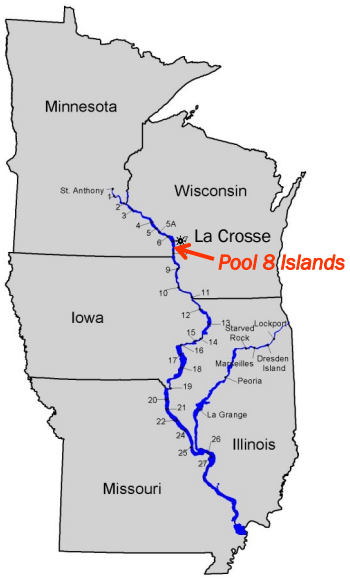
Pool 8 Islands, Phase I, II and III
Upper Mississippi River Environmental Management Program Habitat Rehabilitation and Enhancement Projects

Prepared by: Jeff Janvrin, Wisconsin DNR, Fall 2011



Location of Pool 8 Islands, Phase I, II and III.

25 Years of Habitat Restoration in Lower Pool 8

Habitat restoration in Lower Pool 8 of the Upper Mississippi River began with an idea proposed by Mississippi River biologists and managers in the mid 1980's. Pool 8 Islands, Phase I was selected as one of the first Habitat Rehabilitation and Enhancement Projects (HREPs) to be implemented under the Upper Mississippi River Environmental Management Program (EMP), which was authorized by congress in 1986 with passage of Section 1103 of the Water Resources Development Act.

Planning for Phase I began in early 1987, followed by Phase II in 1995 and Phase III in 2000. Construction of these projects spanned 23 years (1989—2012), although construction activity was not continuous due to sequencing with other EMP HREPs throughout the Upper Mississippi River and availability of funding.

Construction of Pool 8 Islands, Phase III, August 2009 *(USGS UMESC)*

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A Federal, State and Public Partnership

The Mississippi River falls under the jurisdiction of several federal, state and local agencies. With regards to the Pool 8 Islands HREPs, the Corps of Engineers receives the federal EMP funding. The Corps is also responsible for managing Pool 8 for commercial navigation. Additionally, the projects lie within the boundaries of the Upper Mississippi River Wildlife and Fish Refuge and are located in the states of Minnesota and Wisconsin.

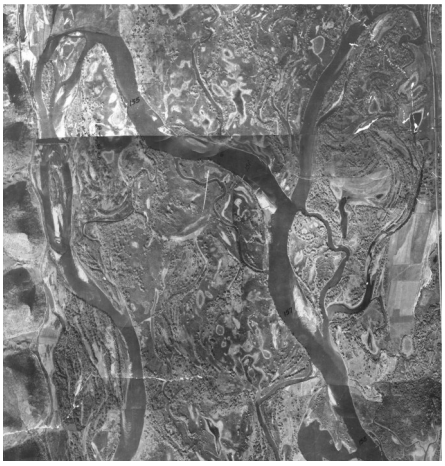
All EMP HREPs go through multiple levels of interagency review prior to being selected for implementation, with the first step being planning. Planning, which can take several years to complete, is accomplished through an interagency team that identifies the resource issues, develops goals and objective and identifies alternatives for evaluation. Most projects include at least 2 public meetings to solicit insights and comments from the public.

Resource Issues in Lower Pool 8

Lock and Dam 8 was put into operation in 1937. The sole purpose of the locks and dams was to provide for a 9-foot deep commercial navigation channel. These pools of water led to several changes to the Mississippi River floodplain.

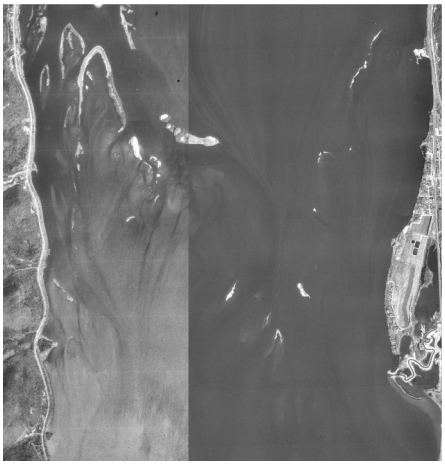
Impoundment of water created a series of islands in lower Pool 8. These islands were the high points of land within the floodplain. However, wave action and river currents gradually took their toll on these islands. Over 90% of the islands in lower Pool 8 had disappeared within 60 years.

