

# Backwater Sedimentation Rates

State of knowledge (POOR!)

- Pre-UMRR studies
- Recent studies
- HREP studies

Forecasting future conditions and HNA II

Other sediment-related information needs



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## Pre-UMRR studies

Typically used dating techniques to measure accumulation

Some shortcomings:

- Erosion can't be measured
- Marker layers can be indistinct
- Most studies collected sediment cores from areas of high accumulation (biased sample)
- The most “recent” period in past studies was 1965 to 1980
- Study areas were typically limited to impounded regions

Valid finding:

- Rates were found to be decreasing since impoundment



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## Pre-UMRR studies

A few studies using bathymetric change from maps

Some shortcomings:

- Gaging the data can be difficult
- Maps from interpolation (potential for large errors)
- Change over long time periods.
- Study areas were typically impounded regions

Valid finding:

- General filling of impounded areas



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Recent studies

## Sediment budgets

Pool-scale – Pool 13 and La Grange Pool

Backwater budgets - Weaver Bottoms

Some shortcomings:

- Errors can be large and bedload not well accounted for
- Does not depict where change is occurring
- Unless multi-year, the long-term retention of sediments is unknown

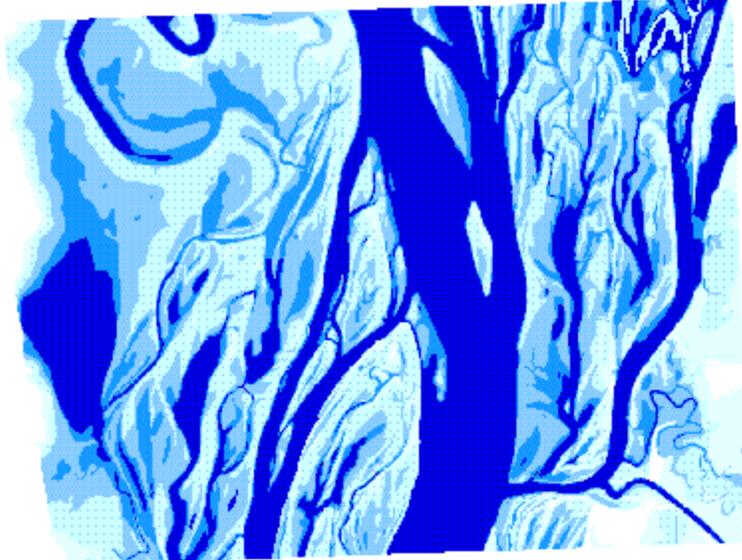


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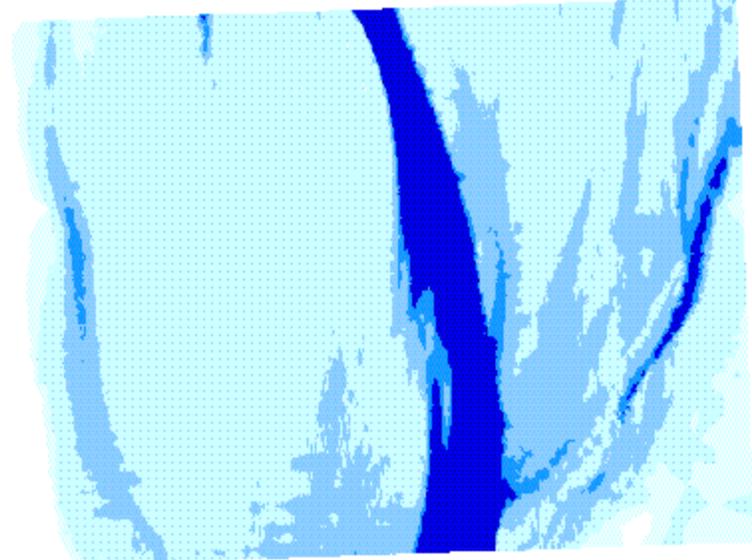


## Recent studies

### Spatial mapping of change since impoundment



1940 Bathymetry



1990 Bathymetry

Valid finding:

- Loss of diversity
- General filling of impounded areas – somewhat quantified

## Recent studies

### Change since impoundment in backwaters using markers

#### Some shortcomings:

- Erosion can't be measured
- Marker layers can be indistinct
- Change over a single long time period.

