

Beavers and Watershed Health

- Brief agenda of discussion
 - Beaver in the Black Hills
 - Beaver restoration as a tool in managing stream and watershed health
 - Beaver Dam Analogs (BDA) and Post Assisted Log Structures (PALS)

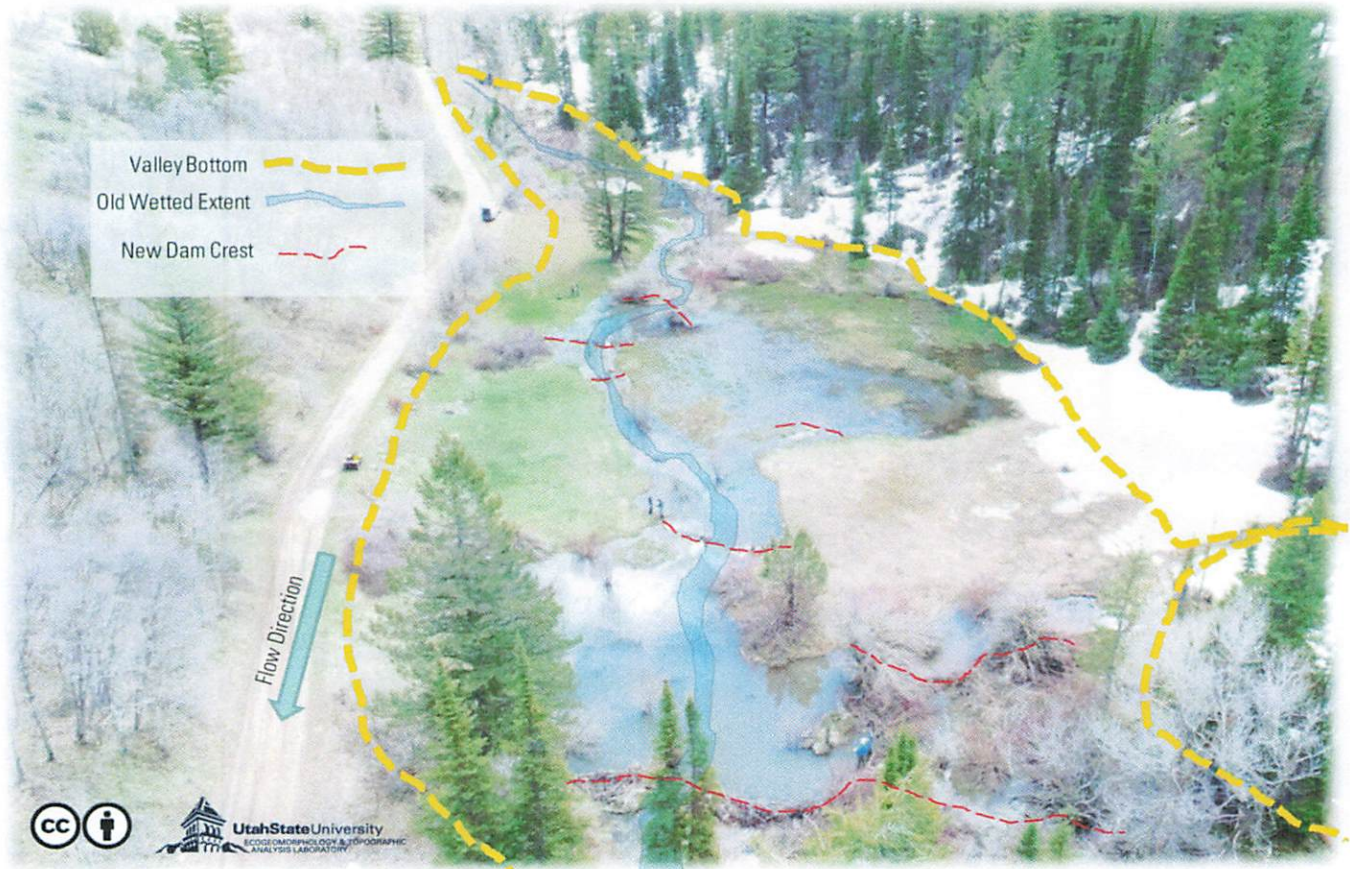
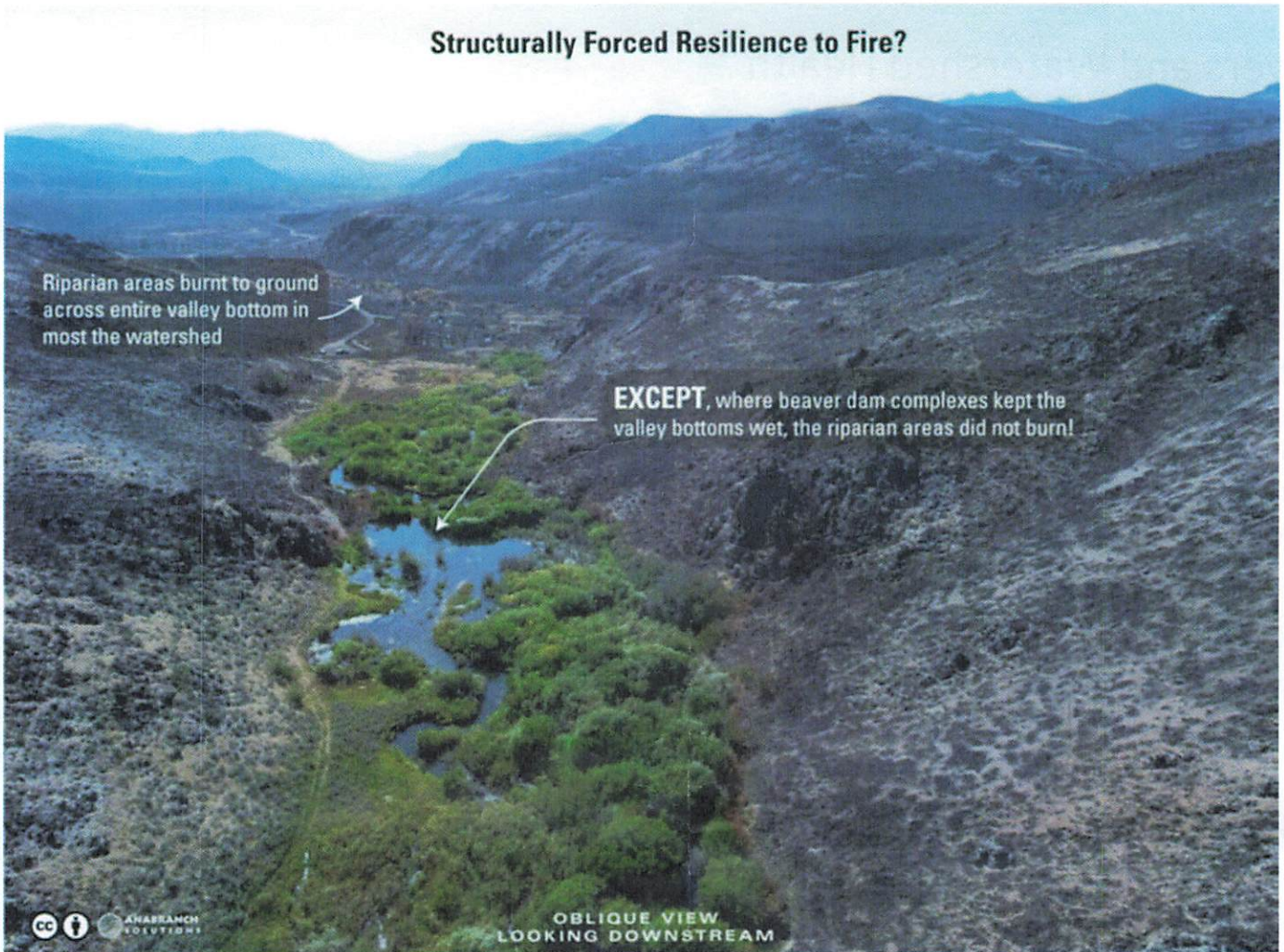
Why talk about beaver in the Black Hills?

