Using Low Tech Process Based Stream Restoration

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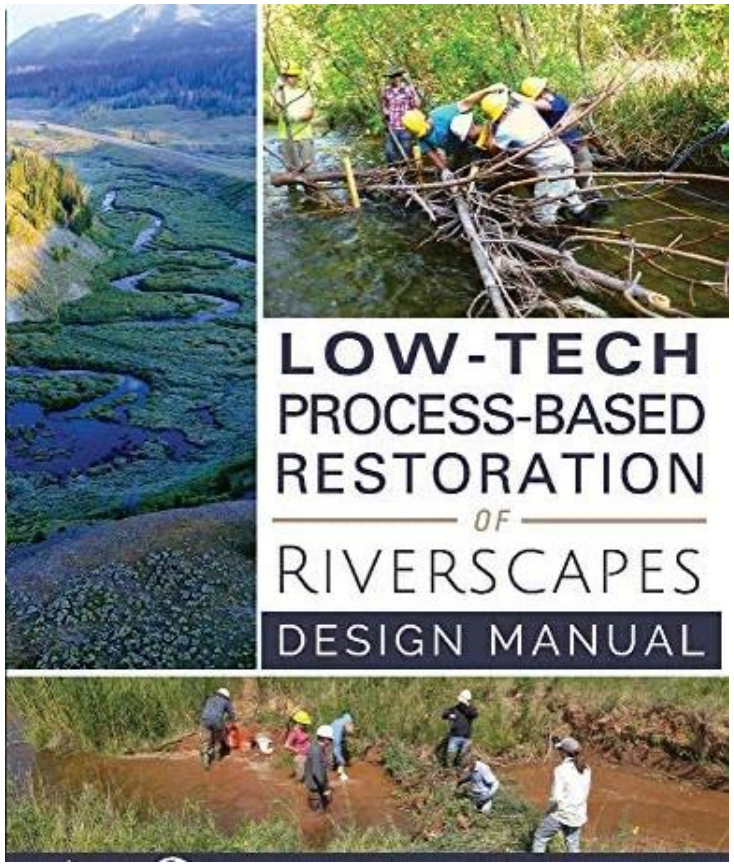
Thanks to our partners

- Ducks Unlimited
- KAWS
- Utah State University
- Kansas State University
- Kansas Biological Survey
- Kansas Dept. of Wildlife and Parks
- Nebraska Game and Parks
- Evergy Green Team
- Friends of the Kaw
- USDA - NRCS

Guides



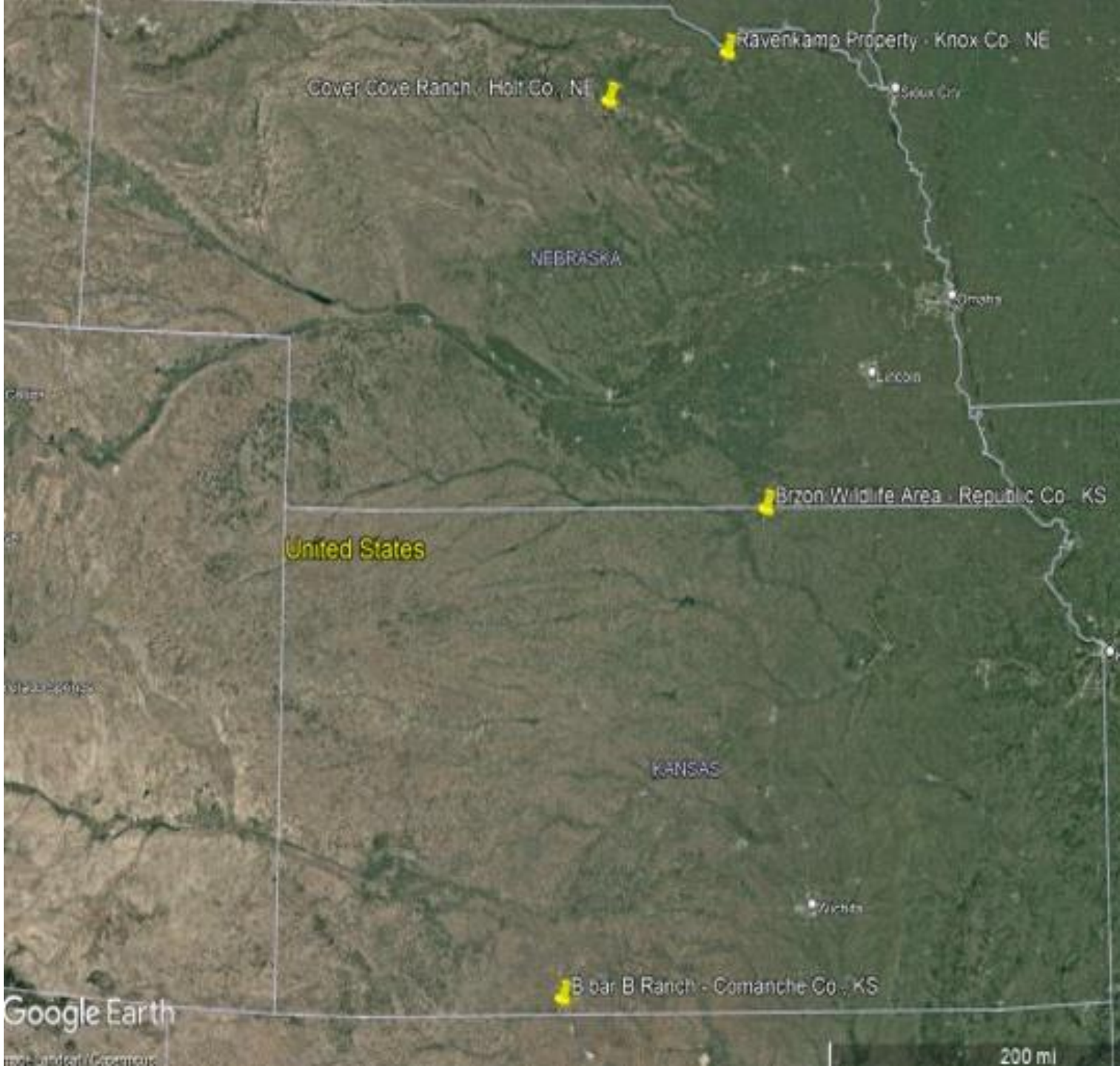
- Utah State
- Anabranch Solutions
- Jon Beckmann
- Jeff Burrel