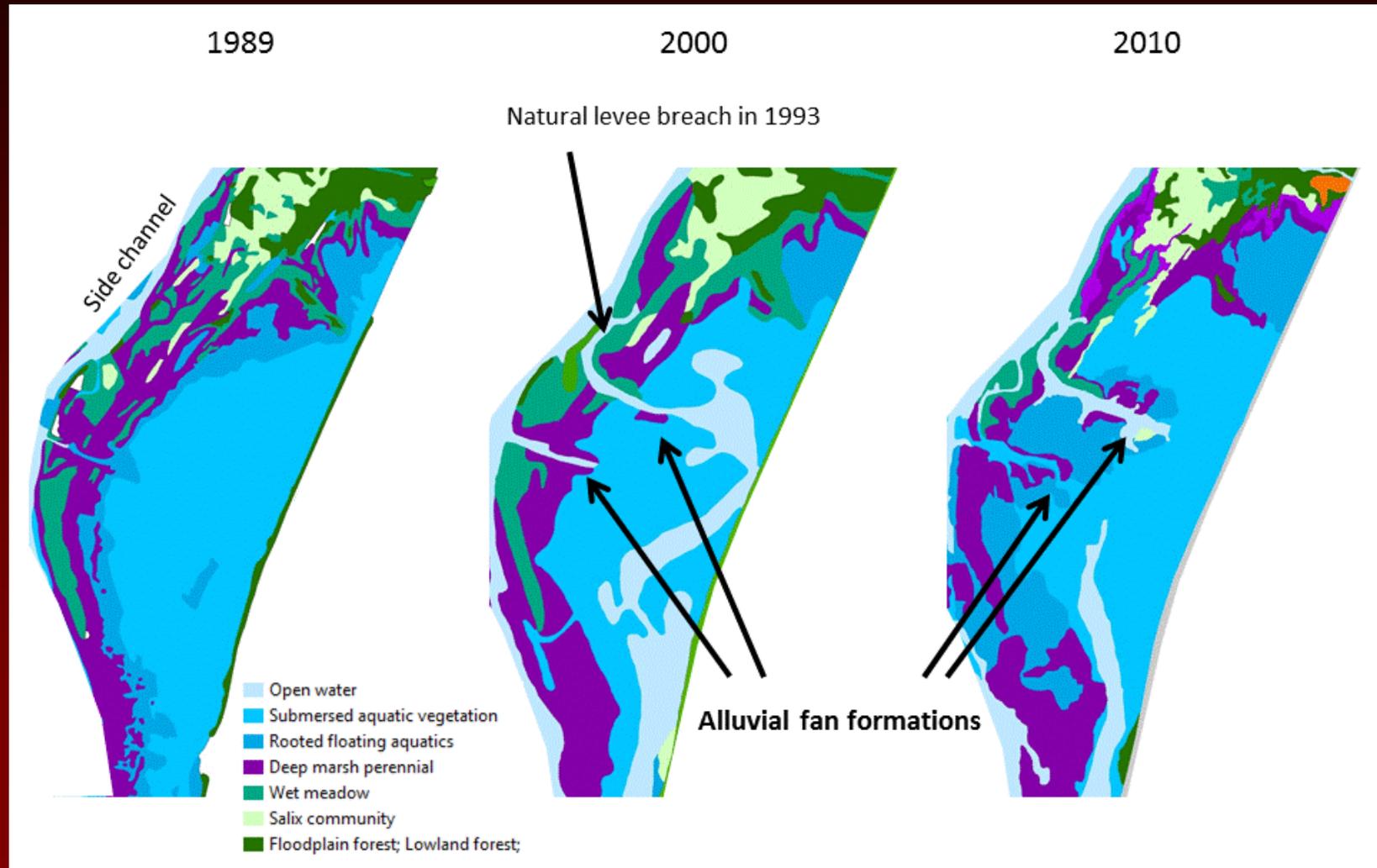
#### Valid finding:

- High spatial variability



## Recent studies

# Alluvial fan formation in backwaters



## Recent studies

# Annual sedimentation rates in backwaters



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### Backwater sedimentation rates in Pools 4, 8, and 13

Net sedimentation rates are estimated annually along established transects by direct survey of the river bottom. Transects across backwater areas were randomly selected in Pools [4](#), [8](#), and [13](#) of the [Upper Mississippi River](#).

Temporary vertical and horizontal benchmarks were set to obtain relative water surface elevations and align the transect. Surveys are conducted over the ice by taping distances and measuring depths with a sounding pole. In open water conditions, elevations are measured using a level.