- beaver dams can increase surface and subsurface water storage,
- modify water budgets and allow site specific flood attenuation,
- alter low flow hydrology, delay sediment transport, and increase habitat complexity and biodiversity on reach scales

The influence of beavers on stream systems is fundamentally distinct from what occurs in their absence. Current stream management and restoration efforts will benefit from incorporating beaver due to the enhancement they provide to holistic ecosystem services.



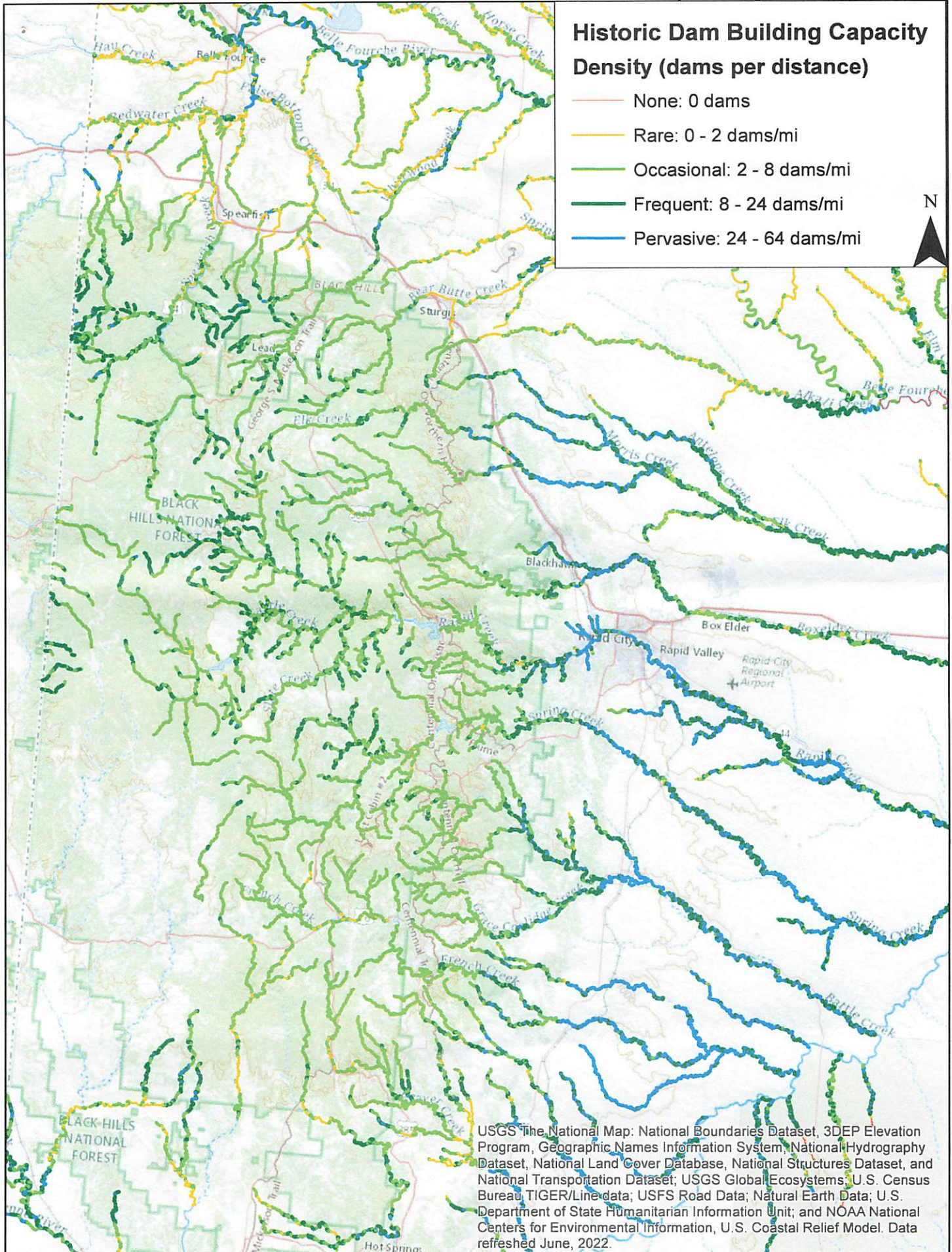
Structurally Forced Resilience to Fire?