LTPB Background

- Beginnings dating back to 1990s in Pacific Northwest
- Nature mimicry
- Focus on the processes
- Low Tech
  - Hand-built
  - Natural materials
  - Short-term design life-spans
  - Cost efficient

Our Study

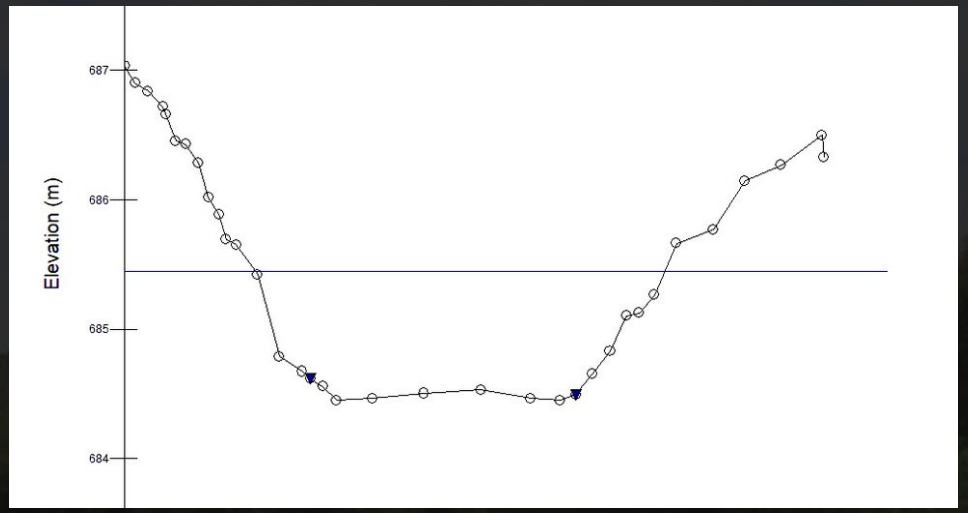
- Three years
- Four Sites
  - Cimarron River, Kansas
  - Brzon Wildlife Area, Kansas
  - Verdigre, Nebraska
  - Holt Creek, Nebraska
- Climate Resiliency
  - Drought
  - Flood
  - Erosion



Objective and Design

- Incised stream with variety of ecosystem setting
  - 20-30 structures
- Three sampling visits per year- Spring, Summer, and Fall
- Outreach
  - Workshops
  - Conferences
- Monitoring
  - Streambed and channel profiles
  - Vegetation and wildlife
  - Water quantity and quality

Geomorphology



- Streambed and channel profiles
- GIS - Mapping
- Data Collection
  - Autodesk Civil3D
  - Rivermoprh

Water Quantity and Quality

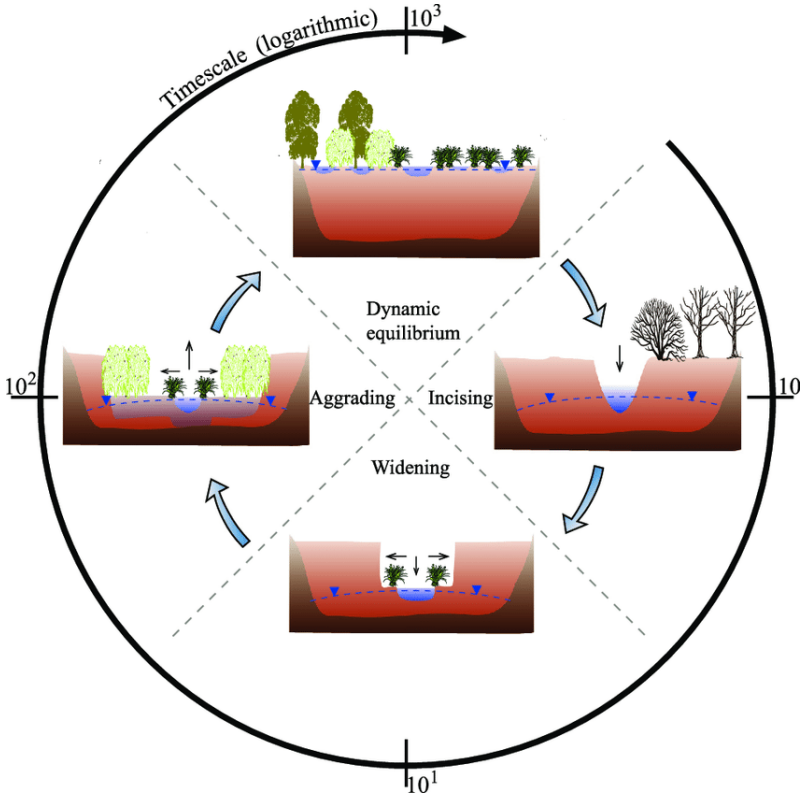
- Water Table Monitoring
  - 6’ Wells with 2” screens
  - 12 Wells/site
- Water Surface Quality
  - Temperature
  - Dissolved Oxygen
  - Turbidity
  - Conductance
  - pH
  - Nitrate
  - Phosphate