[Background project information page](#) ▶  
[Recent rates of sedimentation rates in backwaters of the Upper Mississippi River](#) ▶



Graphical depiction of change along transects between 1997 and 2000 can be viewed:

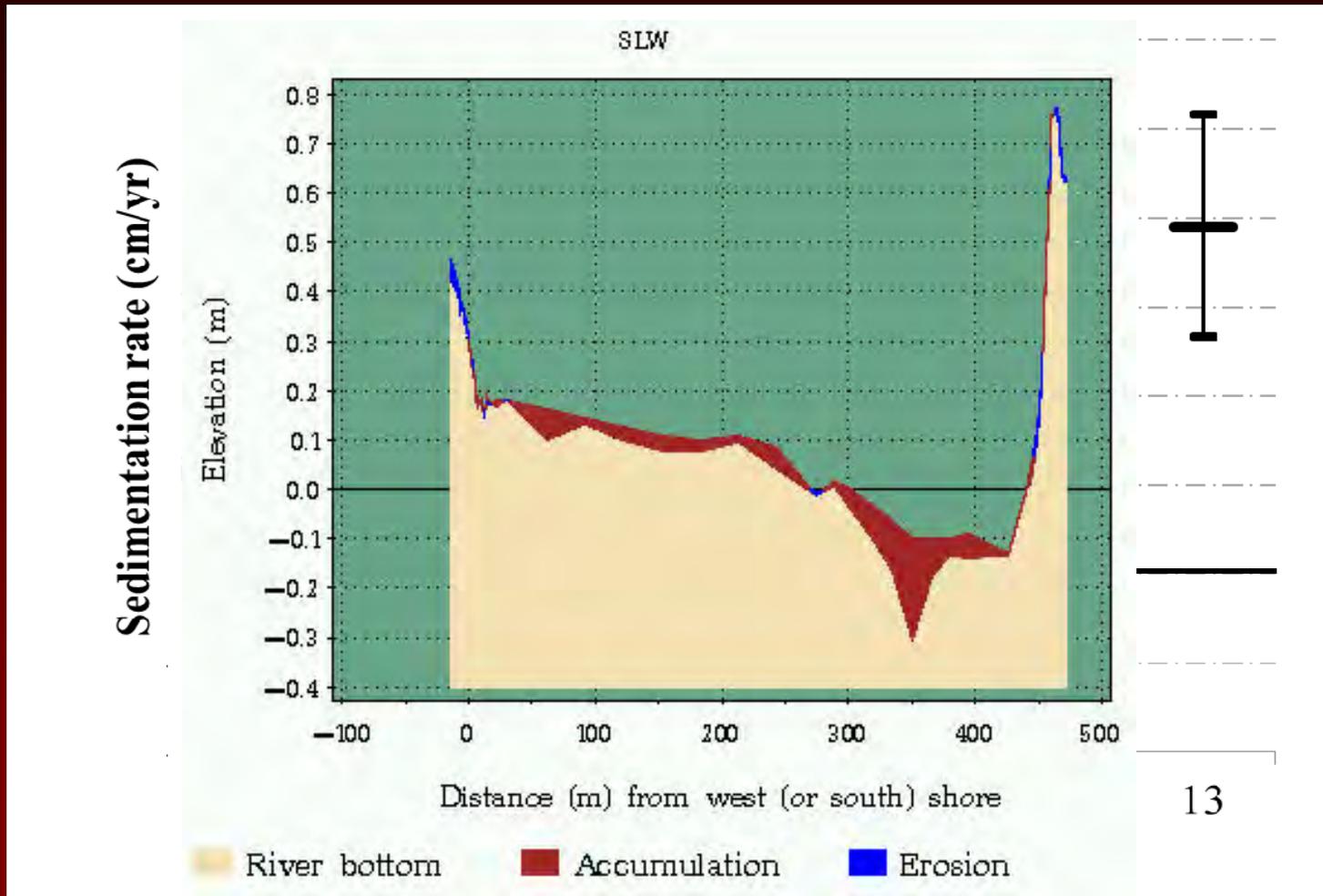
- [Pool 4](#)
- [Pool 8](#)
- [Pool 13](#)



Analysis and reporting of change over a 5-yr period is scheduled in 2002.

