Missouri River Reservoir System Sediment Overview

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US Army Corps of Engineers
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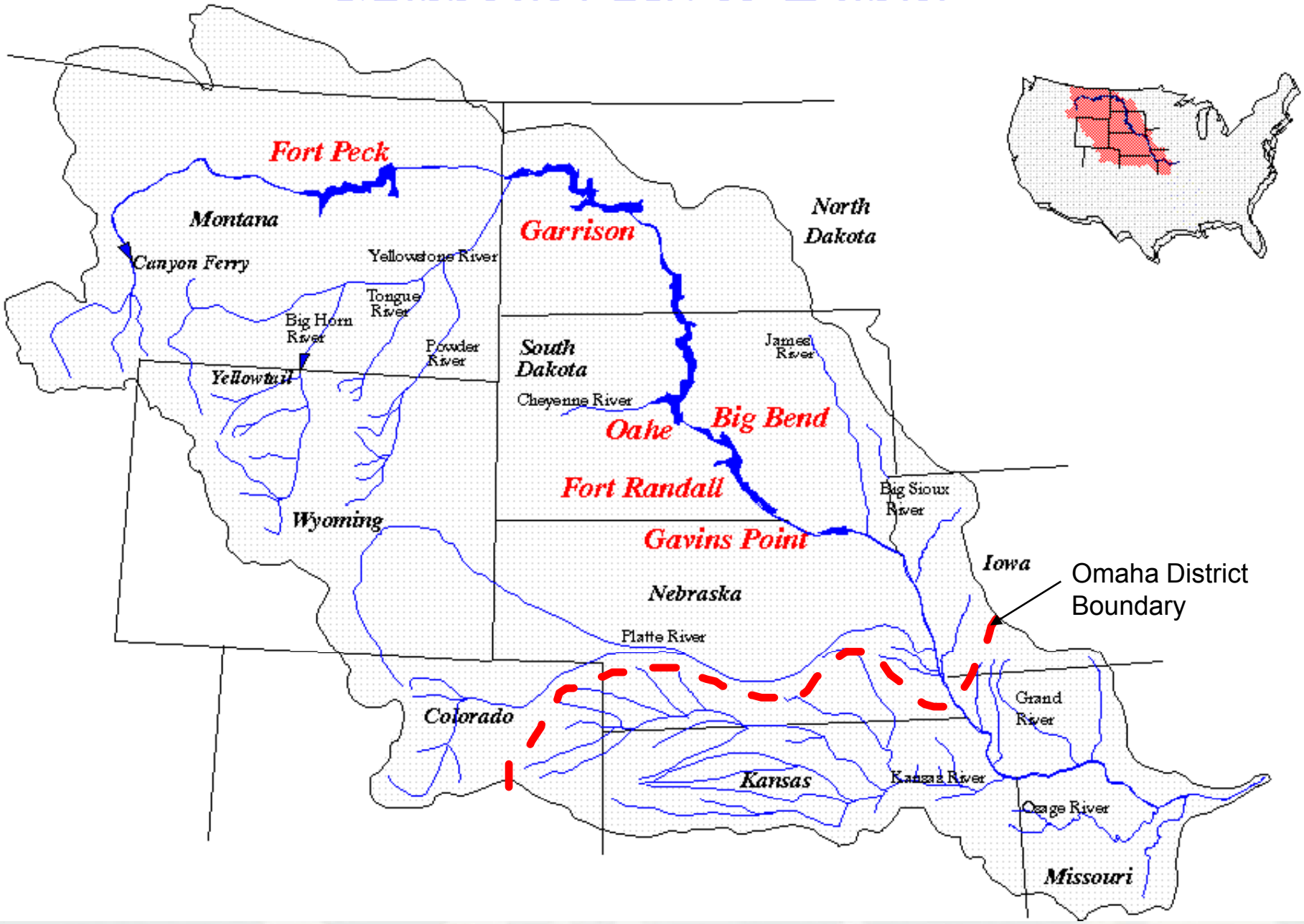
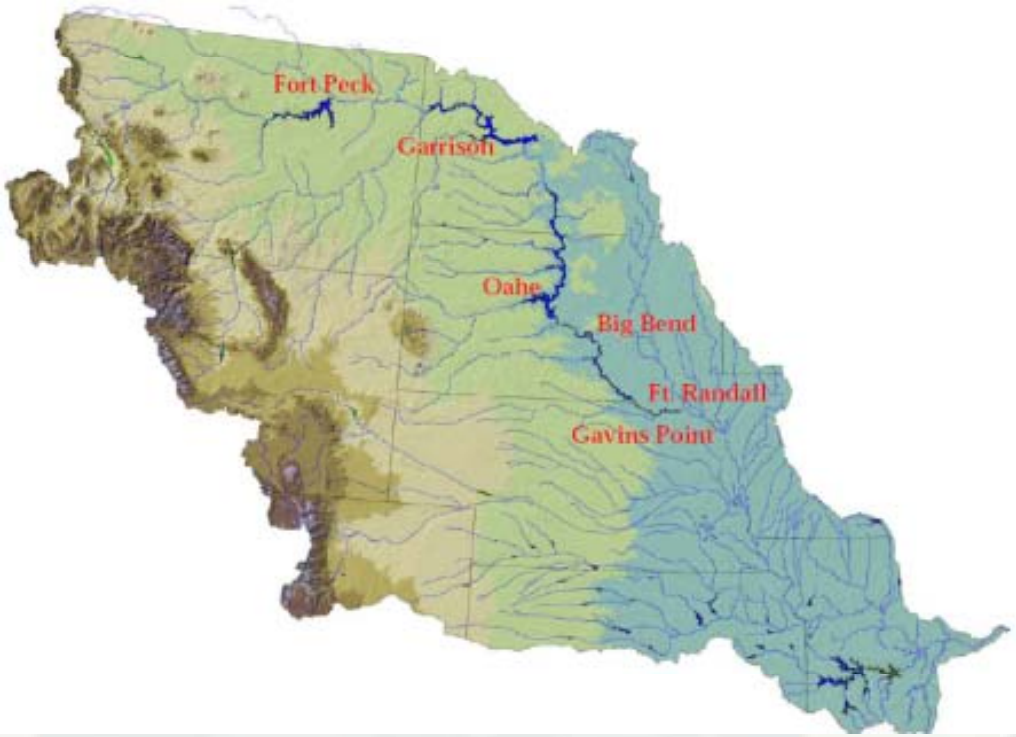
Missouri River Basin