Air photos of the Pool 8 in the vicinity of the HREPs.



1930 (Pre Dam)

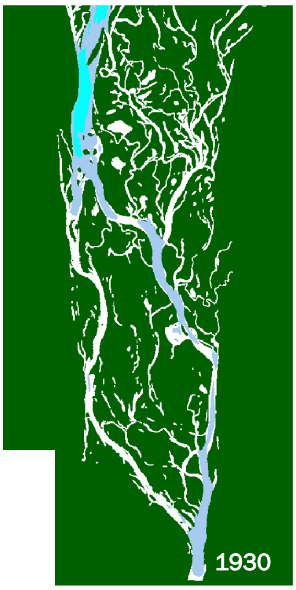
1938

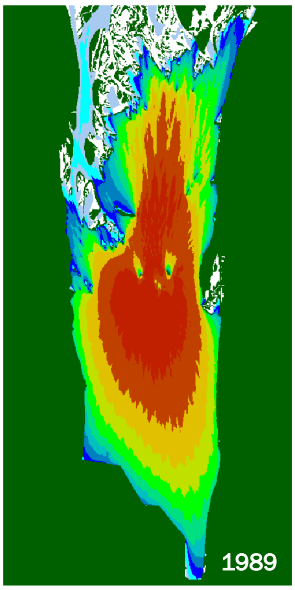


1991

Pre lock and dam, wave action was not a dominant erosive force. Impoundment of the Mississippi River introduced wave action as an erosive force. One way to measure wave action is to map "wave fetch." Wave fetch is the distance waves can travel before hitting a land mass. The longer the distance, the higher the fetch, the larger the waves.

Large waves erode shorelines, uproot vegetation and resuspend sediments (soil on the bottom of the river).





Pool 8 Islands, Phase I

Pool 8 Islands Phase I was the second island constructed under authority of EMP. The project restored 13,000 linear feet of island to protect aquatic vegetation and to reduce sedimentation in the area.

Many design features of the islands set the standard for future island construction.

One feature was islands from the upstream to downstream end to stabilize the island during flood event. This sloping reduces hydraulic head, which is the energy water gets from gravity.

Additional erosion control techniques used here and in future islands included: sacrificial berms to allow the river to shape shorelines to a more stable slope of 1V:10H, bio engineering through the use of willow plantings to stabilize shorelines, and reduction in length of riprapped shoreline by using rock groins where the island was subjected to large wind fetch.

Planned/Constructed: *1987-1991/1989-1993*

Project Area Size: *1,000 acres*

Habitats Restored/Protected: *Main channel border, backwater, wetland, waterfowl nesting habitat, 13,000 linear feet of island (26 acres)*

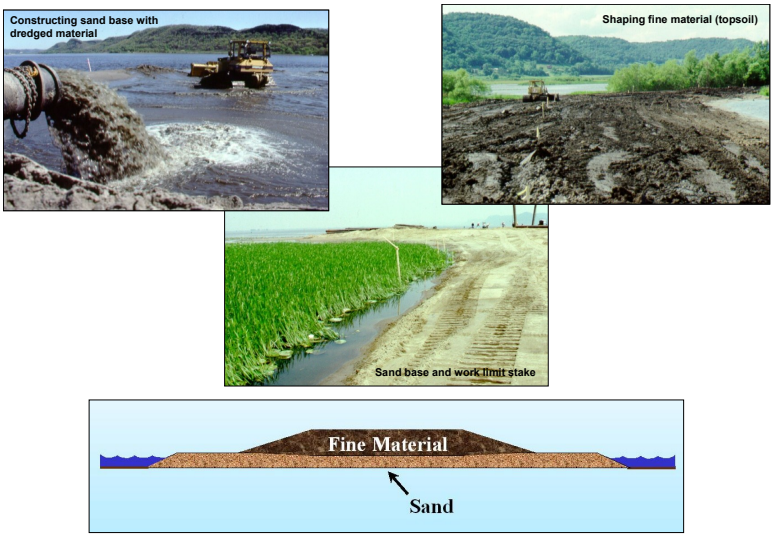
Target Species: *Waterbirds, aquatic vegetation, nesting birds*

Tools and Unique Features: *Hydraulic dredging, mechanical dredging, rock groins, grass and willow plantings*

