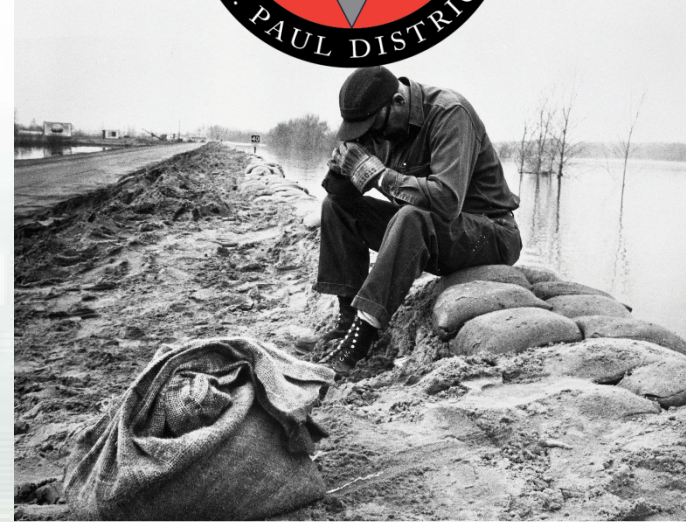


# Habitat Rehabilitation and Enhancement Projects and the Models Used to Justify Them

## Upper Mississippi River Restoration Program Pools 1 through 10

**David Potter and Tom Novak**  
Fishery Biologist  
St. Paul District  
18 April 2016



# Outline

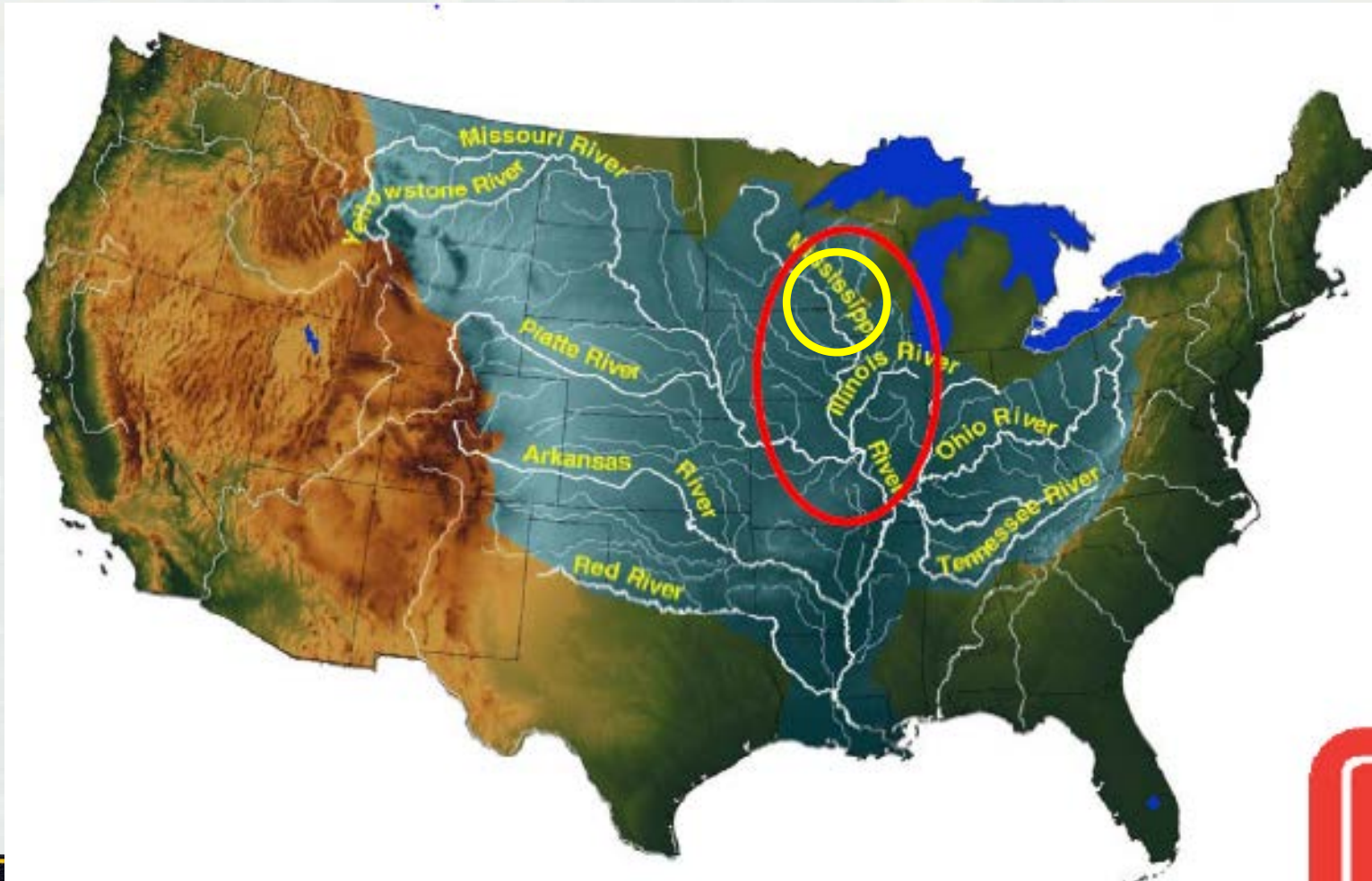
1. Upper Mississippi River Restoration Program  
Habitat rehabilitation in Pools 1 – 10
2. Habitat models/tools for planning