Typical Dam Operations

- Dams alter both flow and sediment
- Flow
  - Decreased peak flows (Flood Control)
  - Increased base flows (Water Supply, Nav. Hydro Power)
  - Other purposes (recreation, water supply, etc)
- Sediment
  - Aggradation / increased stage in headwaters
  - Degradation downstream of dams
  - Storage loss in reservoirs

Suspended Sediment reduction Between pre-1953 and post 1967

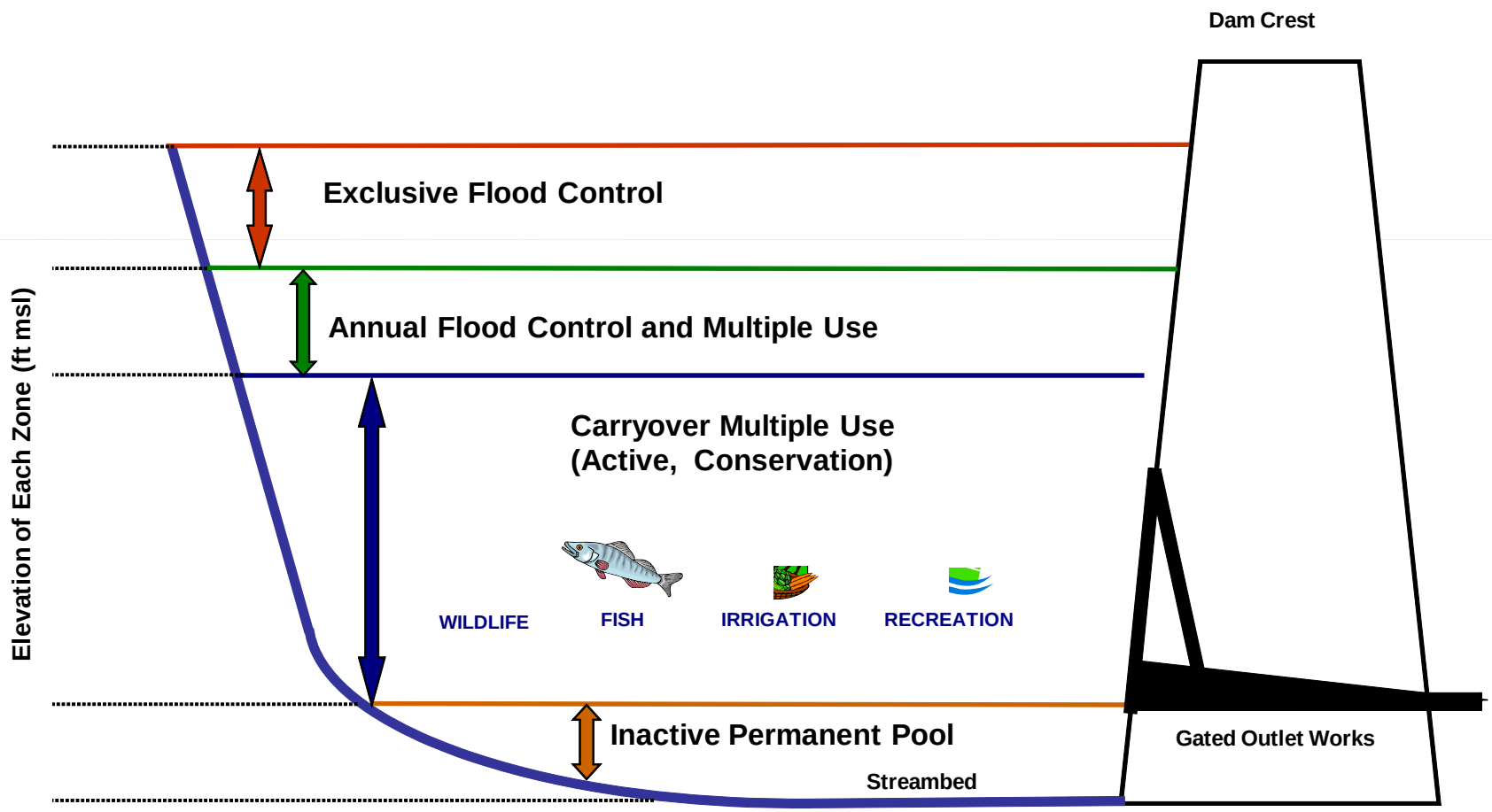


- Time period of placement of multipurpose dams in the Missouri River Basin
- 73 % at Hermann Missouri
- 64 % At St. Louis
- Sediment samples taken at St. Louis (1879 and 1881) indicate a reduction in sediment not contributable to the MO river impoundments