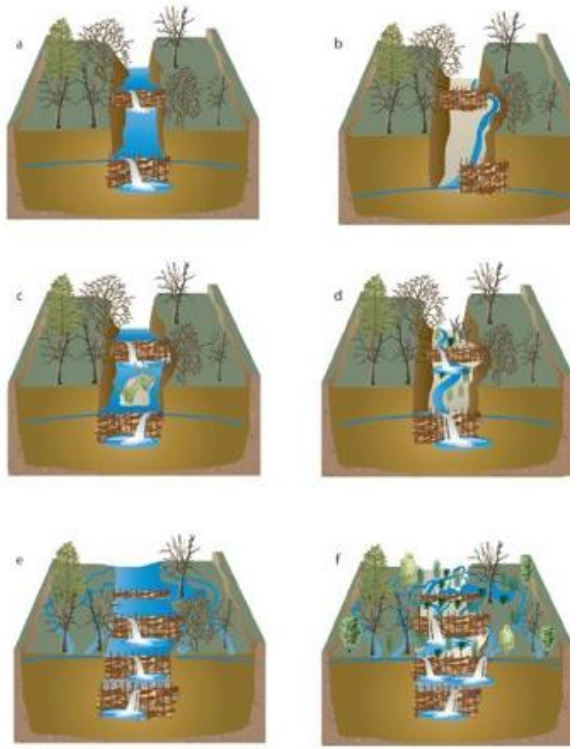
Vegetation and Wildlife

- Vegetation
  - Surveys every Fall
  - Transects perpendicular to stream
  - Greenline composition
  - Woody Species
  - Forage Height and Density
  - Drone Imagery
- Benthic Macroinvertebrates and Fish
- Game Cameras
- Habitat Assessments
  - HSI, Functional Diversity

The Process

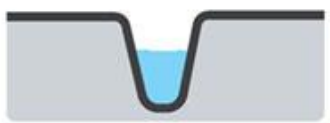
- Aggradation
- Floodplain connection
- Complexity



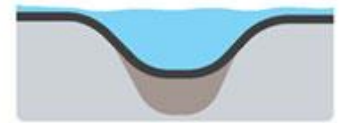


A stream comes back to life

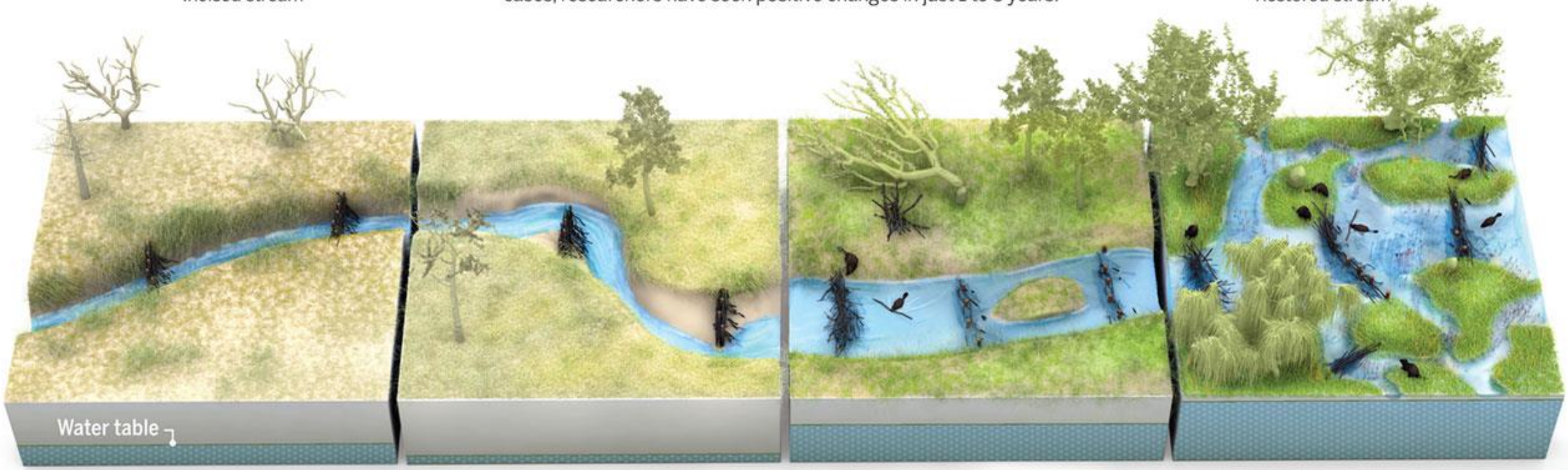
Across the U.S. West, scientists and land managers are using beaver dam analogs (BDAs) to heal damaged streams, re-establish beaver populations, and aid wildlife. In some cases, researchers have seen positive changes in just 1 to 3 years.