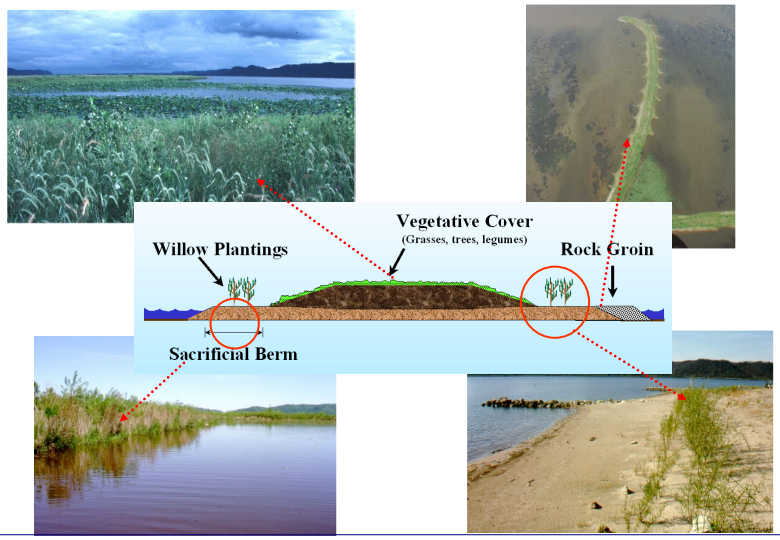
Quantities:

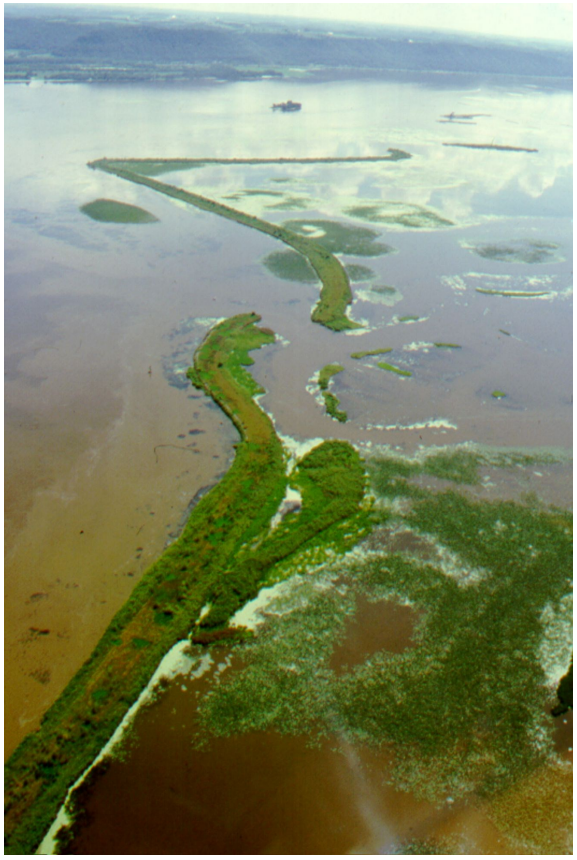
Sand—Approx. 200,000 cy
Fines—Approx. 75,000 cy
Rock—8,024 cy

Construction Cost: *$1,638,000*



Design features to stabilize constructed islands.





Pool 8 Islands, Phase II

Planned/Constructed: *1994 - 1996/1997-2000*

Project Area Size: *600 acres*

Habitats Restored/Protected: *Backwater fish overwintering habitat, waterfowl nesting habitat, waterfowl migration habitat, turtle nesting habitat, 10,700 linear feet of islands (26 acres)*

Target Species: *Waterbirds, aquatic vegetation, nesting birds and turtles, fish overwintering habitat*

Tools and Unique Features: *Hydraulic dredging, mechanical dredging, rock groins, rock sills (one with a 50 cfs notch), seed islands grass and willow plantings*

Quantities:

Sand—Approx. 211,600 cy
Fines—Approx. 66,235 cy
Rock—38,623 cy

Construction Cost: *$2,646,000*

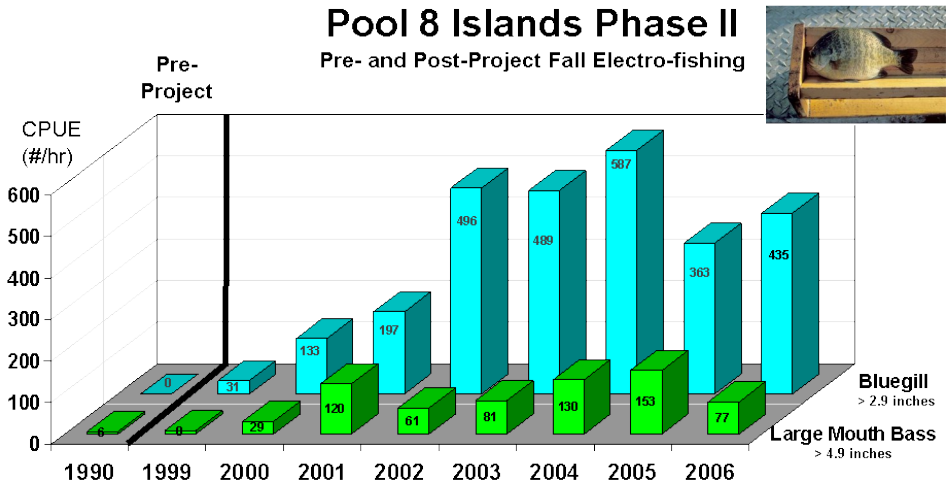
One of the primary objectives for Pool 8 Islands, Phase II, was to restore bluegill and largemouth bass overwintering habitat in this portion of Pool 8. This was accomplished by greatly reducing the amount of water and current entering the project area during fall and winter.

The project also was one of the first designed to manage sediment by promoting scouring of accumulated sediment during flooding by the river's current. This was accomplished through the positioning of interior islands to concentrate flood flows entering over the rock sills into existing channels.

The aquatic vegetation response at Phase II was improved based on lessons learned at previous projects. One of the main features to achieve this was to address southerly wind fetch by including 2 islands at the downstream portion of the project. This resulted in a significant increase in aquatic vegetation when compared to a control area adjacent to the project.

The project also included the construction of turtle nesting habitat and seed islands.

October 1961 August 1994 August 2000



(Project began functioning as over wintering habitat November 1998)

Pool 8 Islands, Phase III

Pool 8 Islands, Phase III, incorporated many lessons learned from several previous HREPs. The 3,000 acre project included turtle nesting habitat, waterfowl loafing structures, mudflats, earthen overflow sills, and a focus on restoring flow distribution in lower Pool 8, along with many other features. It represents the largest restoration project implemented by the St. Paul District of the Corps of Engineers.

The goals and objectives for this project not only included fish and wildlife, but also included goals to partially restore sediment transport and deposition.

Planned/Constructed: *1997-2004/2007—2012*

Project Area Size: *3,000 acres*

Habitats Restored/Protected: *Backwater fish overwintering habitat, waterfowl nesting habitat, waterfowl migration habitat, turtle nesting habitat, 22 islands extending a combined >40,000 linear feet (150 acres)*

Target Species: *Waterbirds, aquatic vegetation, nesting birds and turtles, fish overwintering habitat*

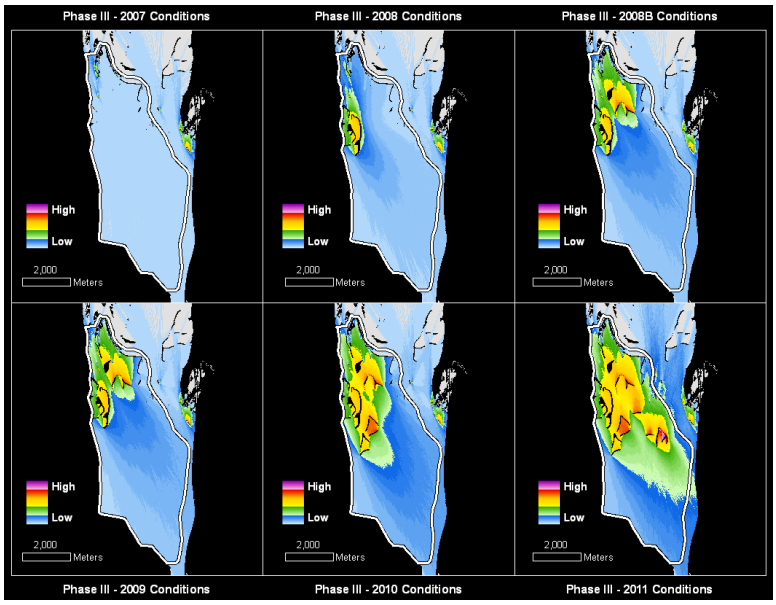
Tools and Unique Features: *Hydraulic dredging, mechanical dredging, rock groins and vanes, mud and sand flats, rock and earthen sills to convey flood flow (one sloped for gradual overtopping, grass and willow plantings), first use of narrow islands.*