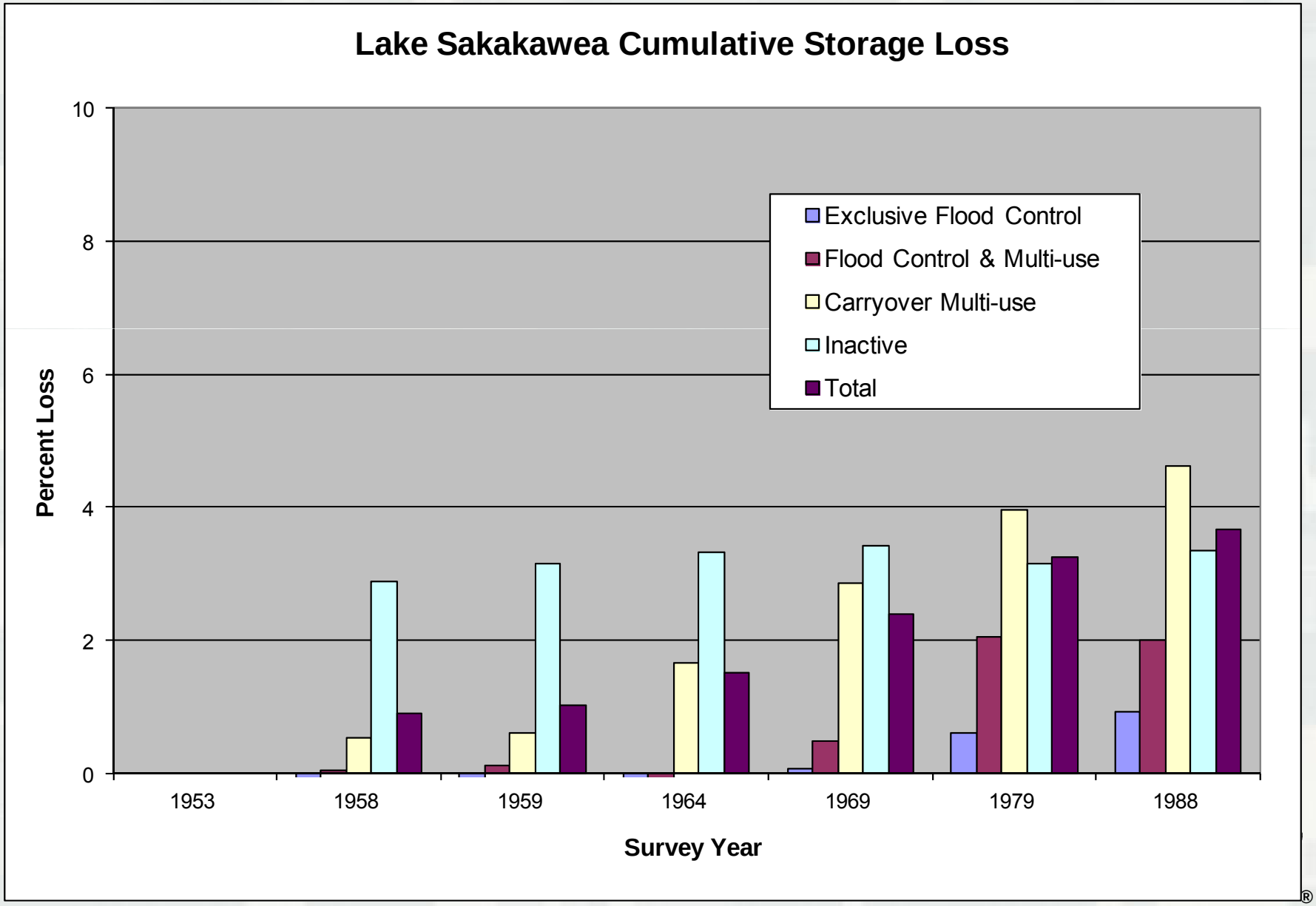
Omaha District Sedimentation Program

- Comprehensive Monitoring Program since 1950's.
- Includes collecting cross section data at 700+ sediment rangelines from Gavins Point through Fort Peck Lake
- Also collect stage data, water surface profiles, bed sediment samples, and suspended sediment samples (USGS)
- Aggradation and degradation zone associated with each dam

