Accumulating Sediment Diminishes System Benefits

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Sedimentation Basics

* Sedimentation is the process of soil, rock & mineral particles being transported by flowing water and settling on a river or lake bottom.*
* The Corps estimates that 89,700 acre feet of sediment accumulates in the reservoirs annually. *(AOP)*
* That annual lost storage is equivalent to 10 square miles of mud slightly more than 14 feet deep.
* The dams act as "sediment traps."
* Since its creation, the system has lost more than 5 million acre feet of storage.

*Lewis & Clark Lake Sediment Management Study Handout/USACE

Sedimentation impacts …

* Flood Control
* Water Intakes
* Groundwater Levels
* Channel Capacity
* Private Property
* Roads & Bridges
* Recreation
* Storage Capacity
* Hydropower Generation
* Ice Jam Flooding
* Water Quality
* Sediment Balance Downstream
* Cultural Resources
* Endangered Species Habitat

Accumulation of Sediment Contributes to Flooding

* When sediment is carried by a fast moving stream into a still water area, the sediment settles to the bottom, raising the elevation of the stream bed. Water must then flow over the built-up channel, raising the elevation of the surface of the water. The process continues. As the stream bed gets higher, the water has less area within the channel to flow and ultimately gets forced out of the channel, contributing to a flood.

Annual Sediment Inflow

Reservoir	Acre Feet Annually
Fort Peck	17,700
Lake Sakakawea	25,900
Lake Oahe	19,800
Lake Sharpe	5,300
Lake Francis Case	18,400
Lewis & Clark Lake	2,600
Total	**89,700**

2011-2012 Annual Operating Plan US Army Corps of Engineers

Sediment delta grows upstream & downstream

Lewis and Clark Lake, south of Springfield, South Dakota

Photo 2007

Niobrara River/Missouri River Confluence Area

2007 MSAC Photo/Above

Nov. 28, 2011 MSAC Photo/Below

Bad River/Missouri River Confluence

Fort Pierre, SD

July 1, 2011 SD Civil Air Patrol Photo

White River/Missouri River Confluence

2007 MSAC Photo/Above

Nov. 28, 2011 MSAC Photo/Below

Addressing Sedimentation …

* "All reservoirs, regardless of size, that are constructed on alluvial rivers will eventually fill with sediment, unless some sort of sediment management/removal/bypass is implemented. Implementing best management practices within basin and sub-basins (NRCS activities) can reduce the rate of sedimentation, but can not eliminate it."
    * Niobrara and Missouri Rivers, South Dakota and Nebraska – Sediment Strategies – Sect. 905(B) (WRDA 86) Analysis Reconnaissance Report – November 2001 USACE p. 2

Estimated Major Economic Benefits of Missouri River Mainstem System Regulation

Management Component	Estimated Average Annual Benefits, NED $millions**
Hydropower	$674
Water Supply	$611
Flood Control	$410
Recreation	$ 87
Navigation	$ 9
Total	**$1,791**
Fish & Wildlife/T&E Species*	$?
Information from USACE slide "Missouri River: Multiple Uses" 1998 Data	

*Environmental benefits to be developed in MRERP/MRAPS using P&G/**Economic Data to be updated as part of MRAPS

Not in your lifetime?

* Based on 2009 COE data, Lewis and Clark Lake has a storage loss of nearly 22 to 25 percent.
* By the year 2045, Lewis and Clark Lake is expected to be at a 50 percent loss of storage capacity.

Estimated Time to Fill Reservoir Storage Capacities --- 2009 Report

Reservoir	Year Completed	25% of Design Volume	50% of Design Volume
Fort Peck	1937	2201	2465
Lake Sakakawea	1953	2183	2413
Lake Oahe	1958	2250	2542
Lake Sharpe	1963	2048	2133
Lake Francis Case	1953	2027	2100
Lewis & Clark Lake	1955	2000	2045

Phase II Sedimentation Assessment for the Upper Missouri River Basin – USDA NRCS NE, SD, ND, MT and WY pg 14/Based on COE Data http://www.msaconline.com/Missouri%20River%20Phase%20II%20%20Report.pdf

What can we do?