Incised stream



Restored stream



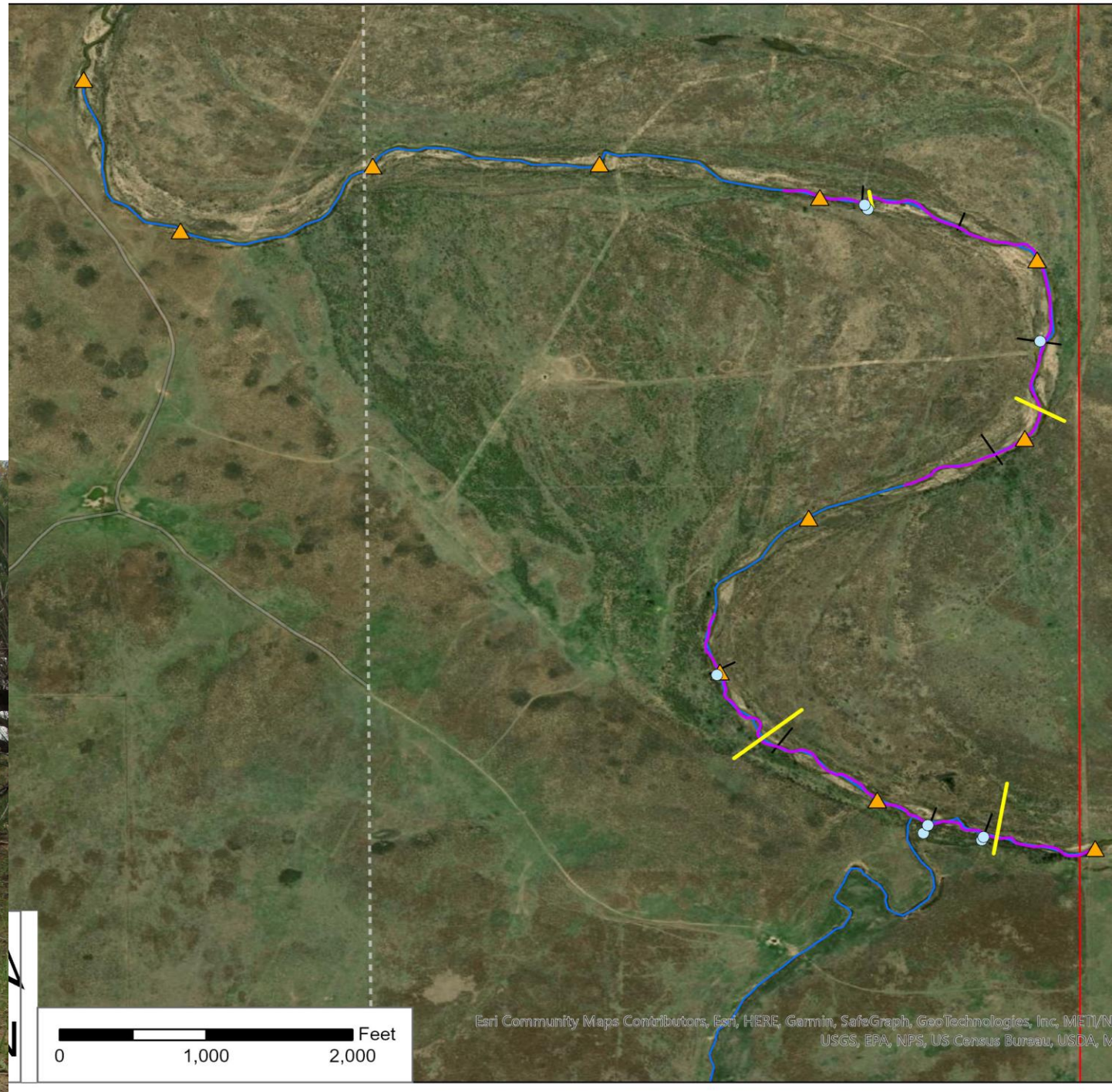
Adding dams
Beaver trapping and overgrazing have caused countless creeks to cut deep trenches and water tables to drop, drying floodplains. Installing BDAs can help.

Widening the trench
BDAs divert flows, causing streams to cut into banks, widening the incised channel, and creating a supply of sediment that helps raise the stream bed.

Beavers return
As BDAs trap sediment, the stream bed rebuilds and forces water onto the floodplain, recharging groundwater. Slower flows allow beavers to recolonize.