Typical Pool Zones

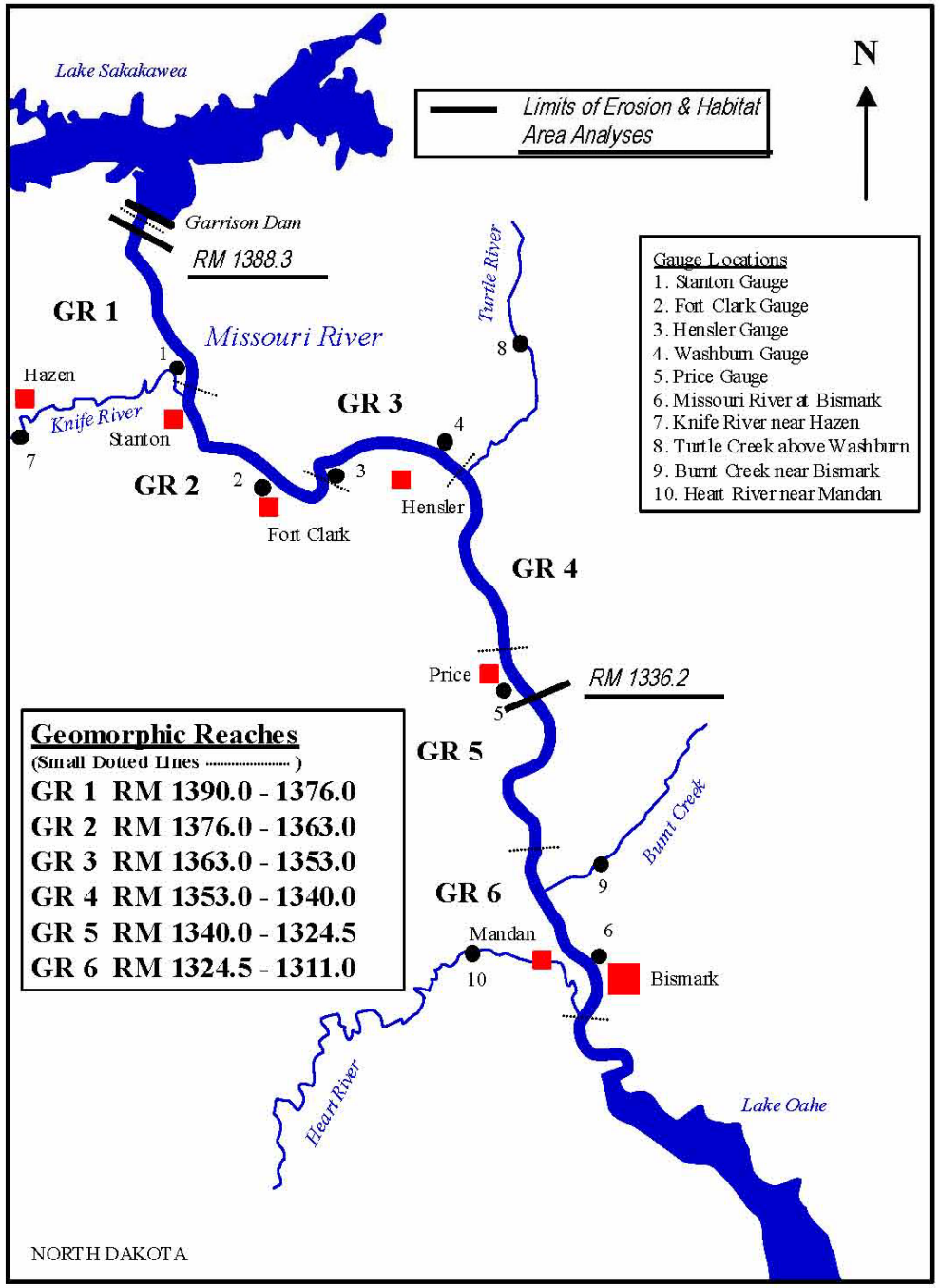


Storage Depletion - Garrison



Garrison to Oahe Reach

(Typical Degradation / Aggradation Transition)



Source: Biedenharn et al., December 2001.