* Reducing sediment inflow will extend the lifespans of the reservoirs
  * More detailed data is needed to ensure watershed treatment strategies are effective. Existing data does not account for 41 to 74 percent of the total sediment in the reservoirs. (pg. 35 Phase II Sedimentation Assessment for the Upper Missouri River Basin) (http://www.msaconline.com/Missouri%20River%20Phase%20II%20%20Report.pdf)
  * See also the National Academy of Sciences 2010 Report http://dels.nas.edu/resources/static-assets/materials-based-on-reports/reports-in-brief/Missouri-River-Report-Brief-FINAL.pdf

What can we do?

* The Corps has engaged in several studies looking at different alternatives such as flushing, diversion, canals, dredging, planned lakes, and a sediment transport pipeline.
* The Title VII and Title IX (WRDA 2000) Task Forces are formed to specifically address sedimentation in the Missouri River in North Dakota and South Dakota.
* A combination of actions is likely needed to meet the short-term and long-term needs of the system.

North Dakota Images

Near mouth of Heart River, south of Bismarck, ND

(photo by Bruce Engelhardt of NDSWC – taken Sept. 30, 2011)

Oil Co. plowed river sediment off access road to tanks/River bottoms sugar beets in 2010

(photo by Dan Farrell, NDSWC -- taken Nov. 12, 2011 traveling south from 45th Street Northwest, Trenton, ND.)

Hogue Island

Photos provided by:
North Dakota State Water Commission

Hogue Island

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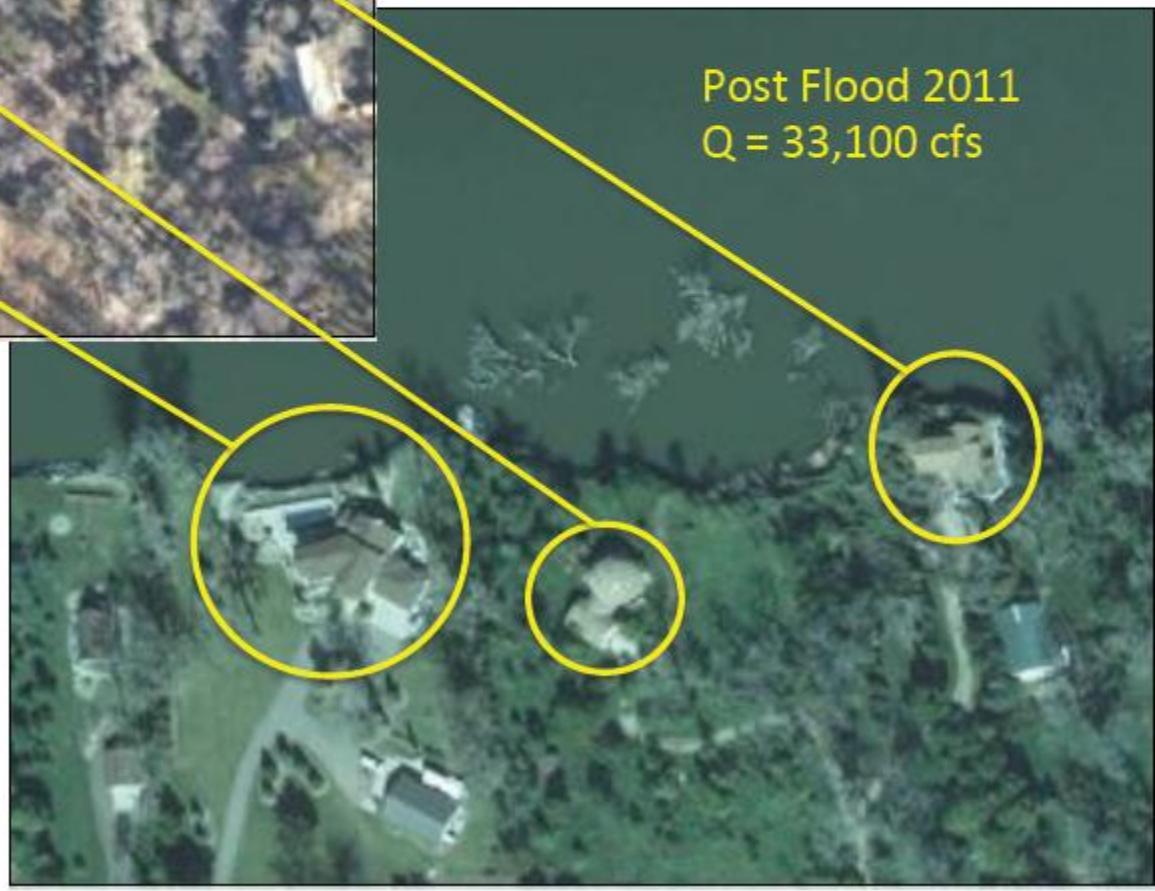
Aggradation at the confluence of the Heart River and South Bismarck Drain