*Spring Lake Islands HREP*



# Mississippi River







Water Quality



Fish



Vegetation



Invertebrate



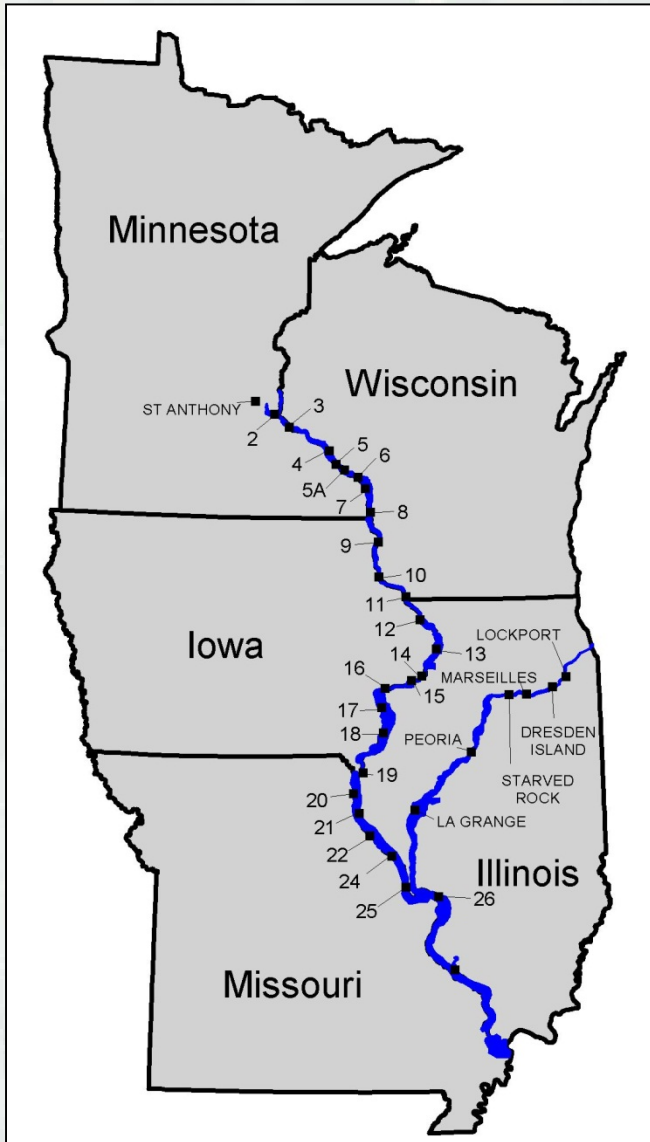
BUILDING STRONG®

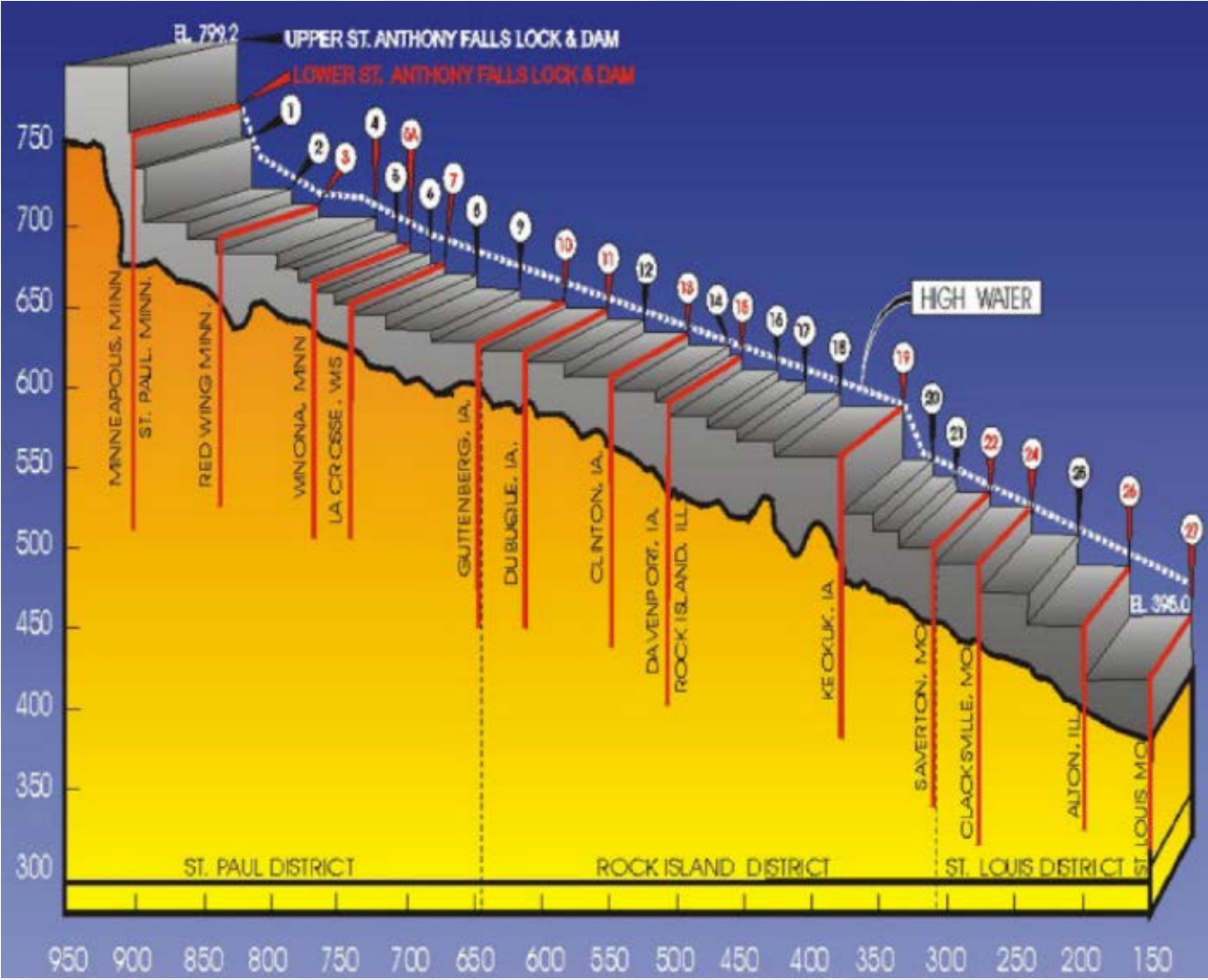
# International Flyway





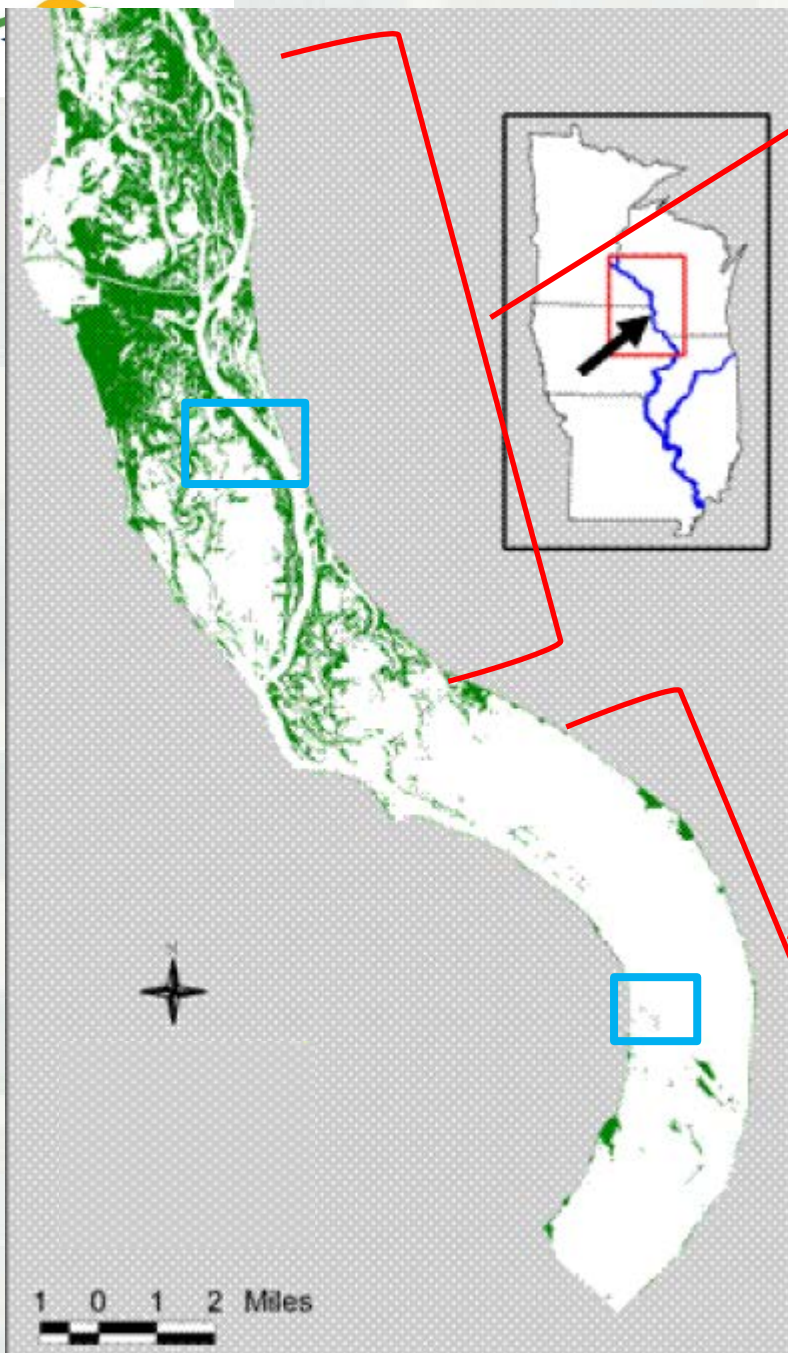
# “9-foot Navigation Channel”