Black Hills Historic Beaver Capacity

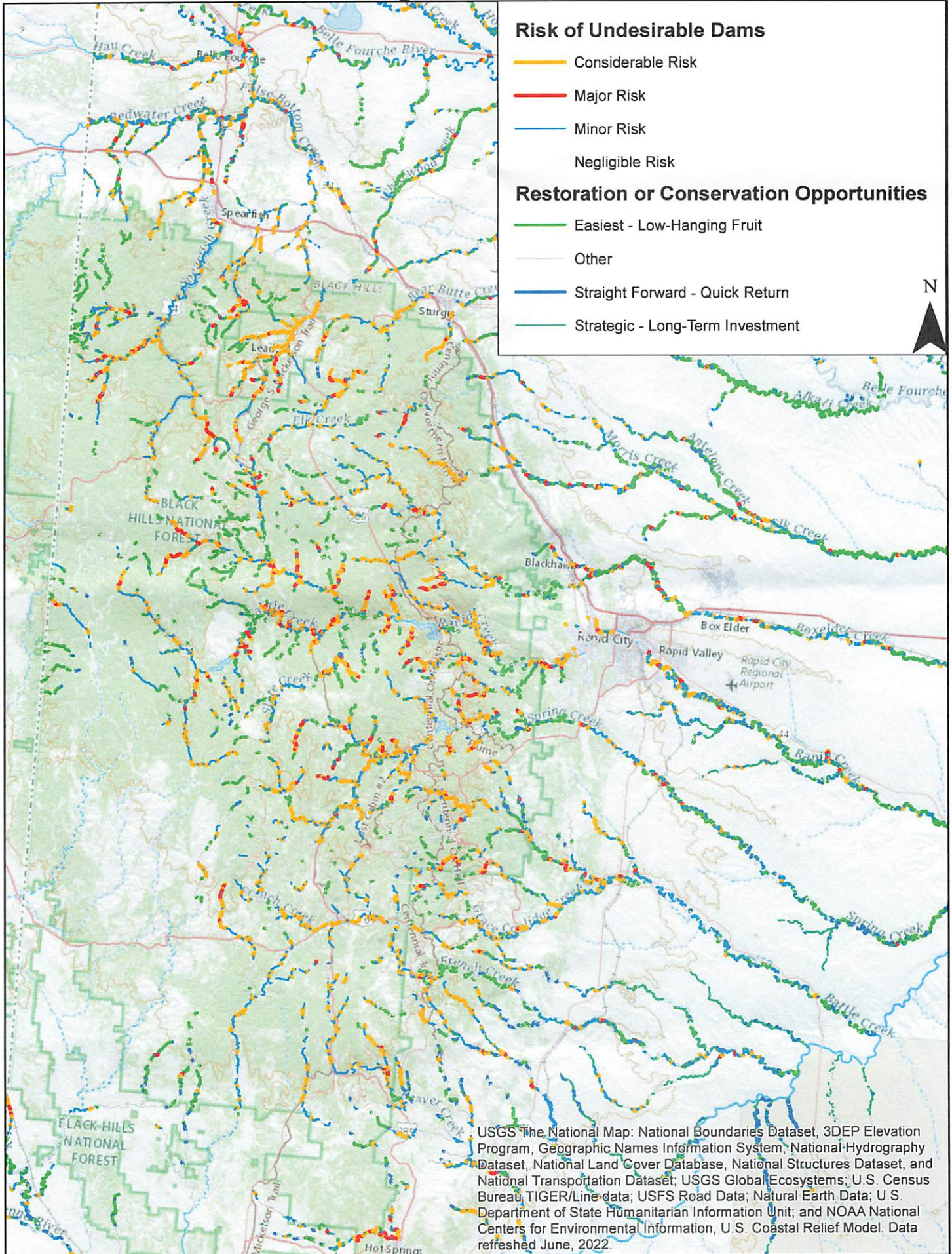
Historic Dam Building Capacity Density (dams per distance)

- None: 0 dams
- Rare: 0 - 2 dams/mi
- Occasional: 2 - 8 dams/mi
- Frequent: 8 - 24 dams/mi
- Pervasive: 24 - 64 dams/mi

