability through replacement of critical facilities to be inundated by the proposed conservation pool raise at John Redmond Lake. Risk management played an important role in considerations of levee safety with respect to ensuring appropriate repairs to the Hartford Levee prior to further considerations of pool level increases.
Goal 2 of the USACE Campaign Plan is aimed at engineering sustainable water resources for the Nation. Specifically, Goal 2a is to deliver integrated, sustainable, water resource solutions. Goal 2b is to implement collaborative approaches to effectively solve water resources problems. These goals guided the development of this reallocation study for John Redmond Dam and Reservoir, KS.

6.0 NEPA DOCUMENTATION (Views of Public, State, Federal and Local Interests)

Official notification of the scoping period began with publication of the Notice of Intent (NOI) on March 7, 2001, in the *Federal Register*. Two public scoping meetings were held in conjunction with the notice, the first in Burlington, Kansas (March 29, 2001), and the second in Chetopa, Kansas (April 5, 2001). An advertisement for the scoping meeting was placed in the Coffey County Republican newspaper on March 14, 2001. A total of 30 individuals were present in each meeting and represented citizens and county, State, and Federal agencies.

Publication of the Draft Supplemental to the Final Environmental Statement (DSFES) was announced in the Federal Register on 28 June 2002 and the DSFES was circulated for agency

and public review comments from 11 July 2002 to 11 September 2002. Copies of all agency letters, as well as substantive written comments received from the public are included in Appendix H of the final SFES. Comments were received from two Federal agencies (U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service), two state agencies (Kansas Historical Society, Kansas Water Office), two local agencies, and the general public. Substantive comments and responses to these comments are provided in Table 1-2 of the final SFES starting on page 1-14.

A Biological Assessment (BA) was submitted to the USFWS as part of the coordination undertaken to comply with the Endangered Species Act. The USFWS concurred with the Corps' determination that the reallocation of storage at John Redmond would not likely adversely affect Threatened and Endangered species over and above current operations. Specific coordination with the USFWS can be found in Appendices C and D in Volume II of the SFES. The BA can be found in Appendix D. The mitigation/replacement elements discussed in this report can also be found in Appendix D.

Informal contact with State and Federal resource agencies also was conducted, in a workshop format, informing them of the proposed rise in the pool level and date and time of the workshop. Of those attending the workshop, the following summarizes the comments from individuals:

- Remove the logjam at Jacob Creek
- Logjam is causing increased flooding in the upper reaches of the lake and is flooding wildlife management areas, cropland, and is affecting the Kansas Department of Wildlife and Park's (KDW&P) seasonal pool manipulation plans.
- High pools isolate non-easement lands preventing farmers from harvesting crops.

In response to the NOI and agency notification, a total of 17 comment forms, letters, and e-mails were received. The content of the comments are similar to the concerns expressed at the public meetings, and include:

- Three respondents were for the 2-foot raise in water level.
- Nine opposed the reallocation due to loss of flood control storage.
- Three wanted the lake to be dredged.
- Four noted that habitat would be affected
- Two noted that it would improve recreational opportunities and one was opposed because it was done strictly to benefit recreation.
- Three stated that the logjam needs to be removed.
- 101 individuals from the area signed a petition for removal of a logjam 0.9 miles east of the Jacob Creek boat ramp.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Summarization of Findings

Based on the evaluation of several alternatives, the recommended alternative is to increase the top of the conservation pool elevation from 1039.0 to 1041.0 feet NGVD to comply with storage contract agreements. Congressional approval would normally be needed for storage reallocation that would involve major structural or operation changes. Fifteen percent of total storage capacity allocated to all authorized project purposes or 50,000 acre-feet, whichever is less, may be reallocated for water supply at the discretion of the Commander, HQUSACE. The proposed reallocation is for 17,200 acre-feet and falls within this approval authority. Due to the atypical nature of this reallocation, HQUSACE has determined that the Reallocation Report will be forwarded to the ASA (CW) for approval.

In summary, a storage reallocation can be accomplished at John Redmond Reservoir to allocate 17,200 acre-feet of flood storage for water supply. The almost doubling of sediment in the reservoir will result in the conservation pool being reduced by 52% by year 2014. This reallocation would allow the Federal government to meet the intent of its initial 1975 agreements with the KWO for water supply contracts of 37,450 acre-feet through 2014.

Replacement measures, as agreed to by the State of Kansas, will offset long term adverse effects. The Kansas Water Office has already paid for the agreed on replacement measures. The current projected costs for these modifications are estimated as outlined in Table 12. The replacement measures already completed by the US Fish and Wildlife Service with funding provided by KWO are:

- Boat Ramp and Parking Area Replacement
- Replacement of Strawn Flats and Goose Bend #4 Dikes, Outlet Works and Pumping Facilities
- Update the Neosho Basin Management Plan
- Update the Annual Water Level Management Plan
- Perform Post-Development Impact Evaluation Studies for Wetland Development above Elevation 1041.0
- Replacement of Wetland and Riparian Woodlands

In addition, informational and public awareness programs for downriver entities as described in Section 5.8 of the SFES will be developed at nominal cost by the USACE and State of Kansas as part of normal project operations.

There would be minimal increase in flood flow releases. Reservoir water quality would be slightly improved. The additional storage would facilitate water quality releases during drought periods consistent with the terms of the 1985 Memorandum of Understanding between the Corps of Engineers and the State of Kansas.

The hydrology analysis for this study shows that the loss of flood storage would not significantly affect downstream flooding. Impacts to structures or crops due to flooding are minor. An analysis of downstream flow and frequency curve-duration data shows little measurable increases in flood stages at downstream locations. The potential flood control benefits lost is considered insignificant.

7.2 Reference Applicable Web Sites

- WEB 1, http://www.swt..army.mil/recreat/
- WEB 2**,** http://www.swt..army.mil/recreat/OPSField

7.3 Recommendation of the District Engineer

Based on the findings in this study and the Supplement to the Final Environmental Statement, I recommend changing the elevation of the conservation pool at John Redmond Dam and Reservoir, Kansas, from 1039.0 to 1041.0 feet NGVD by reallocation of 17,200 acre-feet of storage from the flood pool. This reallocation will provide sufficient conservation storage to comply with existing Corps of Engineers and KWO water supply agreements at John Redmond Reservoir.

All replacement costs outlined in section 7.1 have been provided by the Kansas Water Office and State of Kansas through local appropriations, and all replacement work has been completed.

MICHAEL J. TEAGUE
Colonel, EN
Commanding

The recommendations contained herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.