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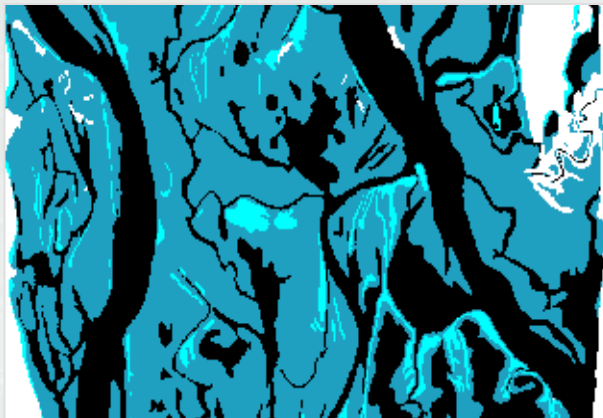




# Stressors

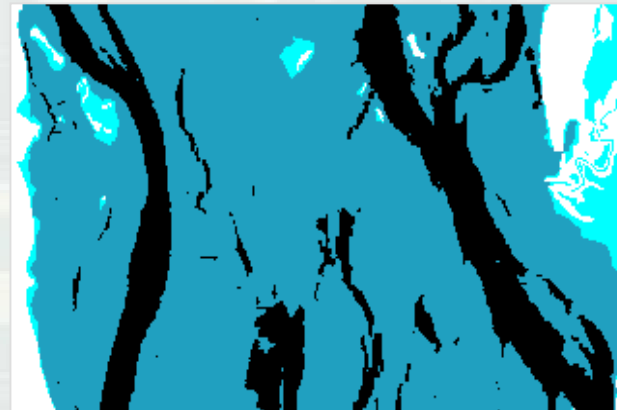
- Habitat fragmentation – longitudinal & lateral
- High hydraulic connectivity
- Wind fetch/wave action
- Stable water levels

1940



**Bathymetry**

1990



# Invasive Species







# Mississippi River Watershed Report Card

**D+**



*ECOSYSTEMS Recreation*  
**WATER SUPPLY**  
*Economy Transportation*  
**Flood control & risk reduction**



# UMRR

- Established under WRDA 1986
- Management Responsibility - Corps of Engineers
- \$15 to \$28M/yr for Habitat Rehabilitation & Enhancement Projects (HREPs)





# UMRR

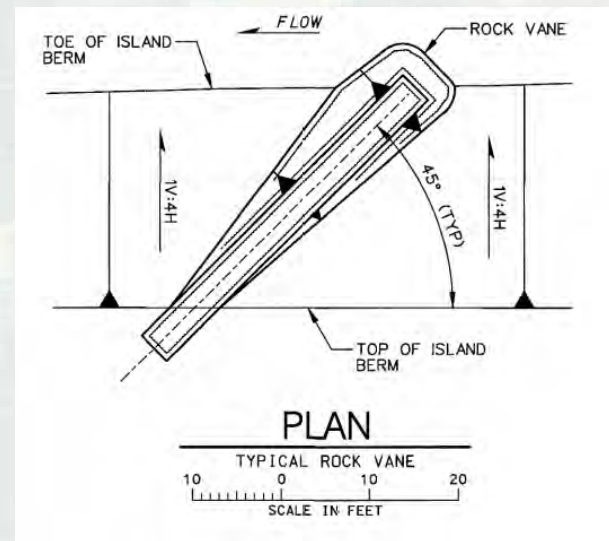
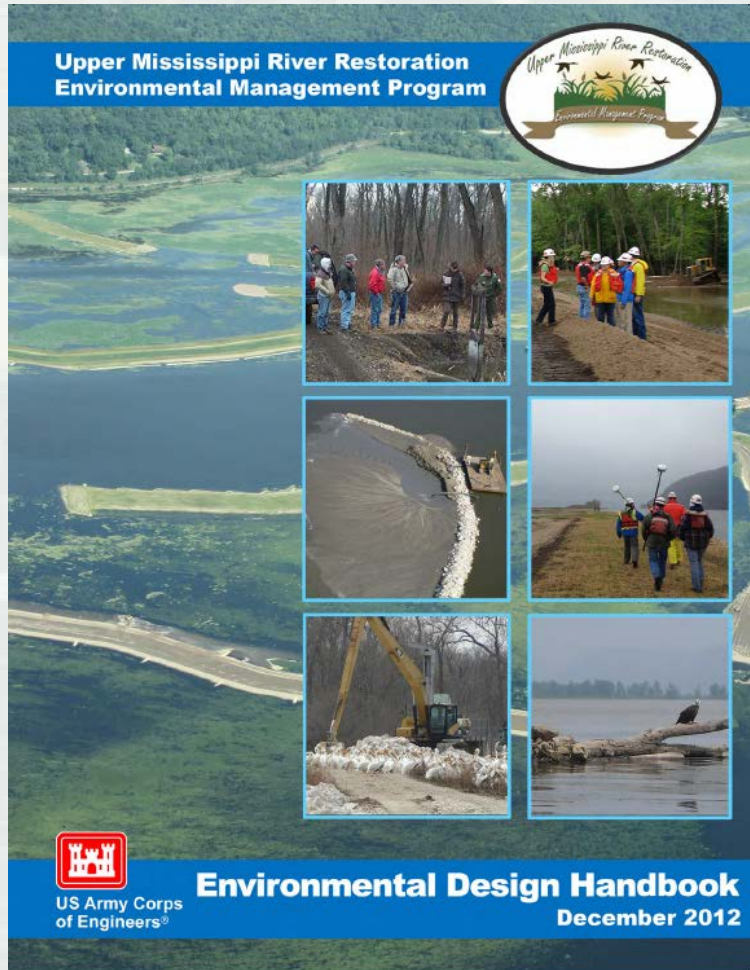
Mission: A Healthier and More Resilient Upper Mississippi River Ecosystem that Sustains the River's Multiple Uses