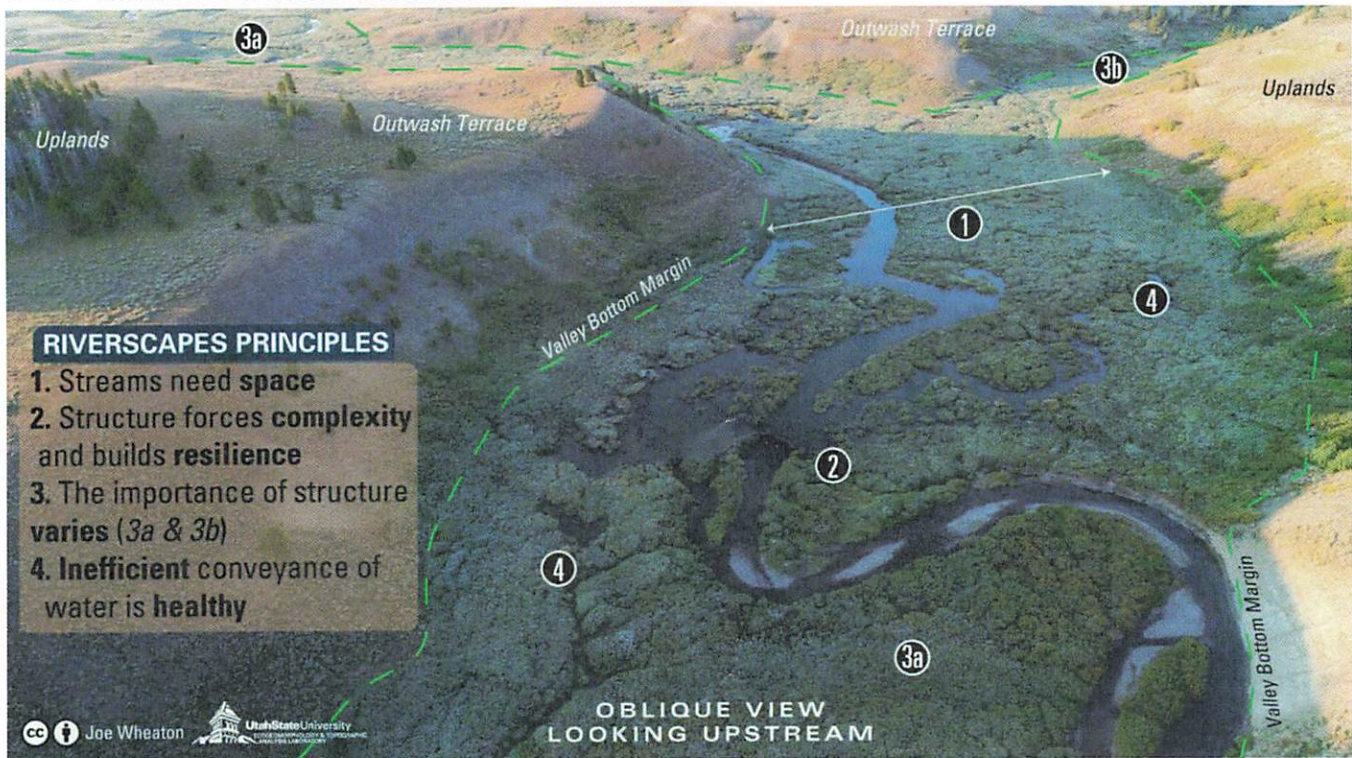


USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed June, 2022.

Black Hills Beaver Management and Restoration Potential



PBR 101: Process Based Restoration



“low-tech” Restoration Structures

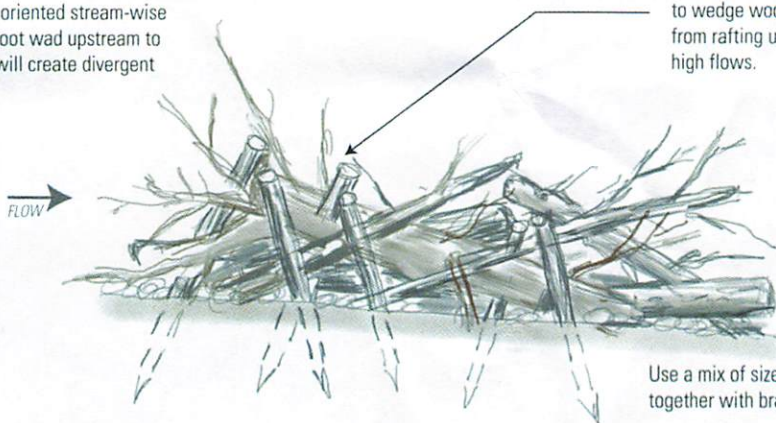
PALS (Post Assisted Log Structures) – Creating physical complexity and diversity



