Restoration of the Middle Fork Zumbro River in Shady Lake Reservoir

Design challenges

1) Accumulated reservoir sediments are up to 18 feet deep.
2) River is incising through the sediments, self-recovery would take a long time and generate significant volumes of sediment.
3) The M.F. Zumbro is subject to large floods (2009 Dam Inspection Report estimate of 500 year flood is 46,600 cfs).
4) The community would like to develop the former reservoir into a park that would provide recreational use of the river.

Design goals

1) Design a self-sustaining stable channel with quality aquatic and riparian habitat, connected floodplain and riparian wetlands.
2) Minimize downstream delivery of accumulated reservoir sediments while maintaining equilibrium with watershed delivered sediment supply.
3) Provide an ecological and recreational asset to the community.

Design Strategy

1) Use reference channel geometry to design a multi-stage channel and flood plain with appropriate dimension, pattern, and profile within the former reservoir.
2) Use constructed riffles to provide grade control and habitat.
3) Use toe-wood/sod mat techniques for bank protection and habitat.
4) Excavate floodplain wetlands.
5) Use native tree, shrub, grass, and wildflower plantings throughout reservoir to provide long-term stability.


Rough Draft Concept for Dam Removal and Restoration of the Middle Fork Zumbro River
Riverbed 941.5
MNDOT 2005
Middle Fork Zumbro
Flow
Pools with Toe-wood Bank Protection
Oronoco
Constructed Riffles
Riverbed 932
Excavated Wetlands
Riverbed 944.5
MNDOT 2005
Gradual Rapids
Crest 940
(1% slope)
South Branch Zumbro
Flow