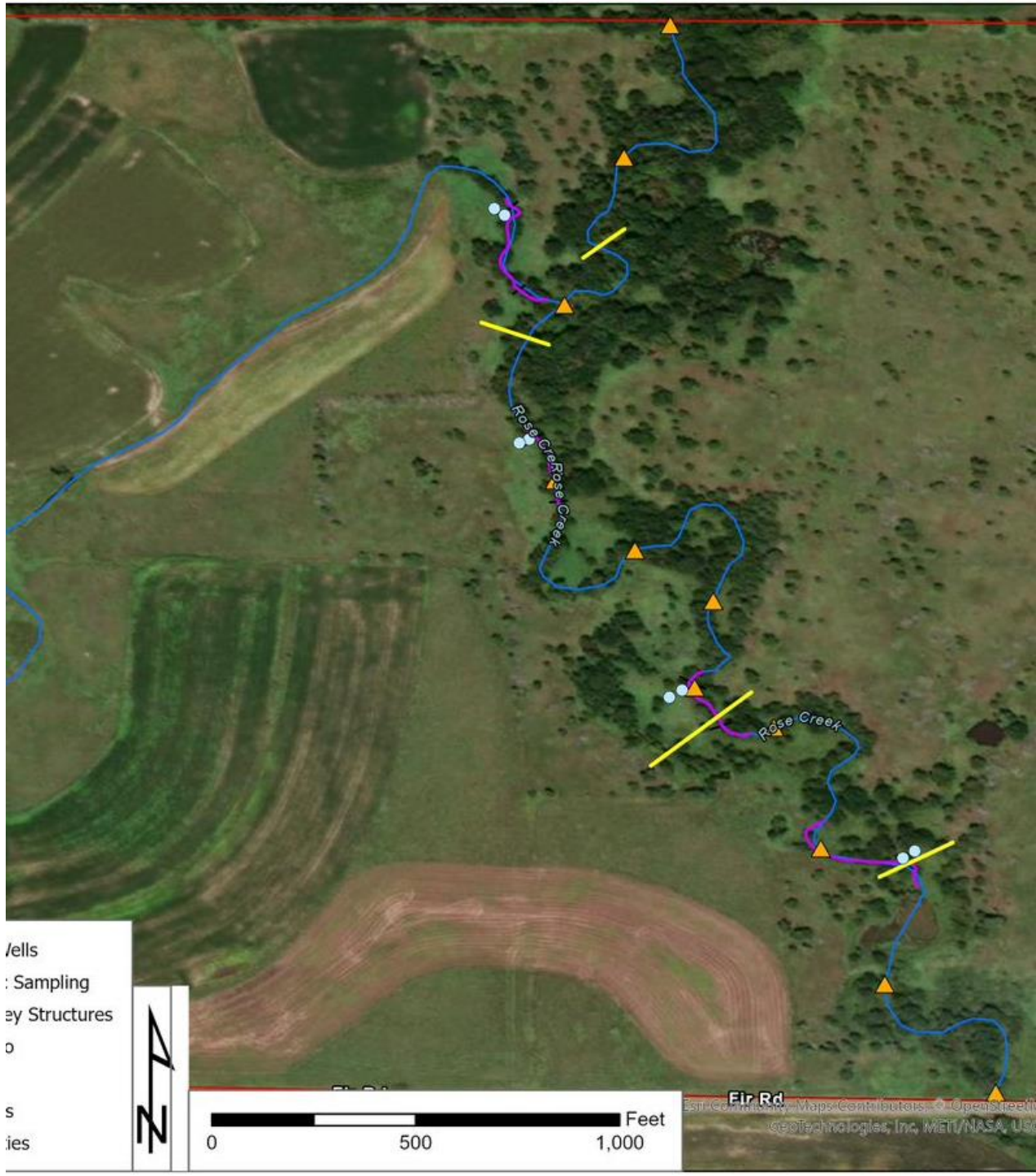
A complex haven
Re-established beavers raise water tables, irrigate new stands of willow and alder, and create a maze of pools and side channels for fish and wildlife.