*Indian Slough HREP*



# Design Handbook

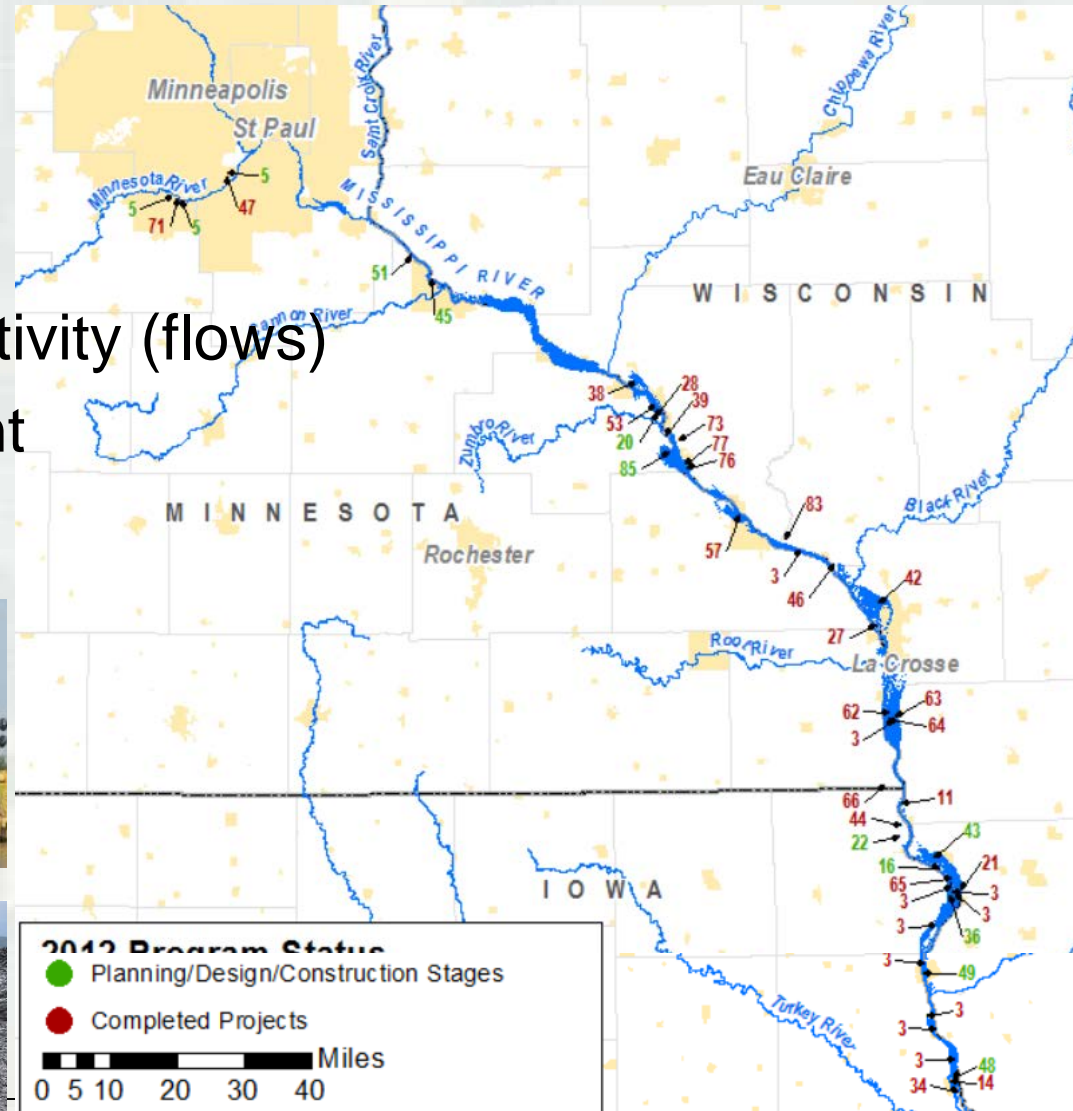




# HREPs in St. Paul District

## MAJOR FOCUS

- Island building
- Habitat dredging
- Adjusting lateral connectivity (flows)
- Water level management
- Shoreline protection



# Pool 8 Islands HREP





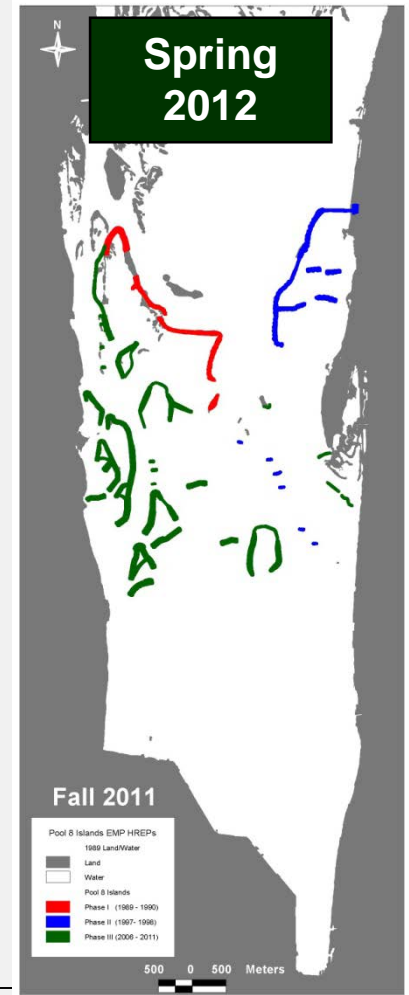
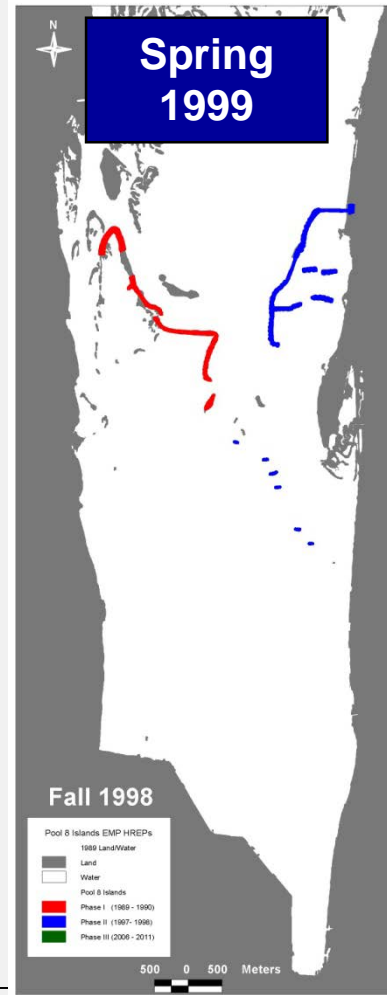
# Pool 8 Islands HREP