Quantities:

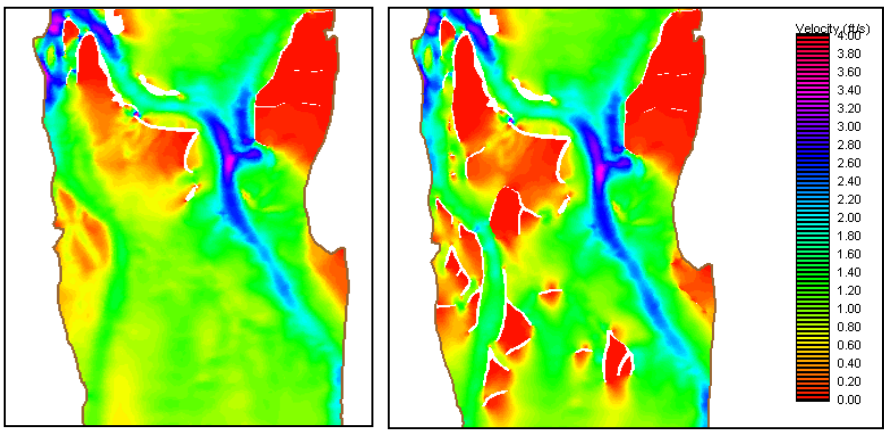
Sand—Approx. 800,000 cy
Fines—Approx. 200,000 cy
Rock—Approx. 100,000 cy

Construction Cost: *$18,000,000 Estimated*

Incremental affect of Phase III islands reduction in weighted wind fetch when compared to no action (2007 Conditions). Low in the legend corresponds to only a small percentage reduction, high equals a greater percent reduction in weighted wind fetch.