B bar B Ranch
Comanche County, KS
2.5 miles on Cimarron River with Willow Creek



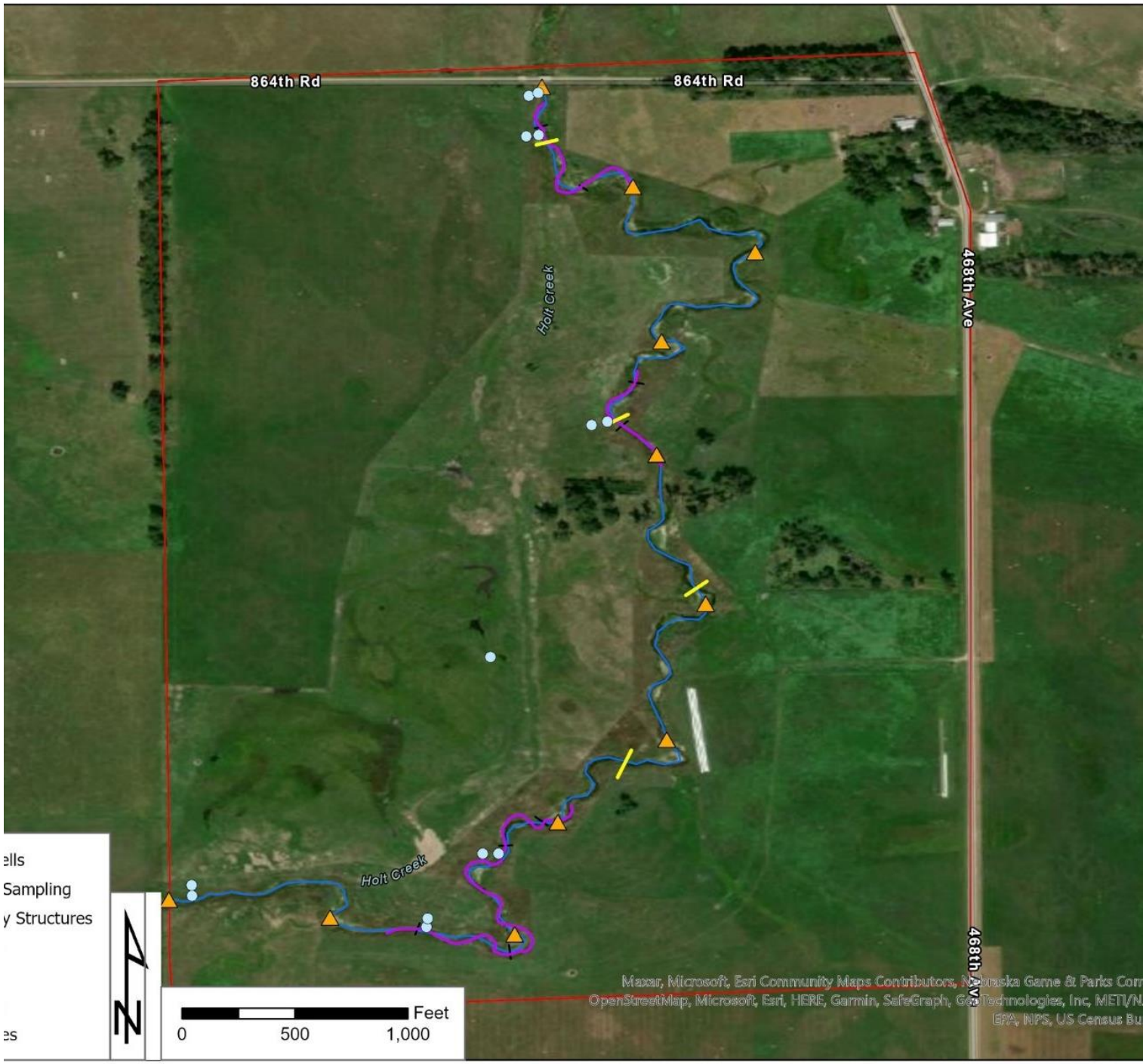
Brzon Wildlife Area

- Republic County
- 0.8 Miles on Rose Creek and Tributary



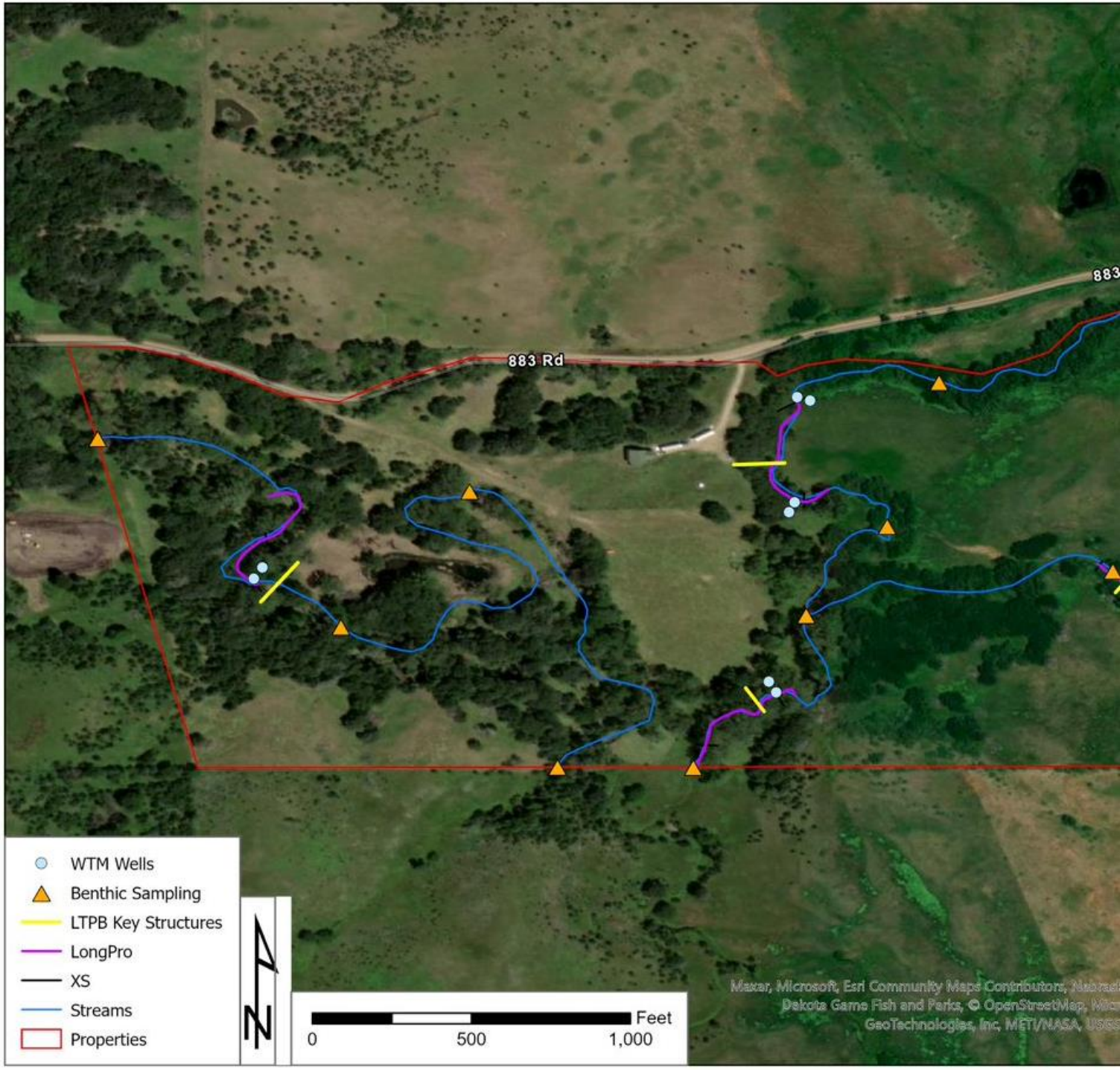
Clover Cove

- Holt Creek, Nebraska



Ravenkamp

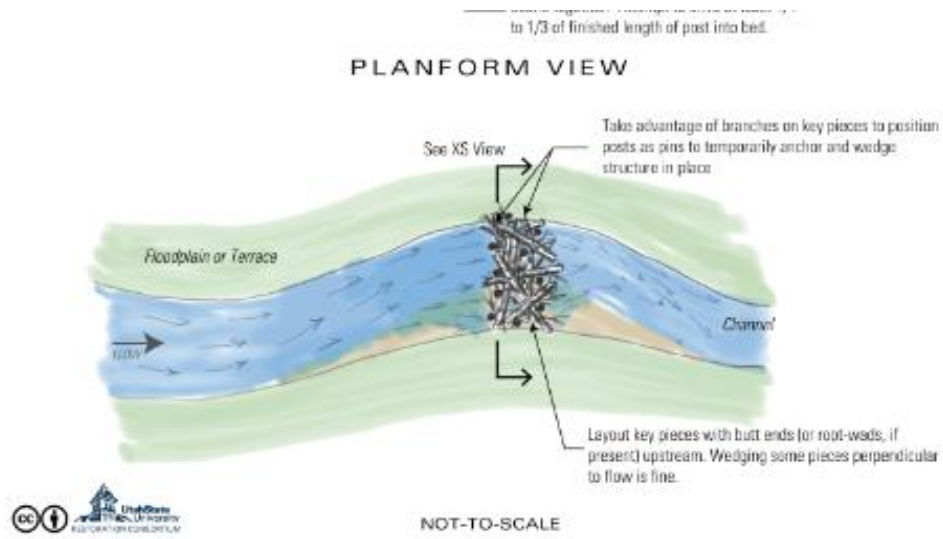
- Verdigre, Nebraska
- Un-named creek



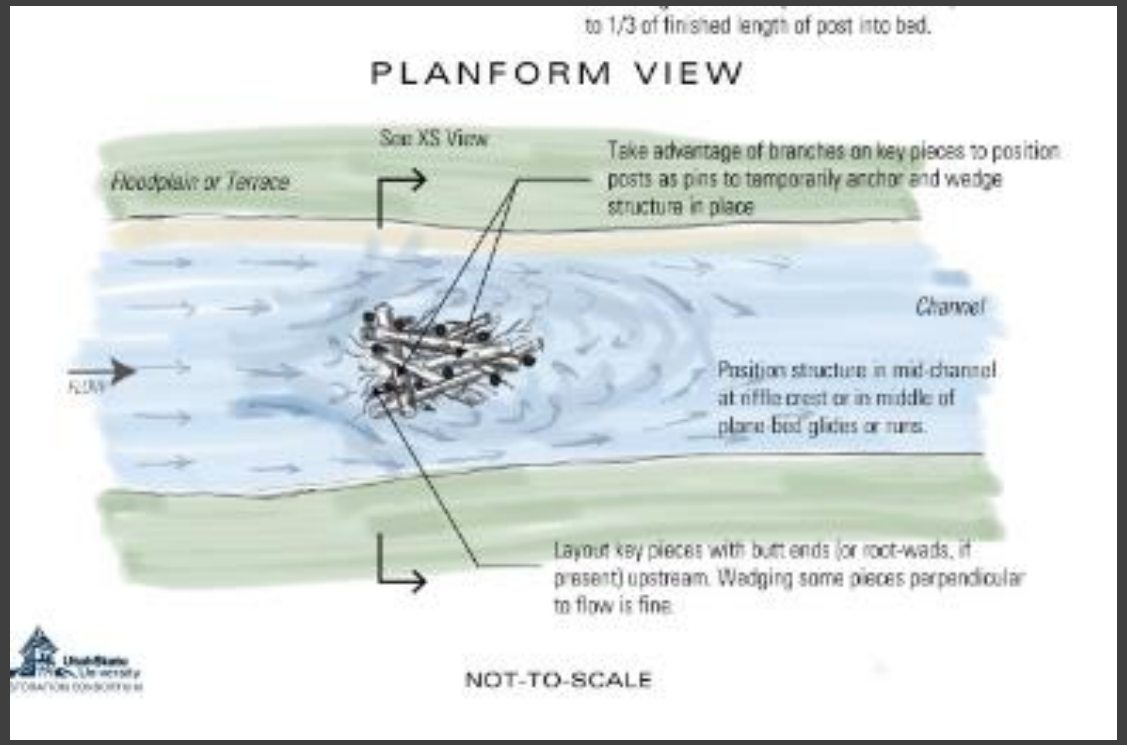
Structures

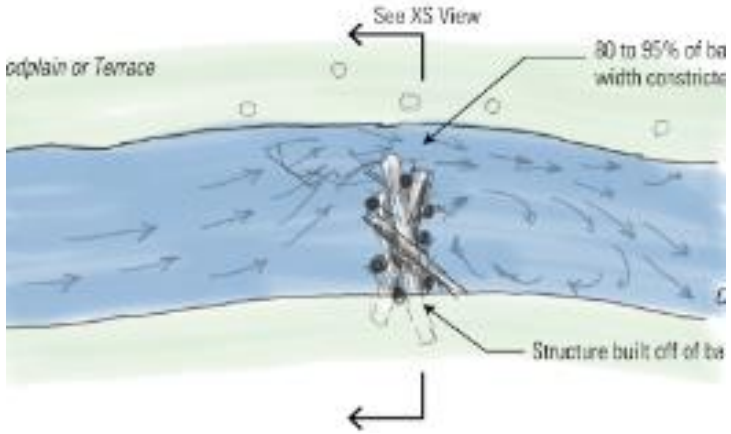