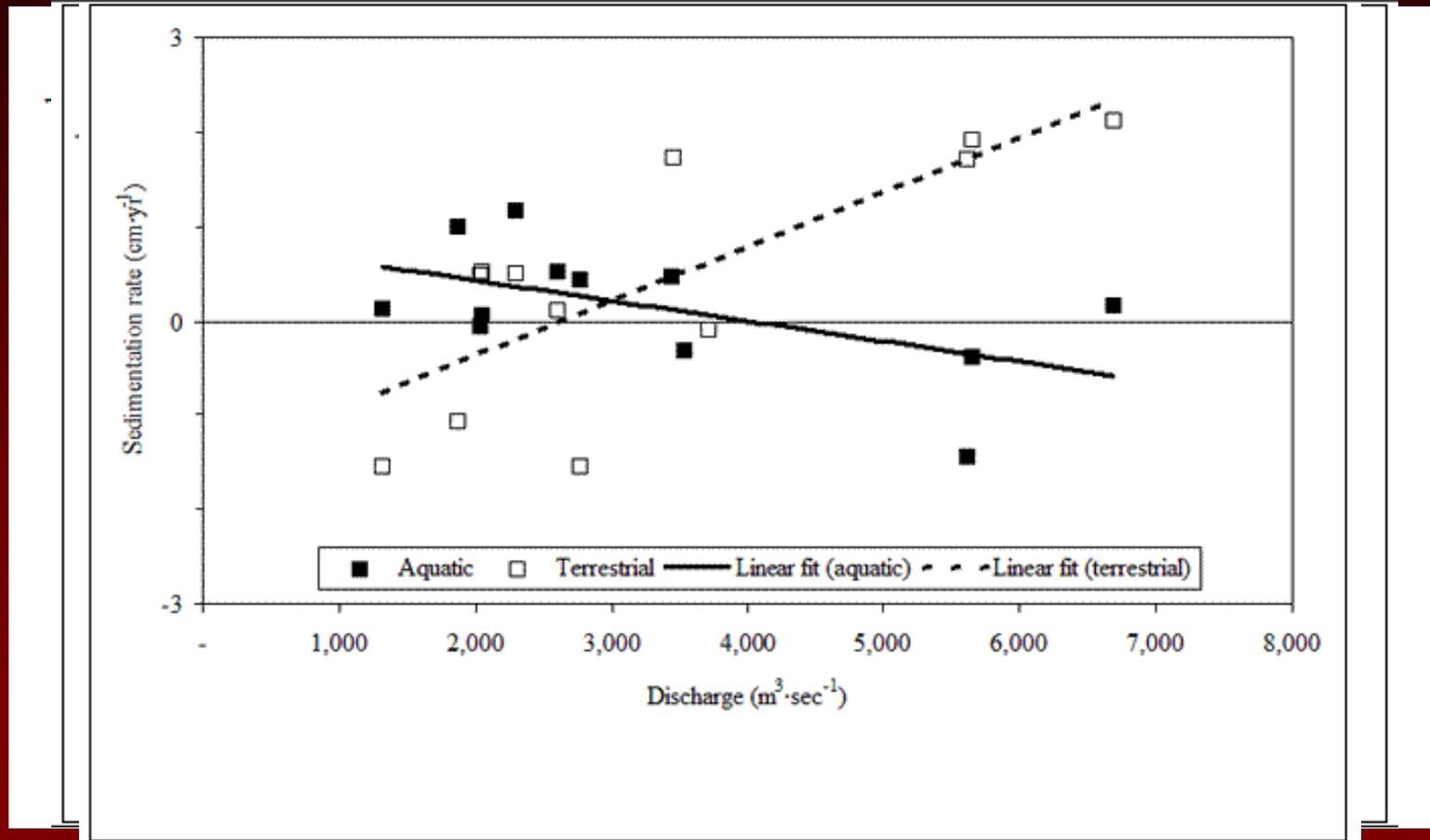
## Recent studies

Findings from annual surveys: Rates of accumulation between 1997-2001



## Recent studies

Finding from annual surveys:  
Different patterns in low discharge vs. high discharge years