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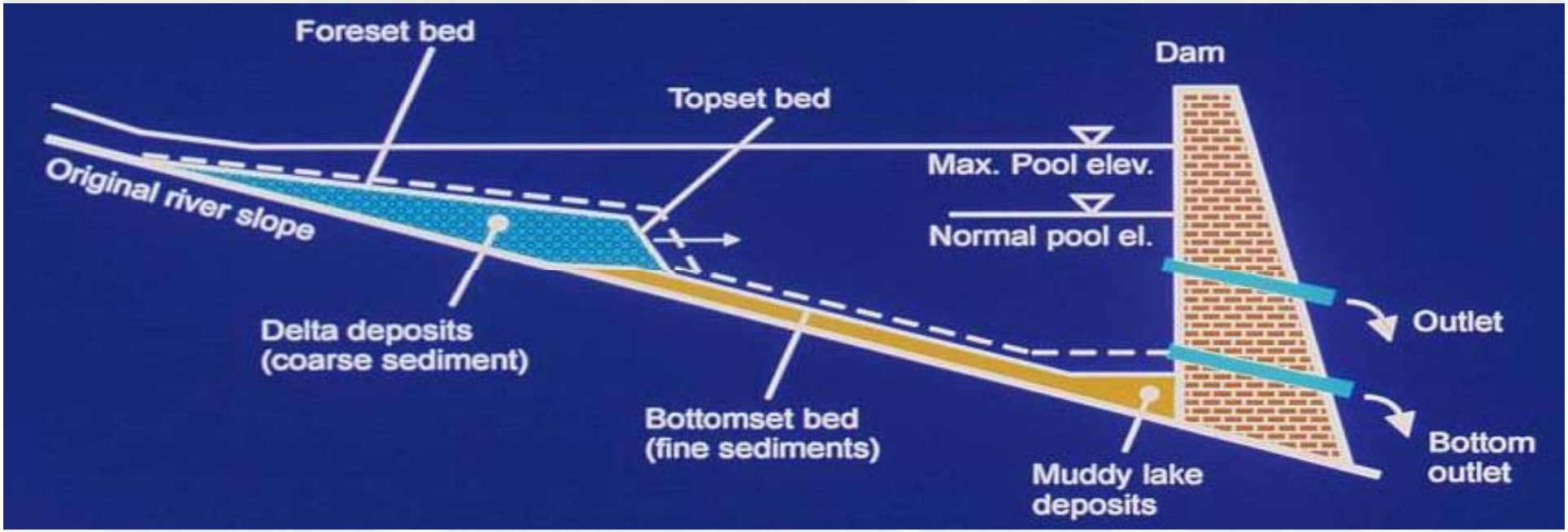