"low-tech" Restoration Structures

PROFILE VIEW

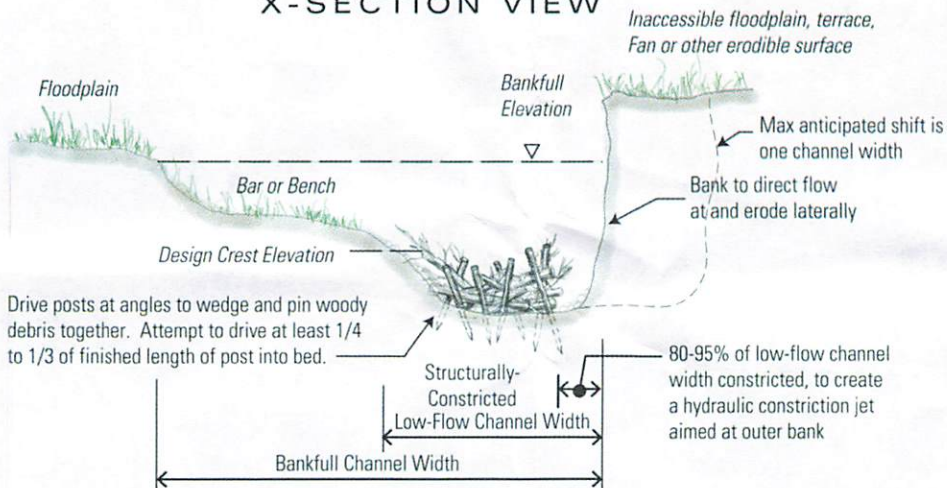
Start with key pieces oriented stream-wise and face butt end or root wad upstream to maximize width that will create divergent flow paths around it.



Drive posts in to bed angled inwards to wedge wood pieces and prevent them from rafting up and floating away in high flows.

Use a mix of sizes of wood and tangle together with branches.

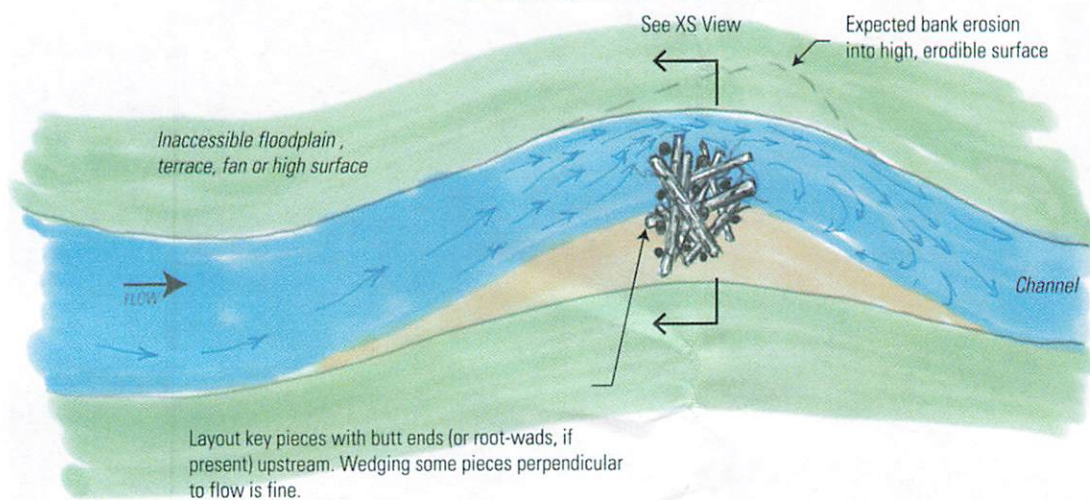
X-SECTION VIEW



Drive posts at angles to wedge and pin woody debris together. Attempt to drive at least 1/4 to 1/3 of finished length of post into bed.

80-95% of low-flow channel width constricted, to create a hydraulic constriction jet aimed at outer bank