# HREP studies

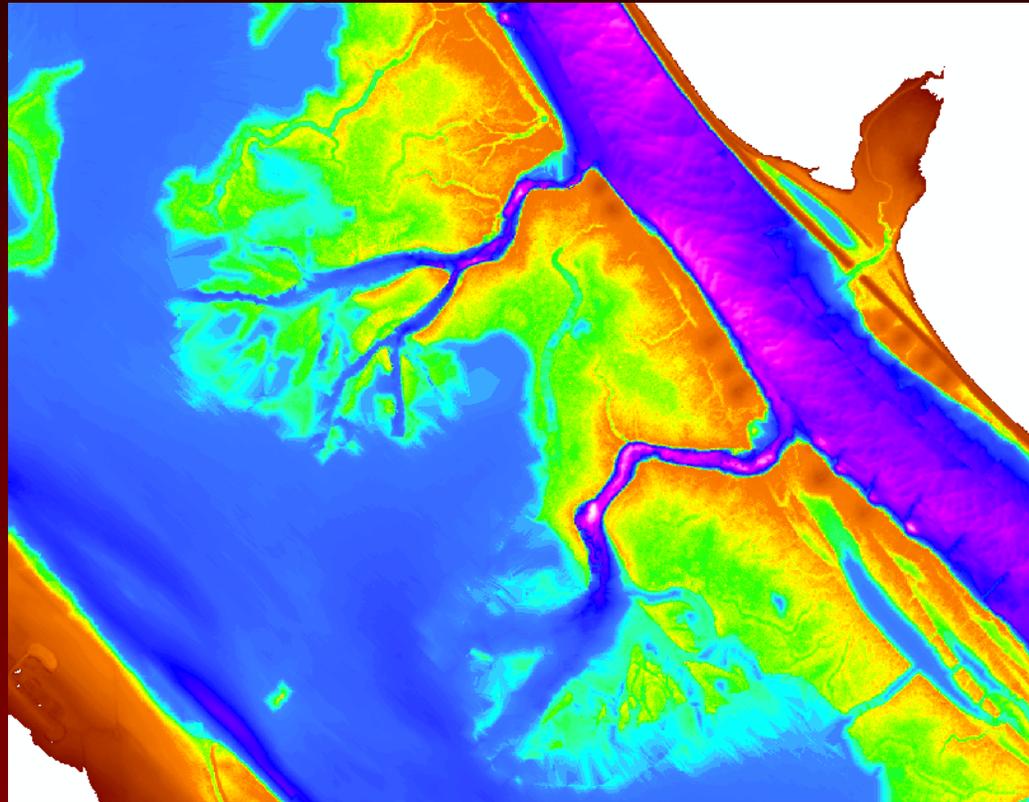


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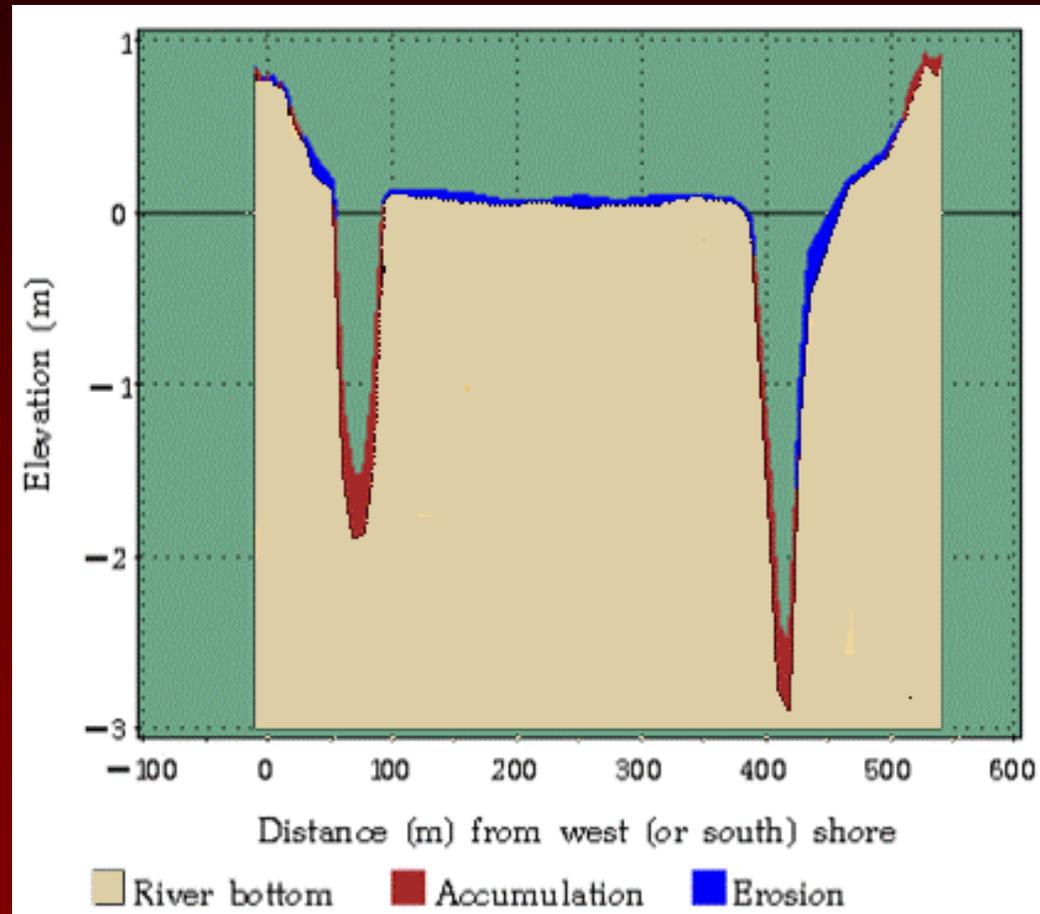
## HREP studies