2001 Conditions **Predicted Change**

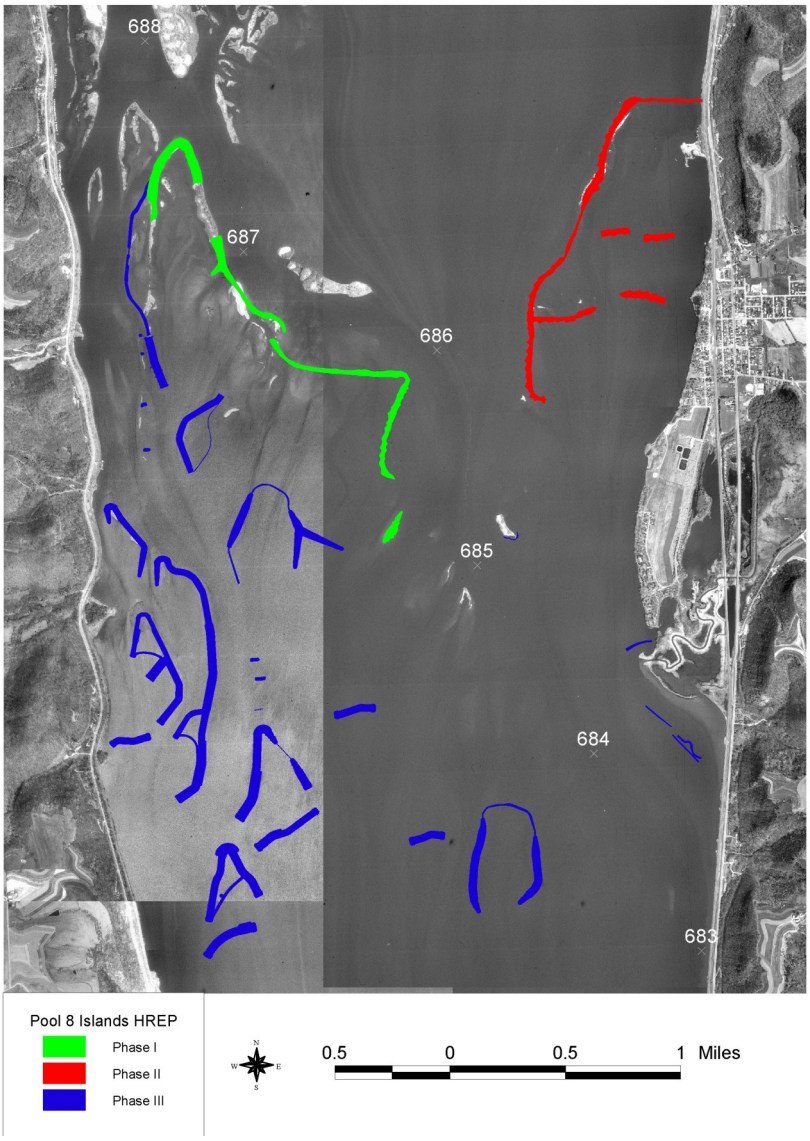


Pool 8 Islands, Phase III, was designed to restore a diversity of water velocities in the project area. This increases habitat diversity and partially restores a natural function of islands with regards to sediment transport and deposition during bank full flood events.

Sunfish Lake HREP, Pool 11

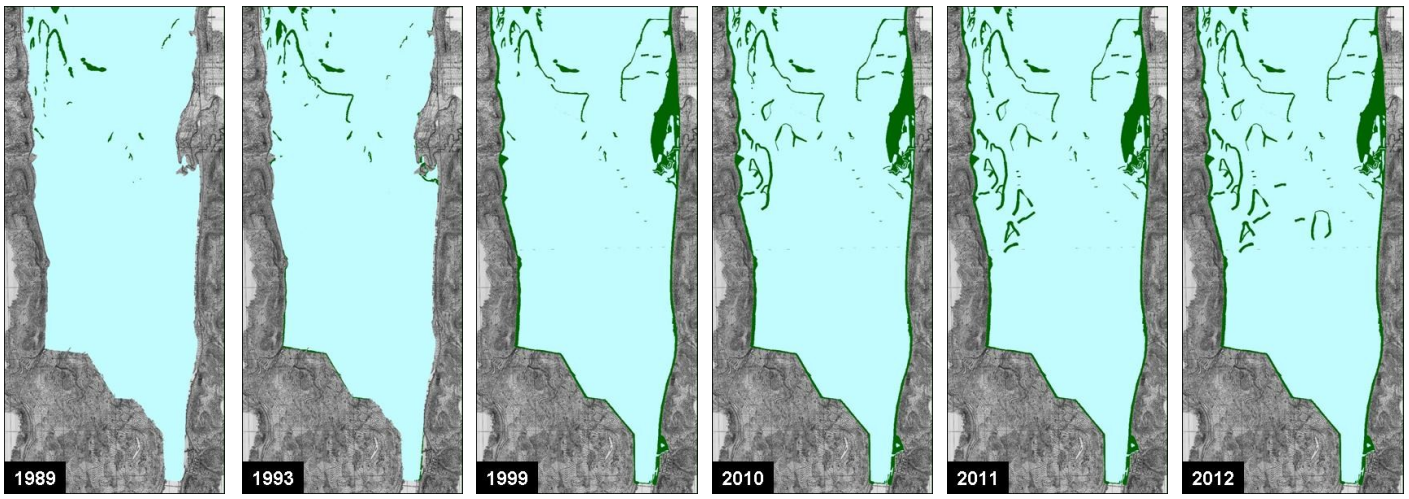
Environmental Management Program Habitat Rehabilitation and Enhancement Projects Along Wisconsin's Border

- 18 Wisconsin and 12 Minnesota and Iowa Projects Completed Since 1986
- Over 33,000 Acres in WI Improved
- Over $50 Million of Federal Funding for WI HREPs
- < $1.5 Million Wisconsin Funding



Locations of the Pool 8 Islands Phases

Construction Sequence of the Various Phases of Pool 8 Islands



Island restoration began with Horseshoe Island, in 1989.

1890 vs. 2010 Distribution of Bluegill and Largemouth Bass Overwintering Habitat

Not all habitat changes that have occurred due to human actions are easy to visualize. Bluegill and largemouth bass overwintering habitat was present throughout Pool 8 prior to the locks and dams being constructed. Today, overwintering habitat is clustered in the upper sections of Pool 8, as well as many of the other pools. Human actions (ie. marina development, sand/gravel mining and habitat projects) have restored a small portion of that habitat (green arrows on 2010 graph). Two of these restored overwintering areas are a result of HREPs in lower Pool 8. Phase III also includes one overwintering site within the 3,000 acre project area. Monitoring will determine if conditions are met to meet overwintering habitat needs. However, even with the addition of one new site, more work is needed to restore the distribution of fisheries habitat to a more natural condition.