Pre Project

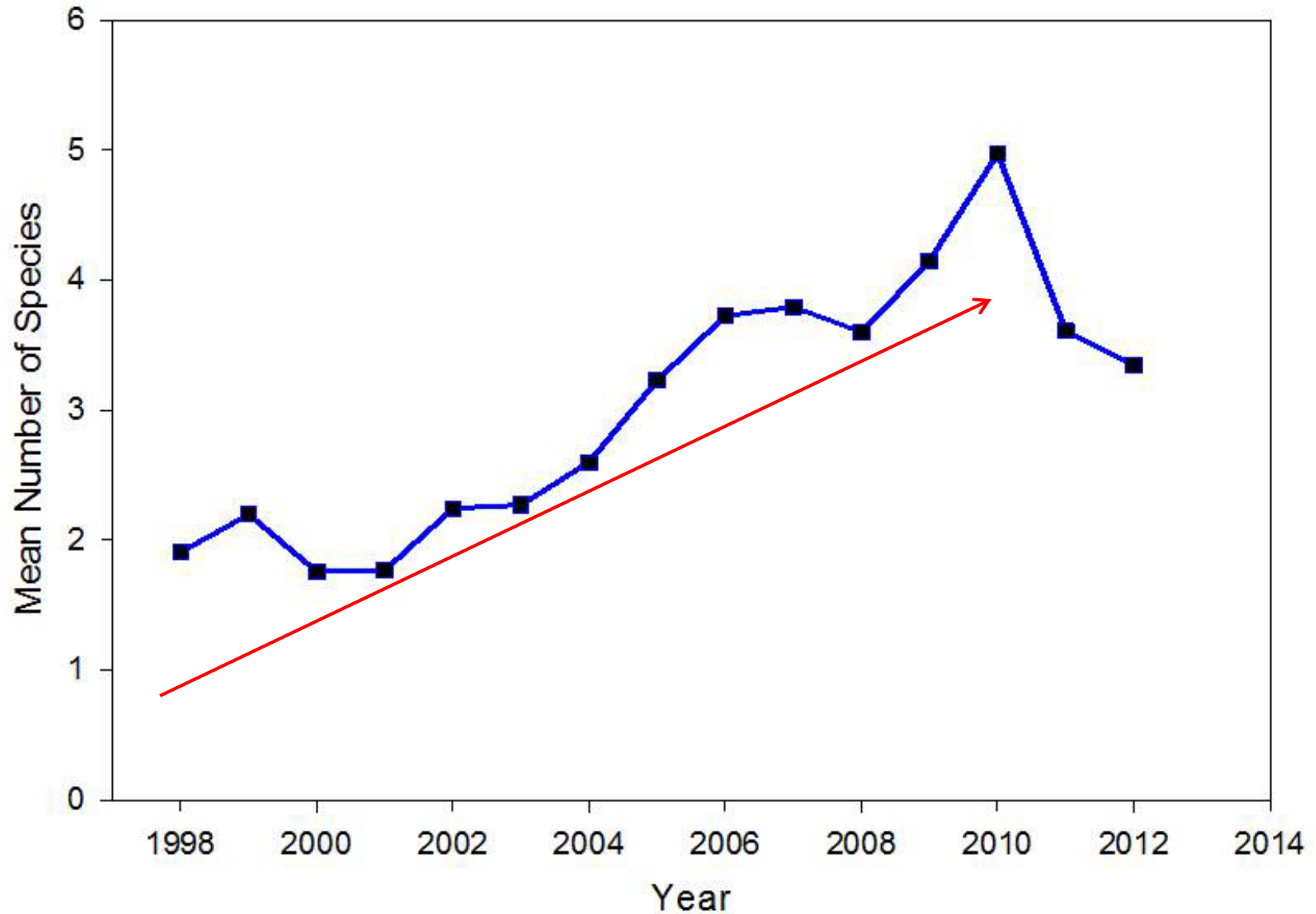
Phase I

Phase II

Phase III



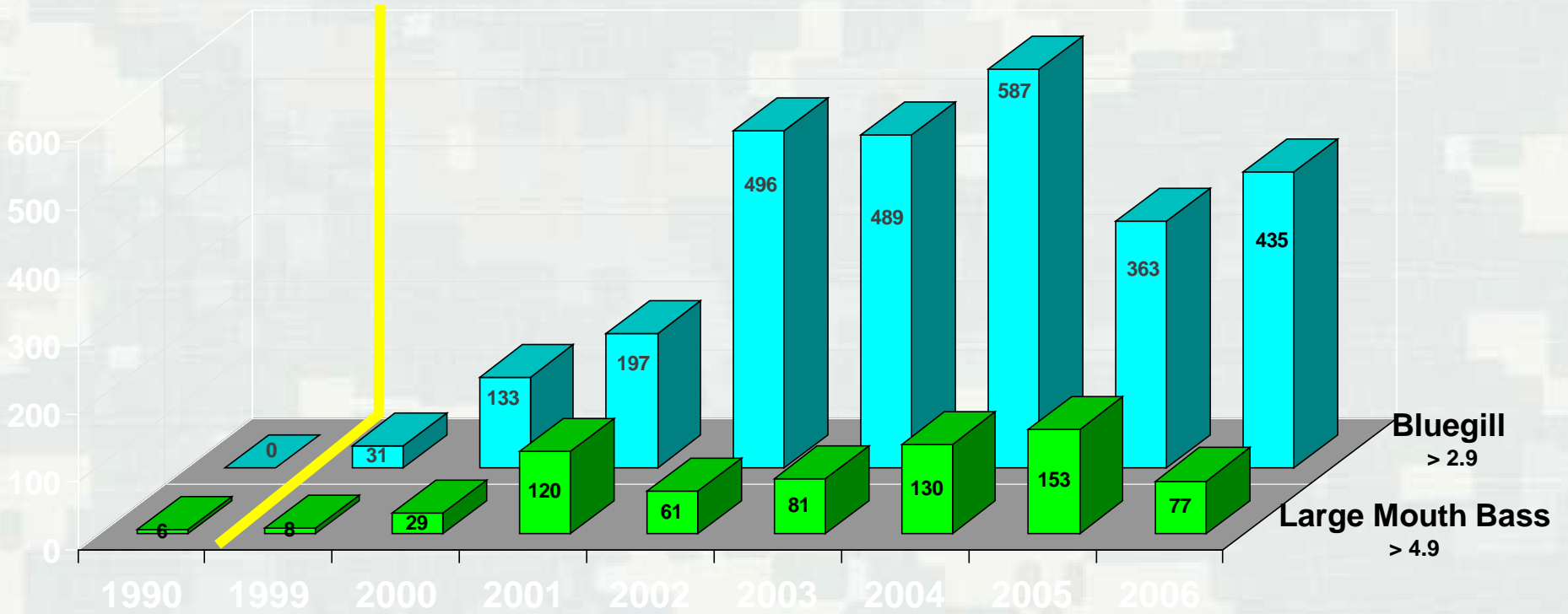
# Aquatic Vegetation Response





# Fish Response

Pre-  
Project



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*Mississippi River Rumble*  
*BASSMASTER blogs*



Photos: B.A.S.S.