### Alluvial fan formation in North Lake, Pool 3



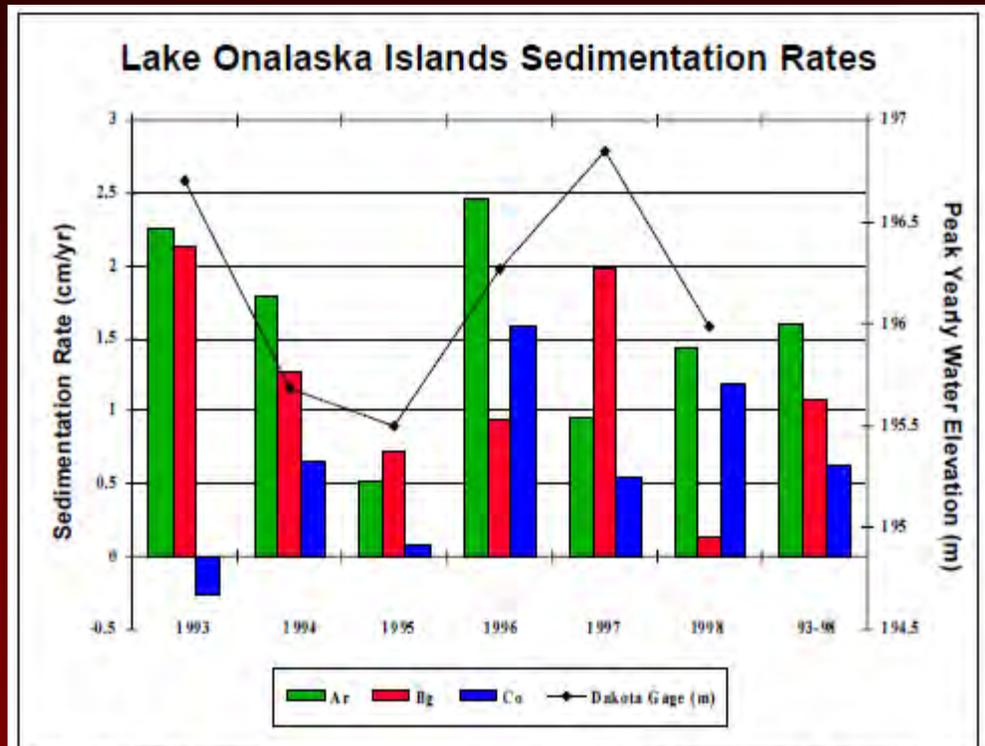
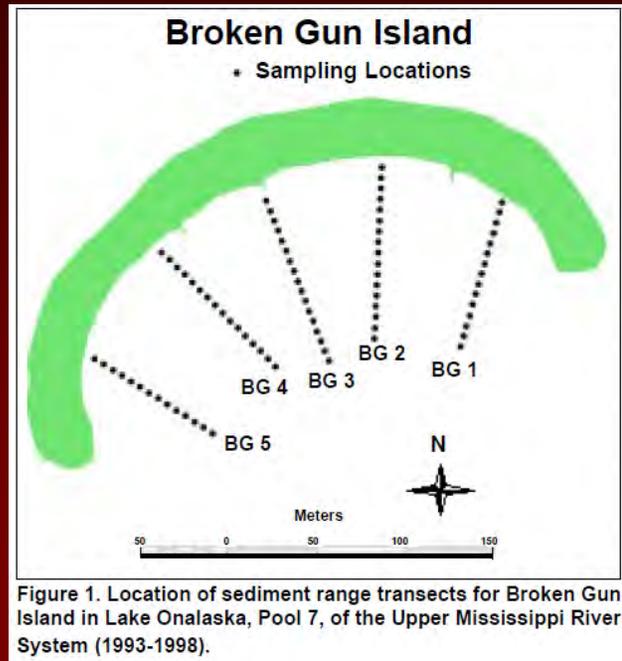
## HREP studies