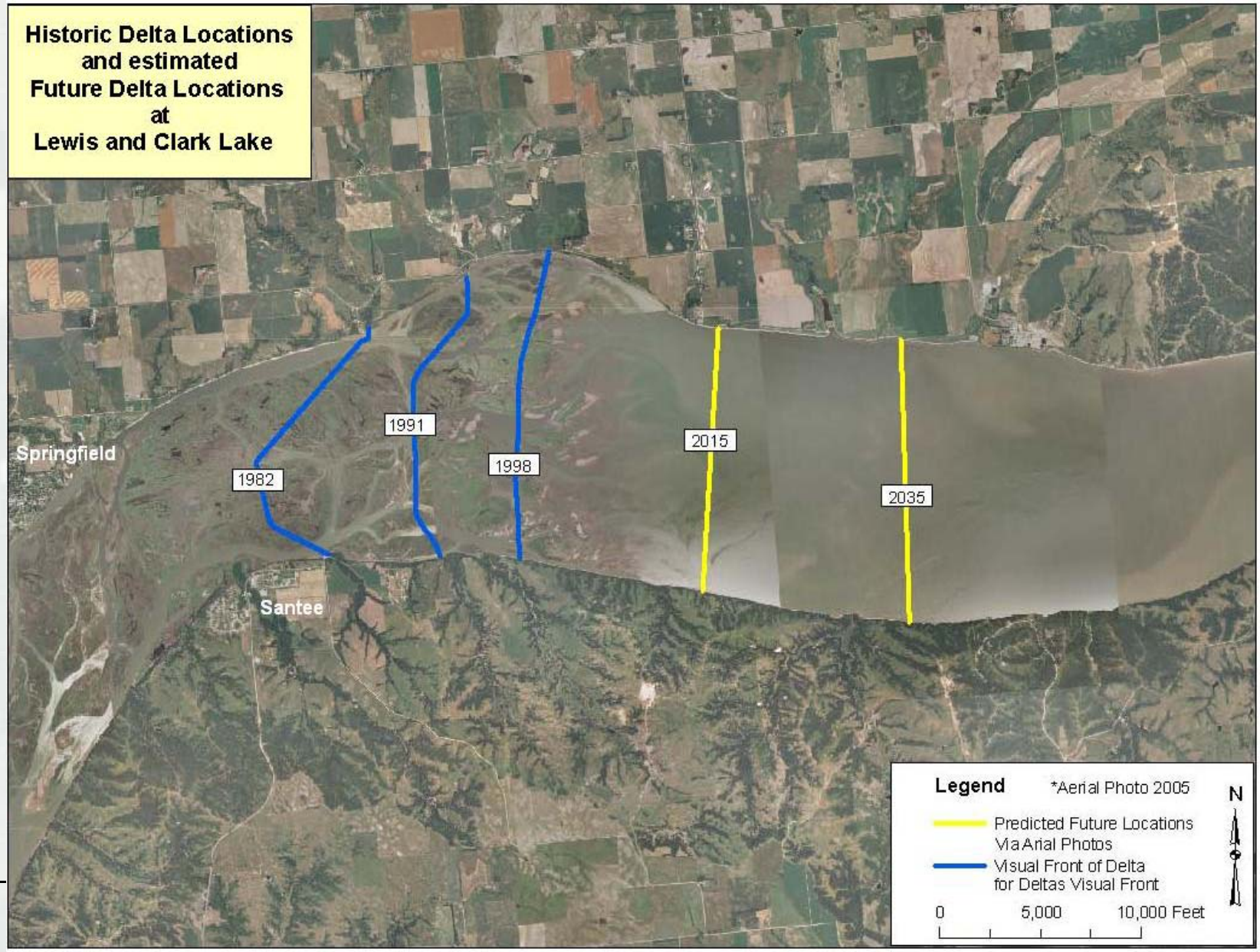
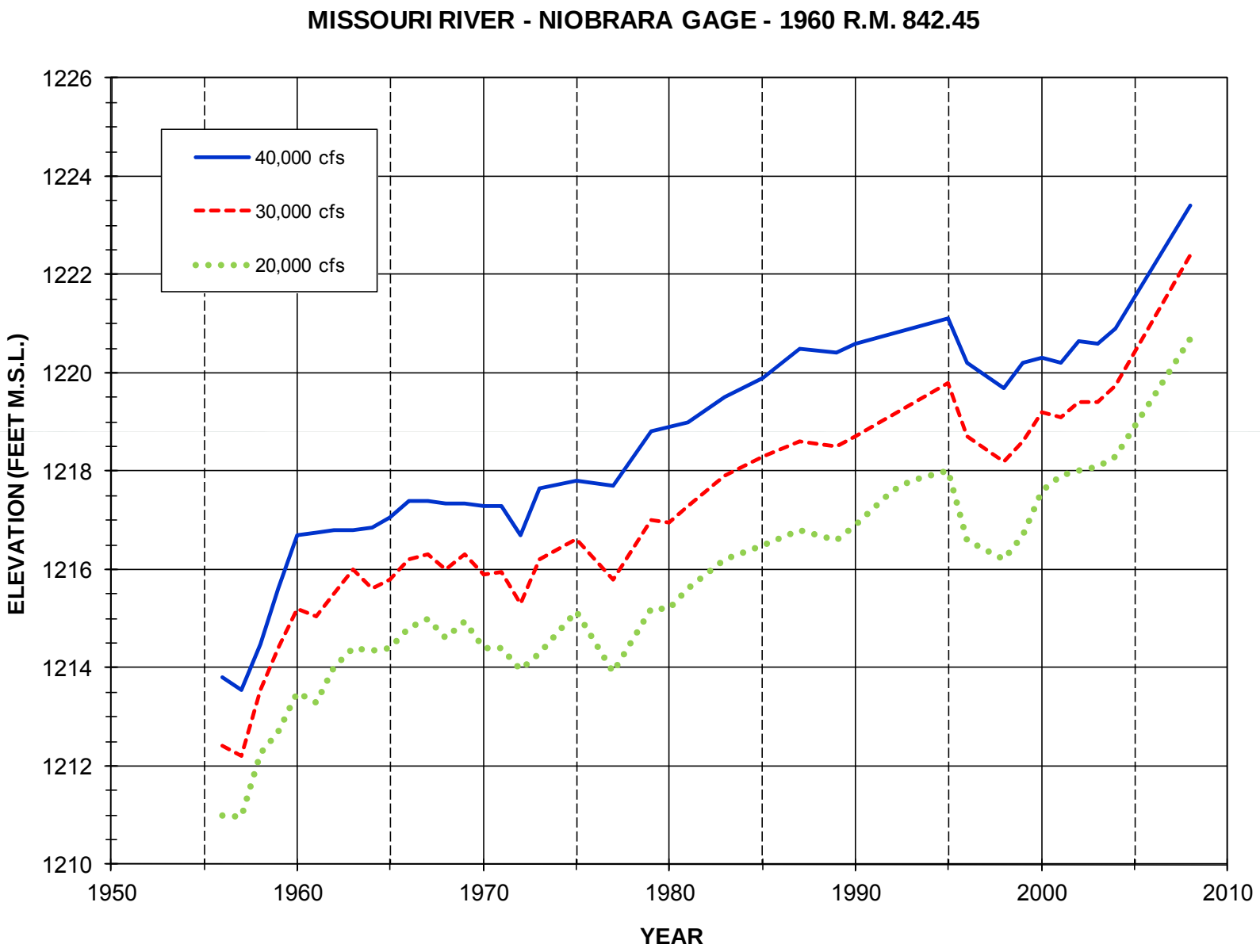
Aggradation Zone
Delta Formation Overview