**BUILDING STRONG®**

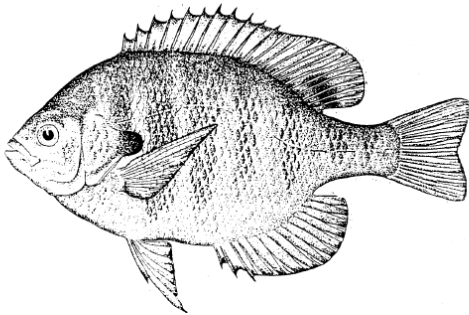


# MODELS

- Habitat Evaluation Procedure (HEP)
- Habitat Suitability Index Models (HSI)

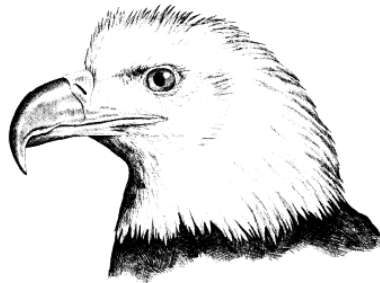
$HSI * Acres = \text{Habitat Units (HUs)}$

HABITAT SUITABILITY INDEX MODELS:  
BLUEGILL



Fish and Wildlife Service  
U.S. Department of the Interior

HABITAT SUITABILITY INDEX MODELS:  
BALD EAGLE (BREEDING SEASON)



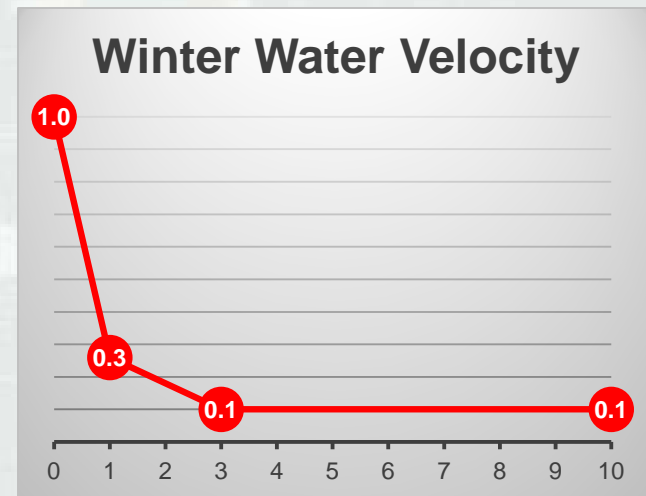
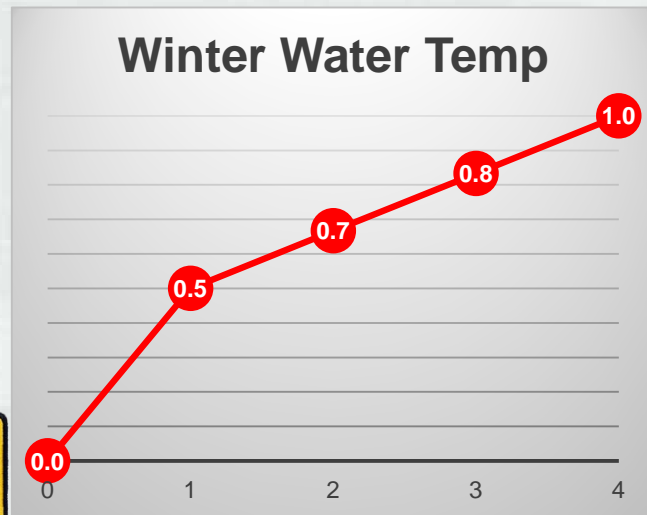
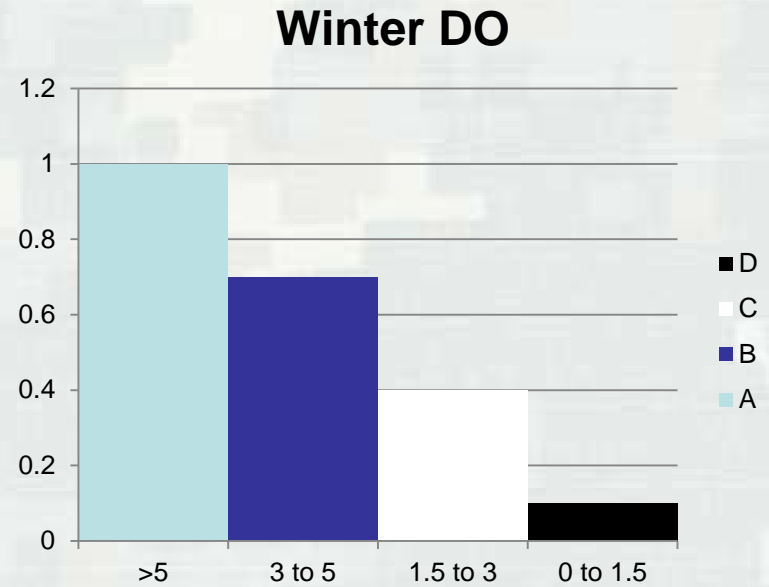
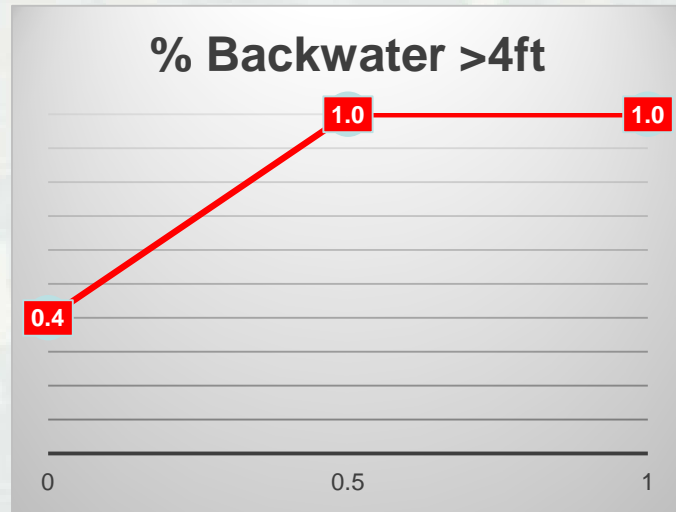
Fish and Wildlife Service  
U.S. Department of the Interior