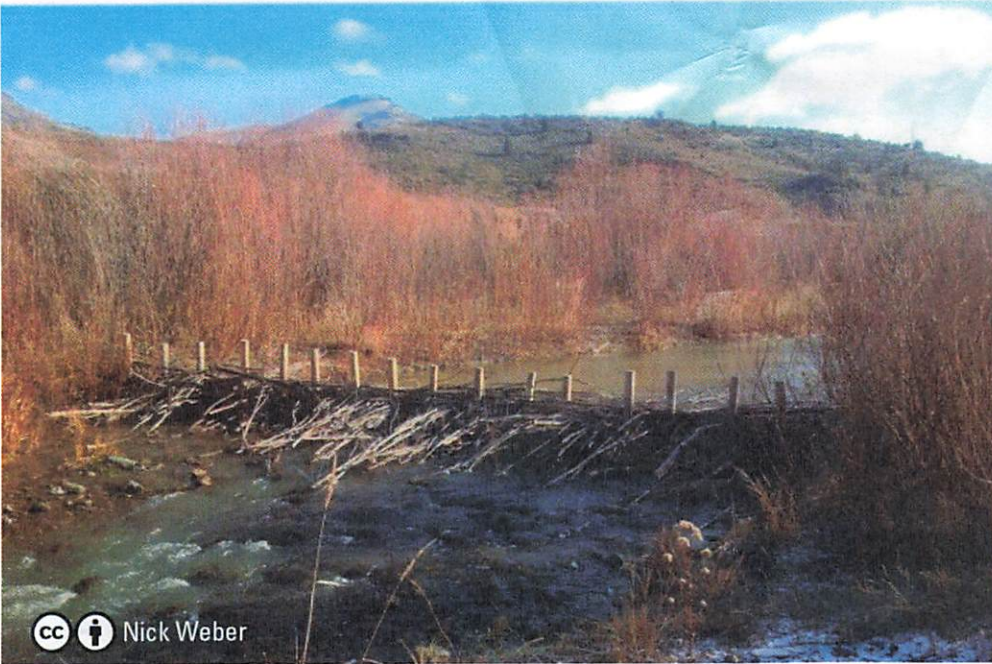
PLANFORM VIEW



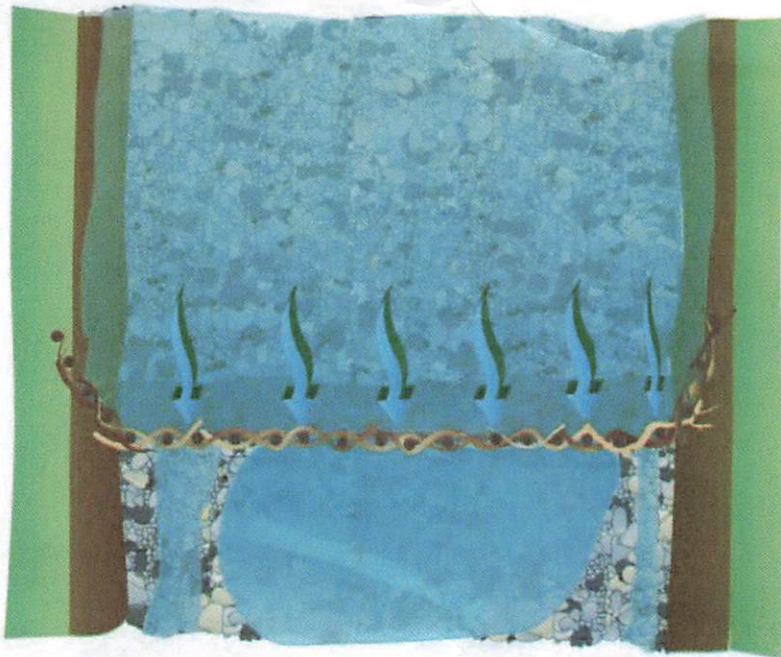
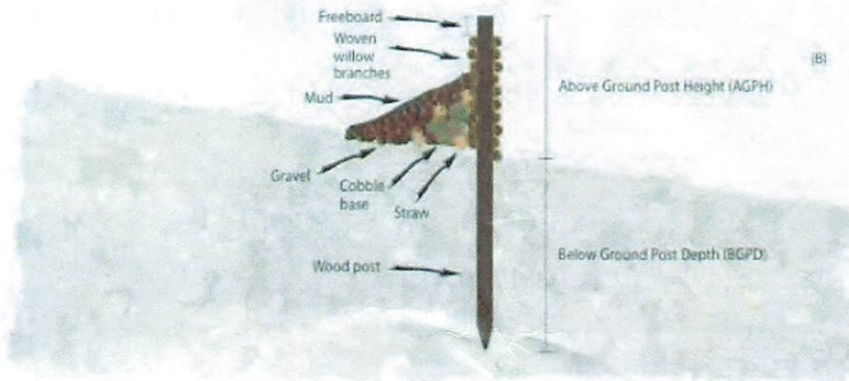
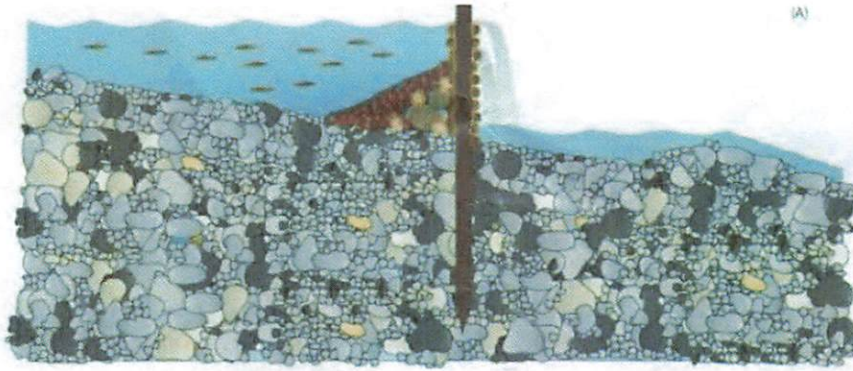
Layout key pieces with butt ends (or root-wads, if present) upstream. Wedging some pieces perpendicular to flow is fine.