- Post Assisted Log Structures (PALS)
- Channels Spanning
- Mid-Channel
- Bank Attached

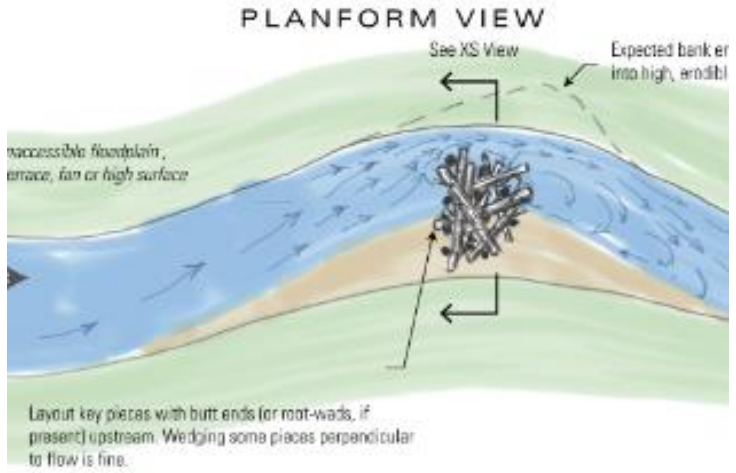
Channel Spanning PALS

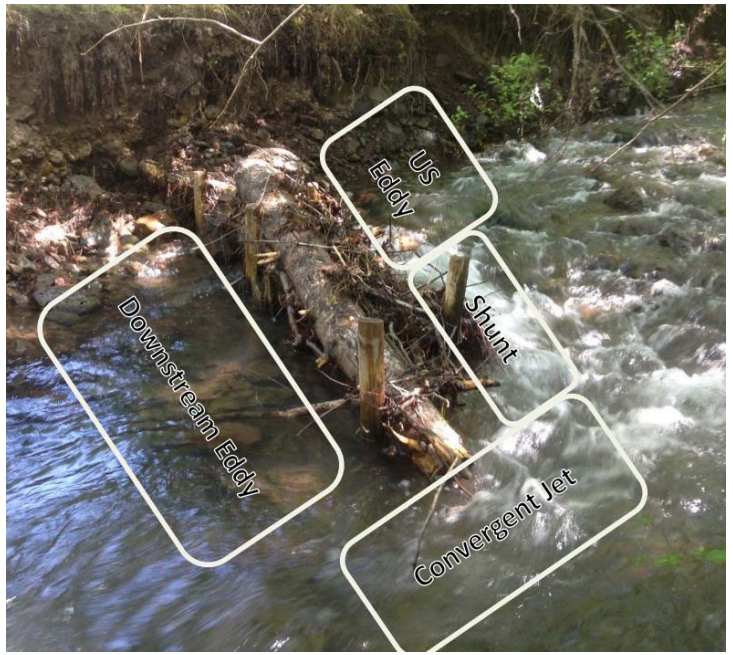


Mid-Channel PALS



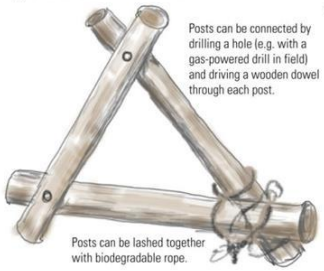






Bank Attached

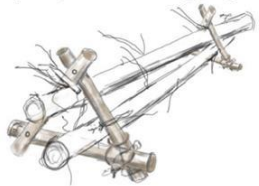
Using posts or logs of 2" to 3" diameter, a triangle frame can be constructed.

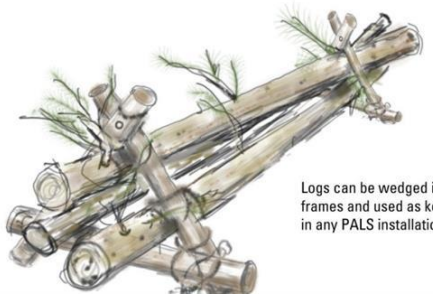


Posts can be connected by drilling a hole (e.g. with a gas-powered drill in field) and driving a wooden dowel through each post.

Posts can be lashed together with biodegradable rope.

The frames can be used to amalgamate , smaller diameter, simpler logs to mimic that of bigger logs.





Logs can be wedged into triangle frames and used as key pieces in any PALS installation.

Thank You!

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