HABITAT SUITABILITY INDEX MODELS:  
FISHER



Fish and Wildlife Service  
U.S. Department of the Interior

# Bluegill Overwintering





# Planning Models - HEP

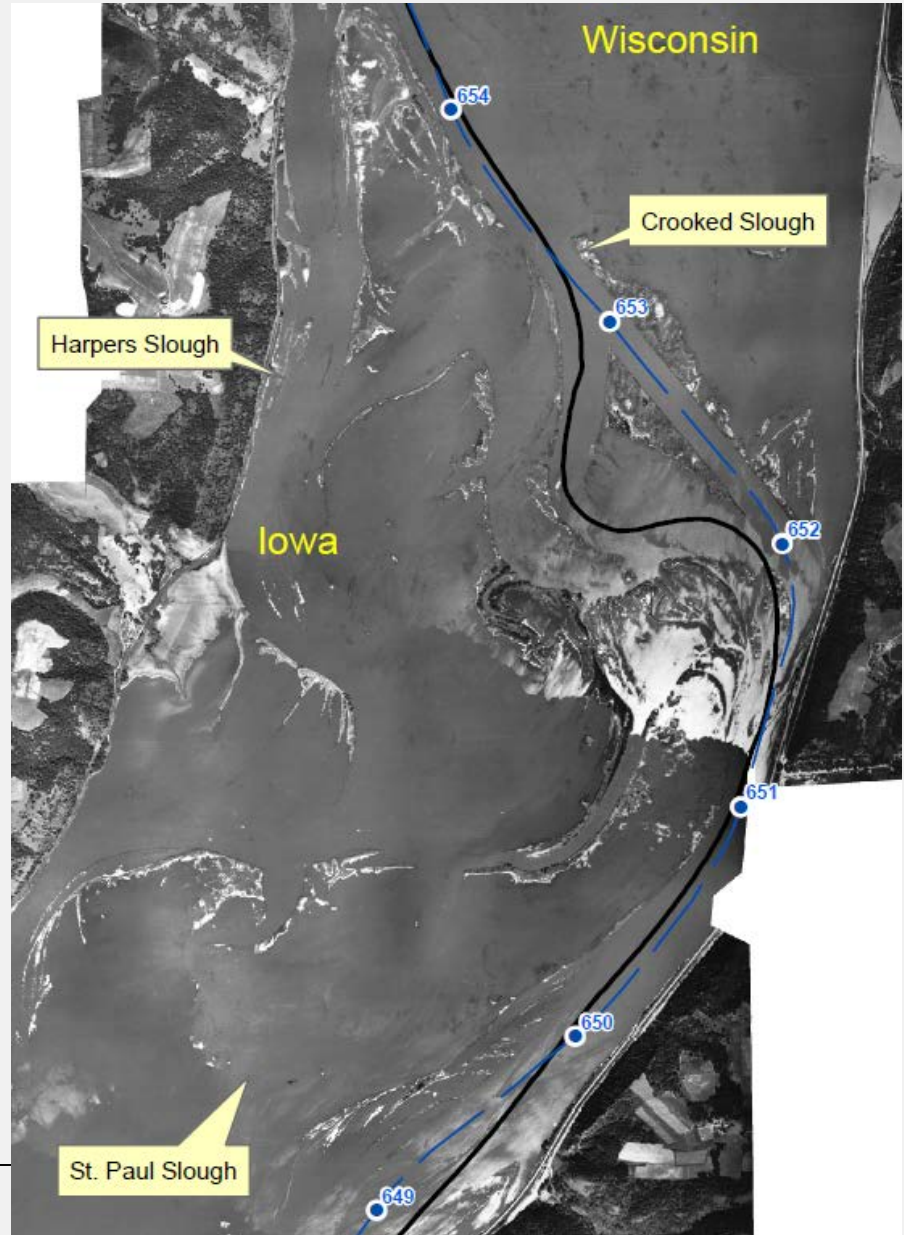
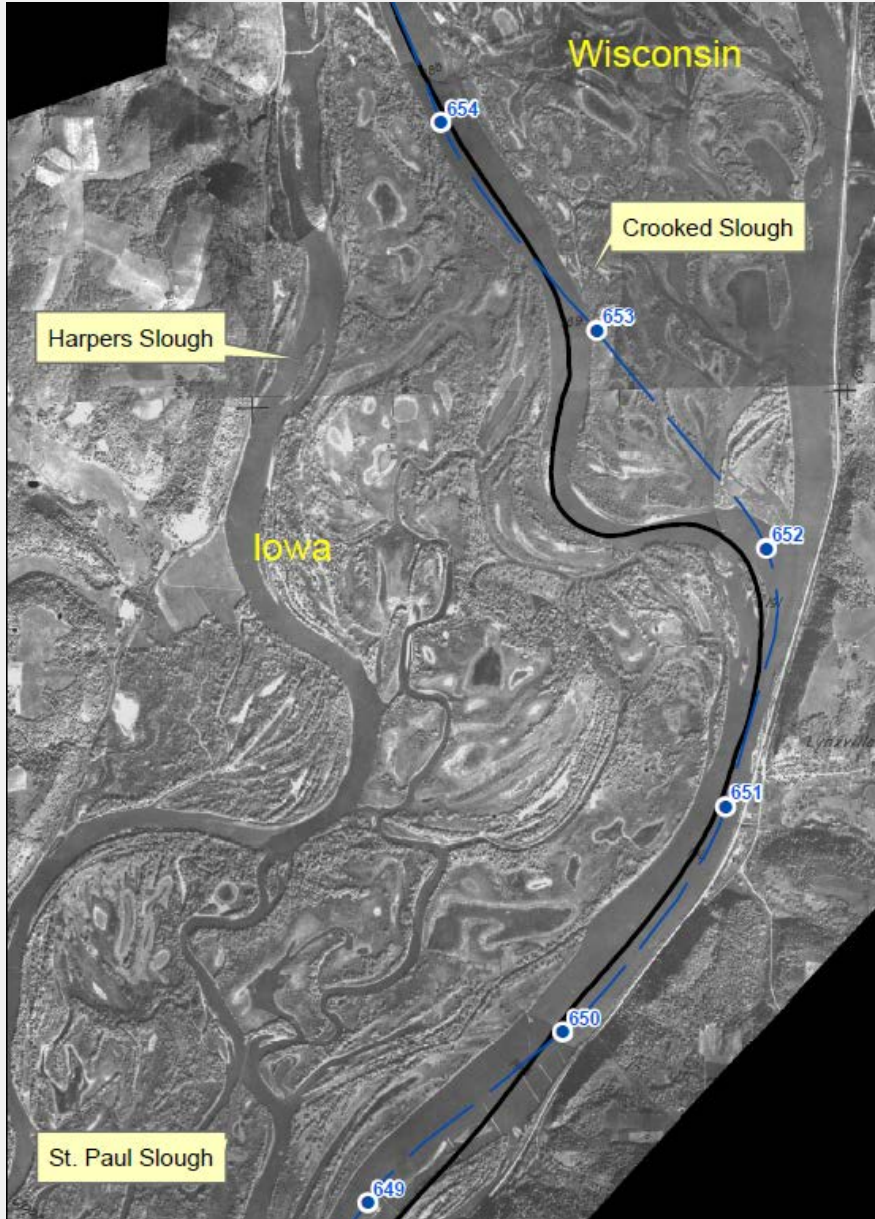
- Dabbling Duck Migration HSI
- Diving Duck Migration HSI
- Fish Passage Connectivity