Sibley Bend



Photos provided by:
North Dakota State Water Commission

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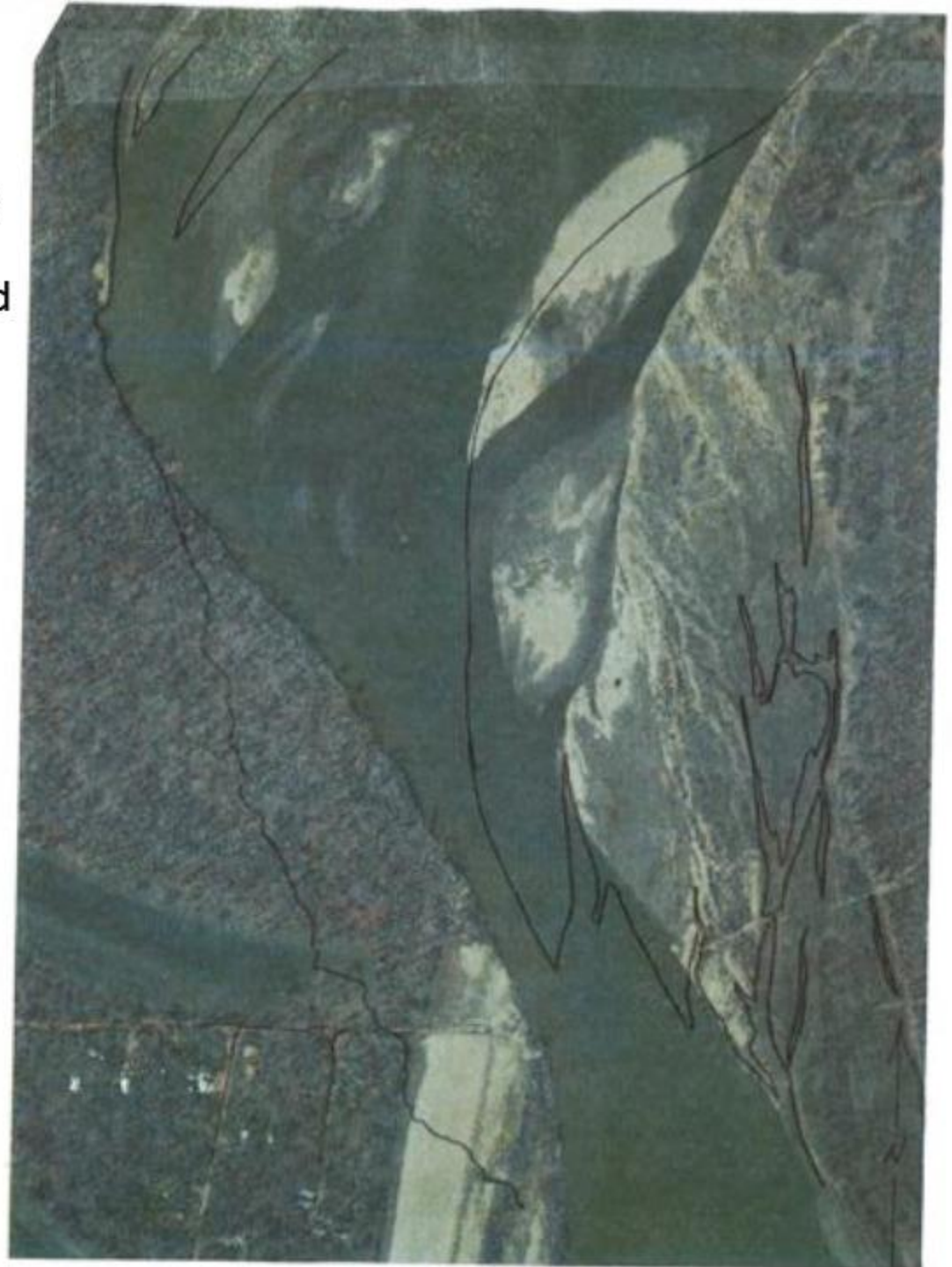
2010 Photography
With
2011 River Digitized



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