Gavins Point Delta





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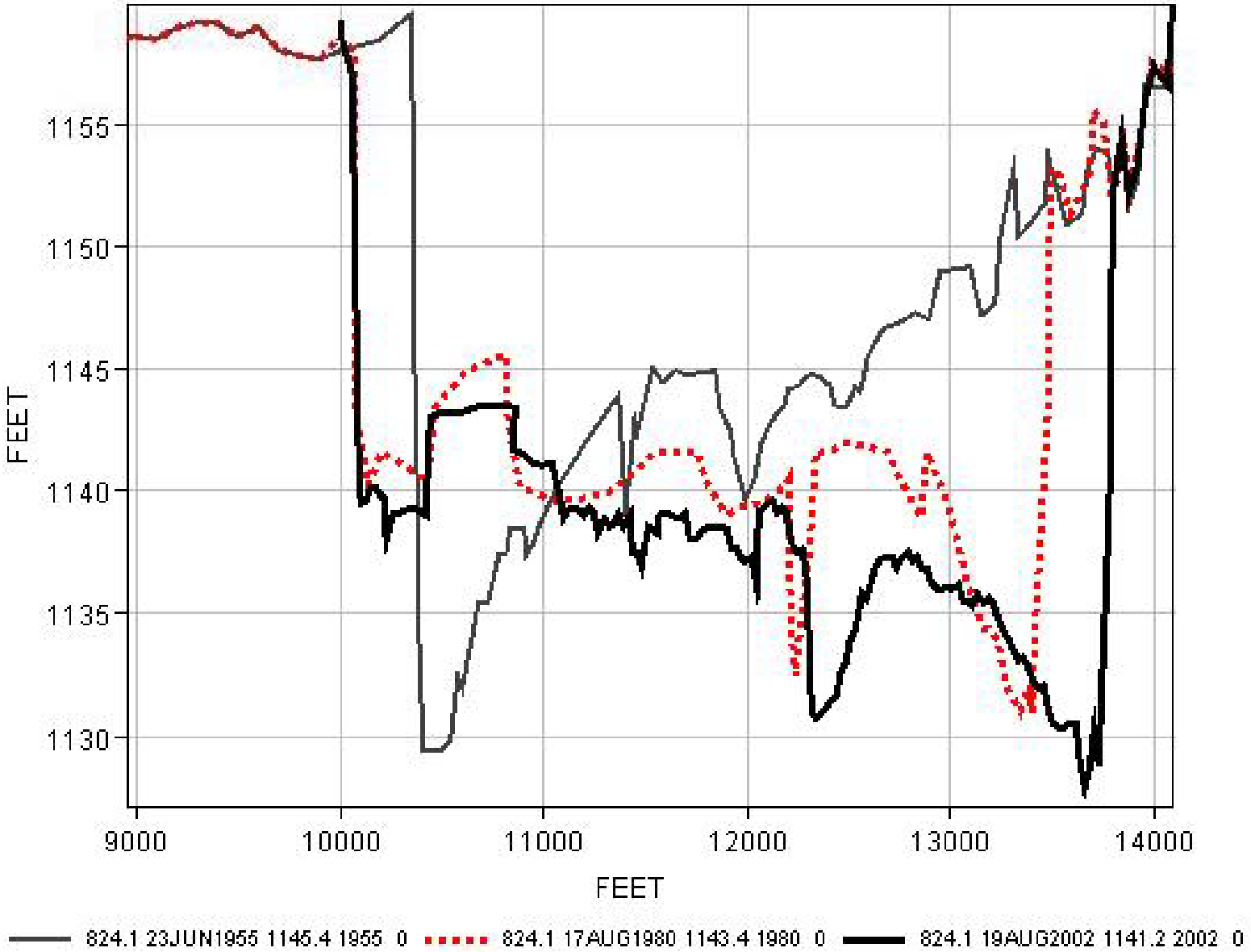
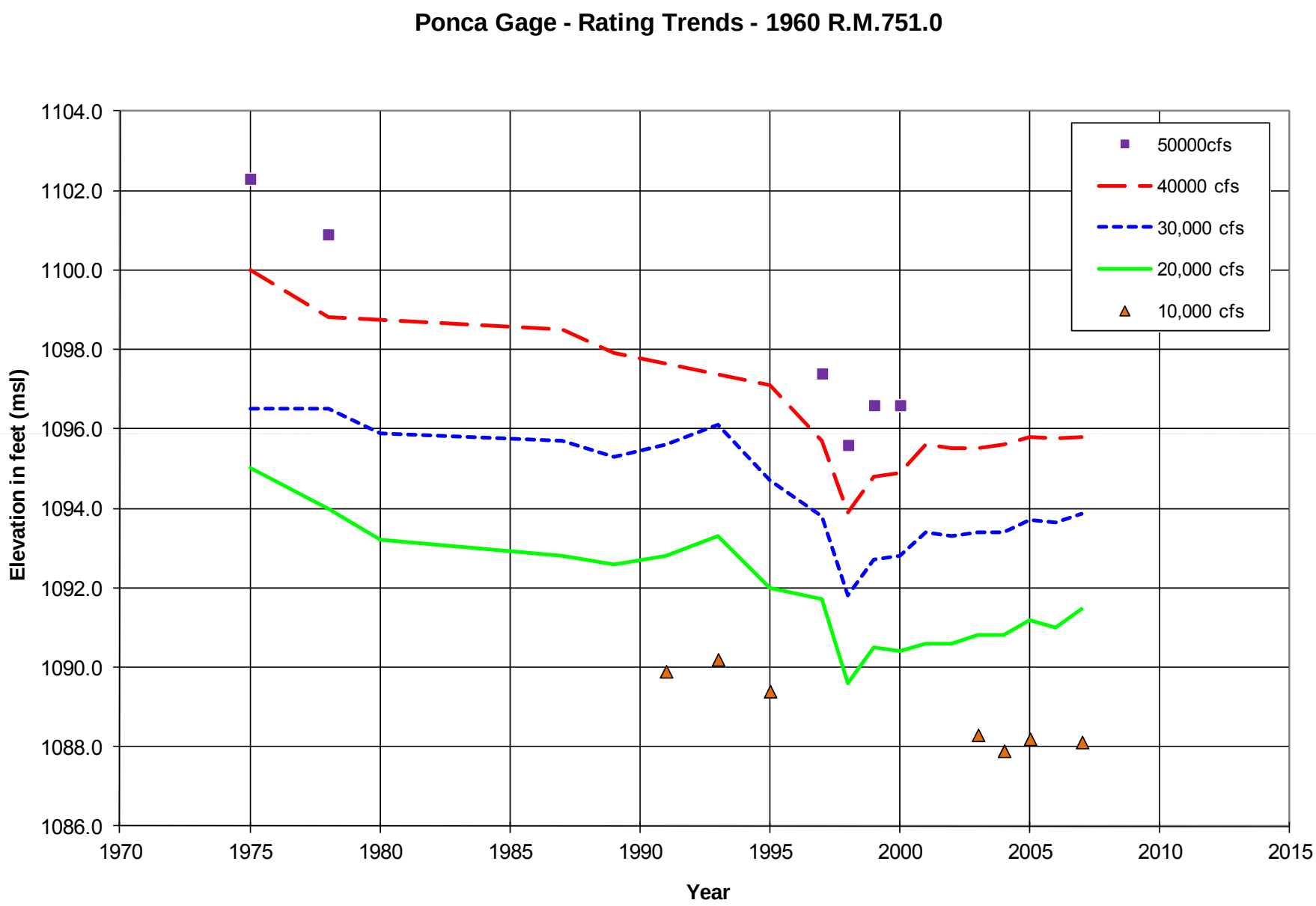
Downstream of Dam Degradation