“low-tech” Restoration Structures

BDA (Beaver Dam Analog) – Slowing and storing water, supporting floodplain connection, support beaver recolonization

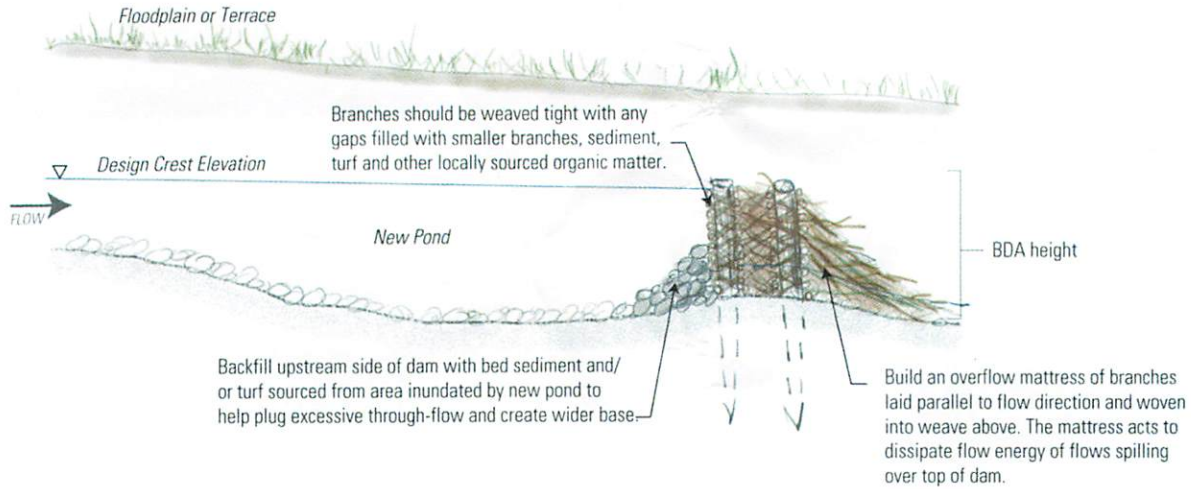


"low-tech" Restoration Structures

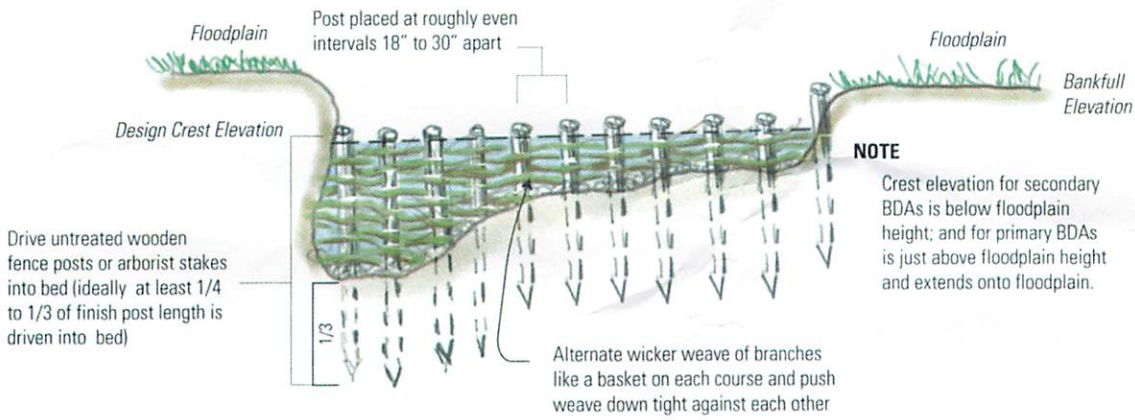


"low-tech" Restoration Structures

PROFILE VIEW



X-SECTION VIEW



PLANFORM VIEW