### Accumulation in dredge cuts



# HREP studies

## HREP island effects



# Forecasting future conditions and HNA II



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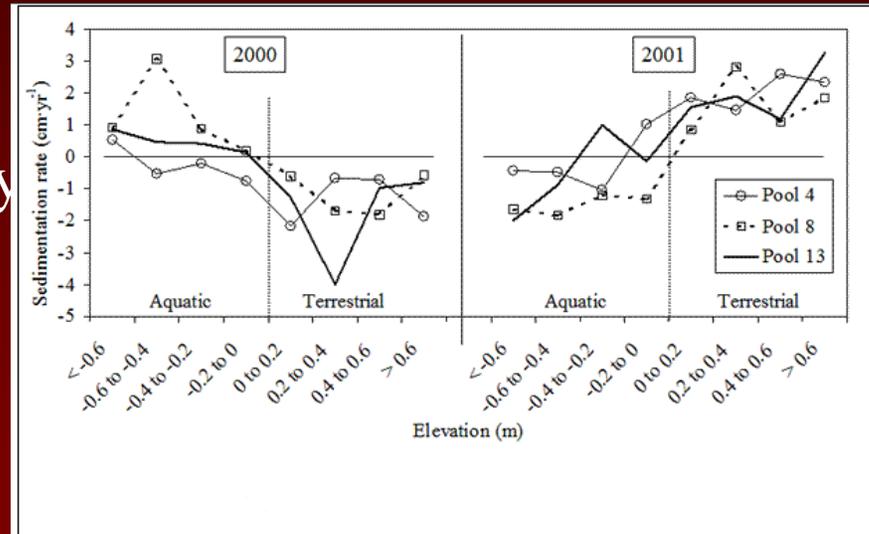


# Forecasting future conditions and HNA II

## Predictive models of sedimentation

Based on our best understanding from past studies

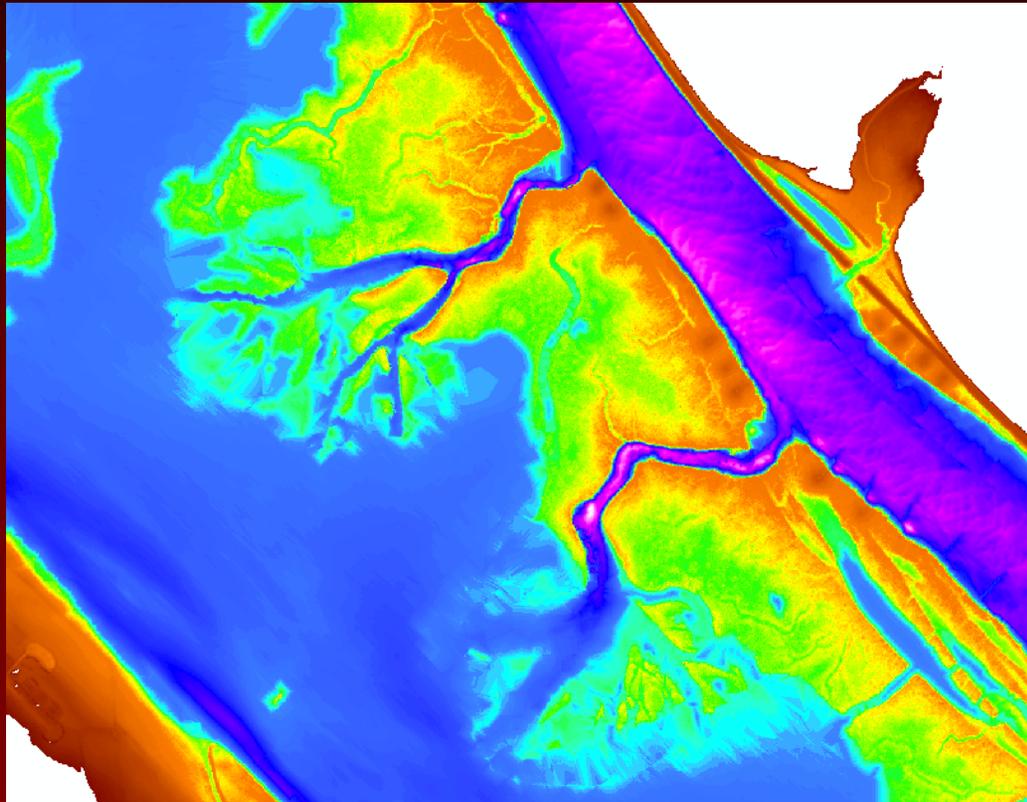
Predictions will not be spatially



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## Forecasting future conditions and HNA II

Can we model changes due to alluvial fan formation?