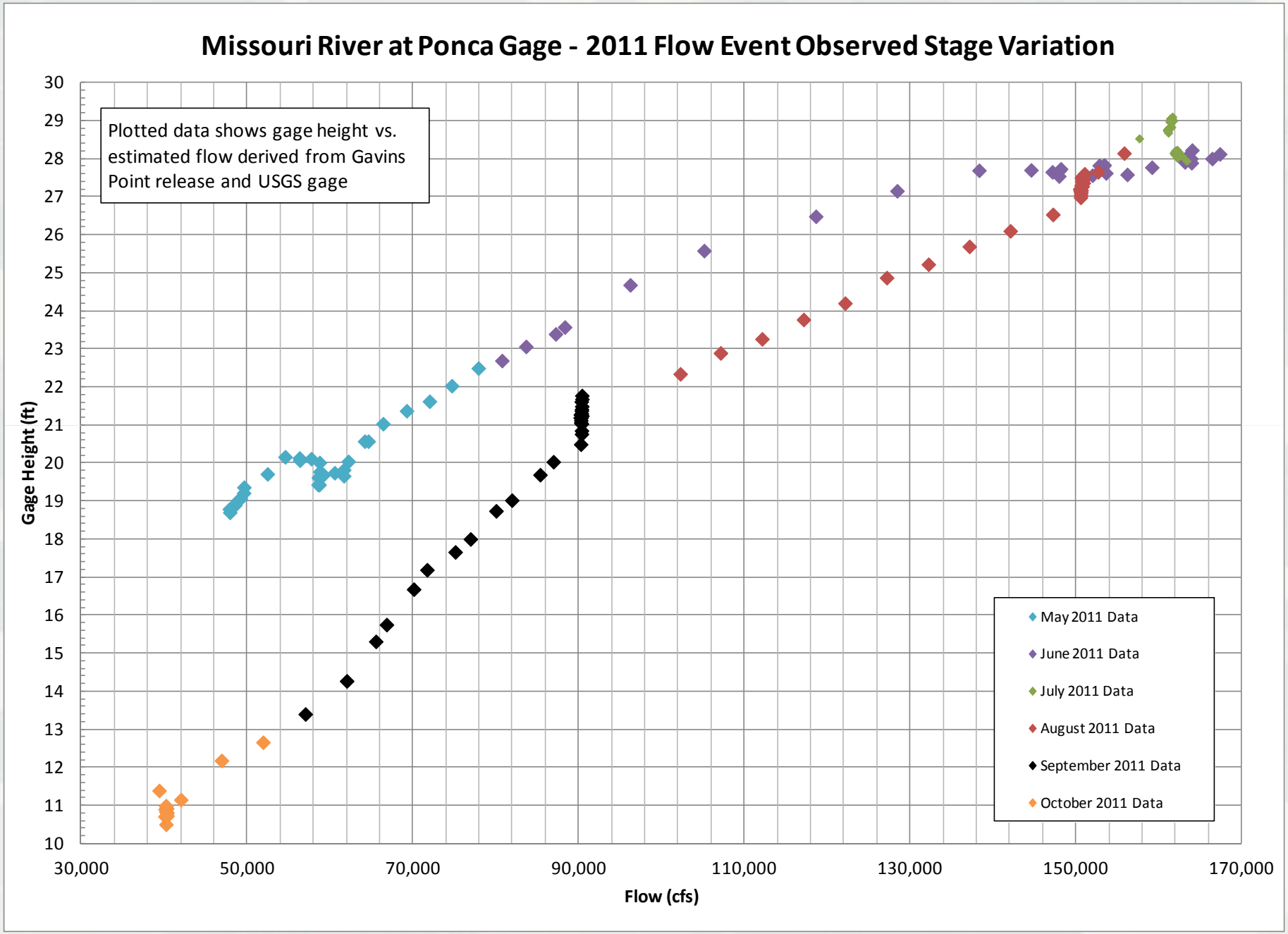
- Stream channel unchanged at first
- Sediment reduced below dam, especially bed material load
- General lowering of channel bed starts below dam and migrates downstream
- Eventually establishes a new equilibrium channel geometry:
  - dam flows, channel materials, bank material, etc.
- Long process, still ongoing on Missouri

Gavins Point Typical Degradation Section

Missouri River Rangeline 824.1 - River Mile 790.1
(about 20 miles below Gavins Point Dam)




Ponca Gage - Rating Trends - 1960 R.M.751.0
Elevation in feet (msl)
1104.0
1102.0
1100.0
1098.0
1096.0
1094.0
1092.0
1090.0
1088.0
1086.0
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Year
50000cfs
40000 cfs
30,000 cfs
20,000 cfs
10,000 cfs



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Questions ?