# Case Study: Harpers Slough HREP

1929

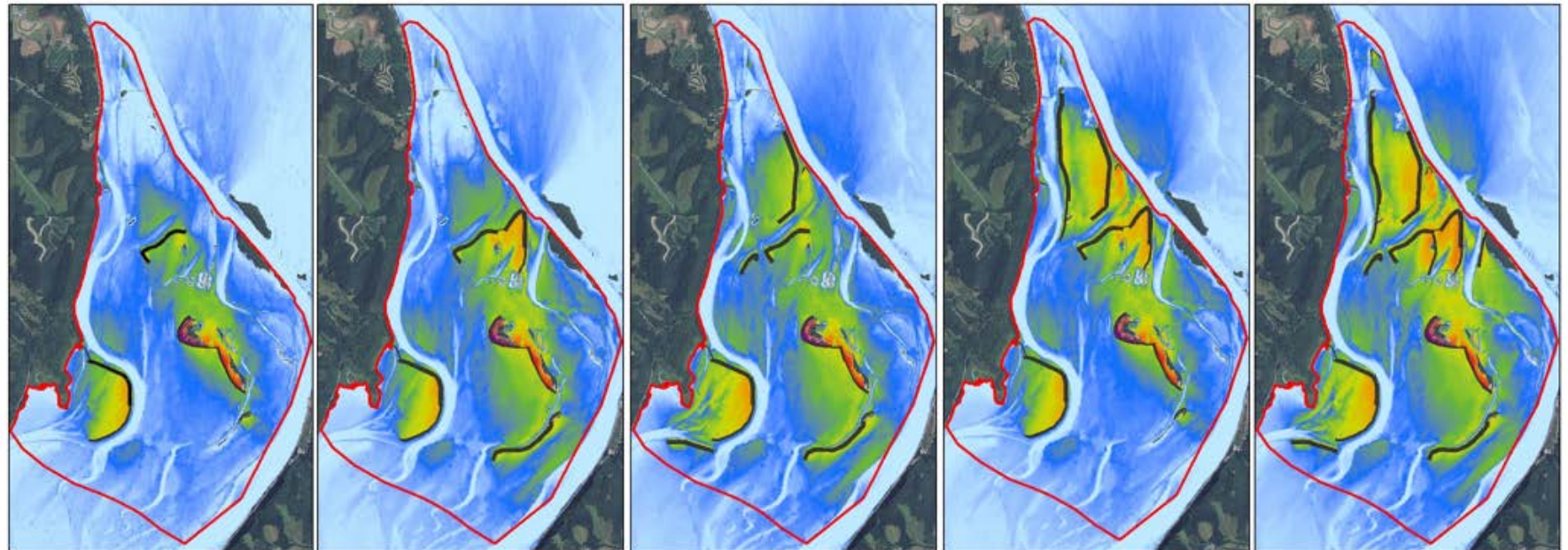
1940





# Wind Fetch/Wave

*Harpers Slough HREP*



Alt1

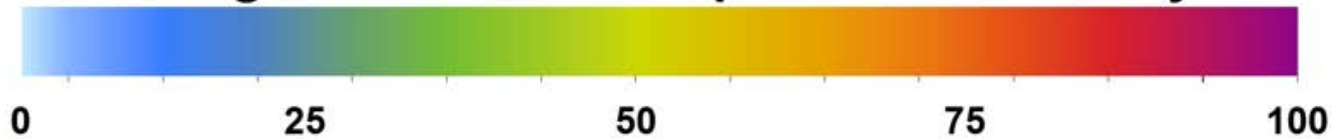
Alt2

Alt3

Alt4

Alt5

**Change in Sediment Suspension Probability**



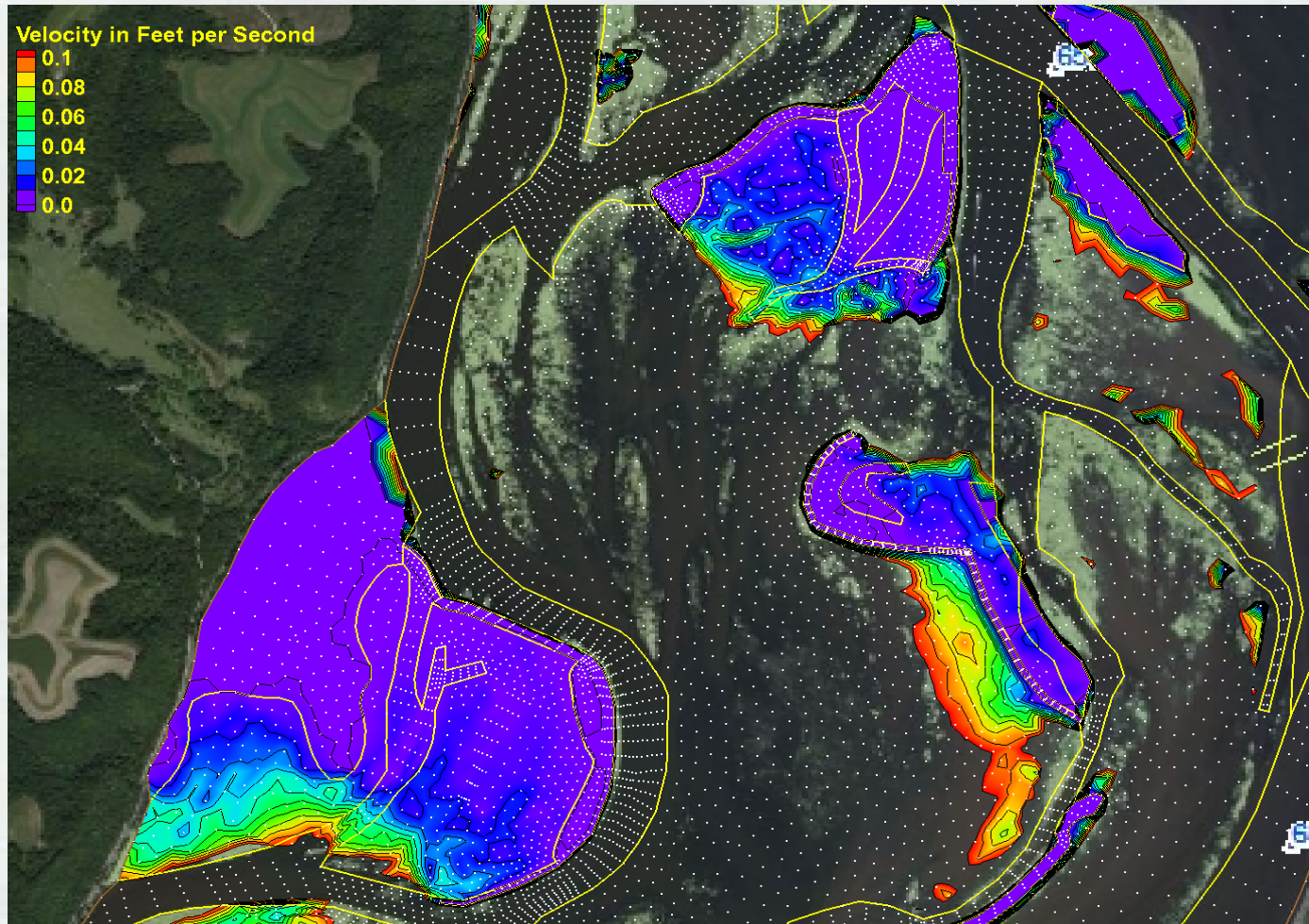
0 25 50 75 100

0 1.5 3 6 Miles



# Hydraulics

## *Harpers Slough HREP*



# Harpers Slough HREP

## Habitat Net Gain (AAHUs)

Alternative	Bluegill	Dabbling Duck	Bald Eagle	Total
No Action	0	0	0	0
1	23	453	24	501
2	35	545	38	618
3	27	574	46	647
4	46	558	52	655
5	50	650	68	768



*Pool 8 Islands HREP*





# Harpers Slough HREP

Alt	Average Cost/AAHU	Incremental Average Cost/AAHU
No Action	n/a	n/a
1	1,300	1,350
2	1,700	3,030
5	2,500	6,140



# HEP/HSI Limitations

1. Outdated
2. Species-specific
3. 2-D
4. Dominated by few species
5. Difficult to validate
6. Performance monitoring?
7. Risk/uncertainty?
8. Ecosystem Services?



*Spring Lakes Islands HREP*



# Next Generation of Models

## Constraints

- Readily available data
- Compatible with streamlined planning process
- Corps certified





# Conclusion

- The UMR has significant natural resources and infrastructure for transporting goods.
- UMRR Program – ensure a healthy and resilient UMR system compatible with navigation.
- HEP/HSI models could be improved.



*Polander Lake HREP*



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