# Other sedimentation-related information needs



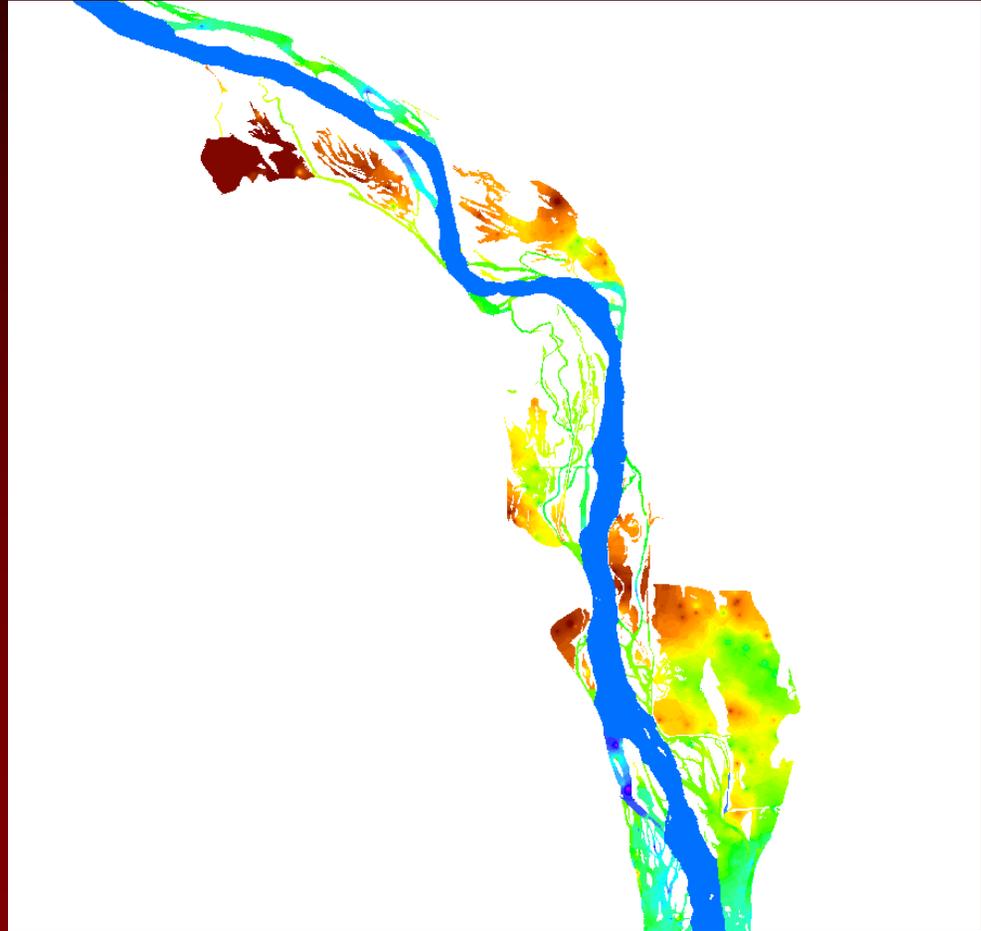
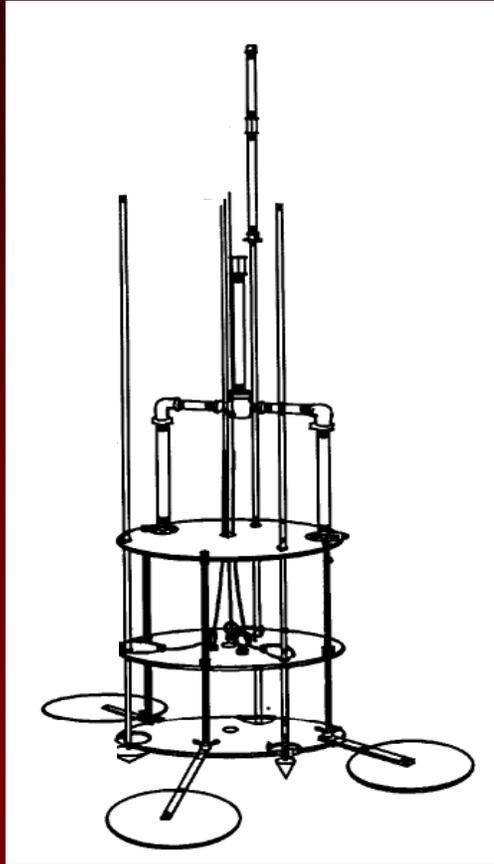
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Other sedimentation-related information needs

Characterizing sediment

## Sediment mapping



## Other sedimentation-related information needs

### Characterizing sediment

#### Examples:

- Nutrient content (P release issues)
- Moisture content (suitability for rooted macrophytes)
- Contaminants

#### Beyond characterizing the sediment:

- The role of sediment in nutrient cycling
- Oxygen demand from sediments



# A Simple Framework for Backwater Sedimentation

Understand rates and patterns of change

Forecasting future conditions based on our best understanding

Understand what type of sediment is accumulating and processes

Assess how depth and sediment changes will alter habitat

Determine habitat rehabilitation needs

Select projects to address habitat needs



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