Implementation of the Biological Opinion

Annual Progress Report
Fiscal Year 2012

U.S. Army Corps of Engineers
Mississippi Valley Division
St. Louis District

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Background:

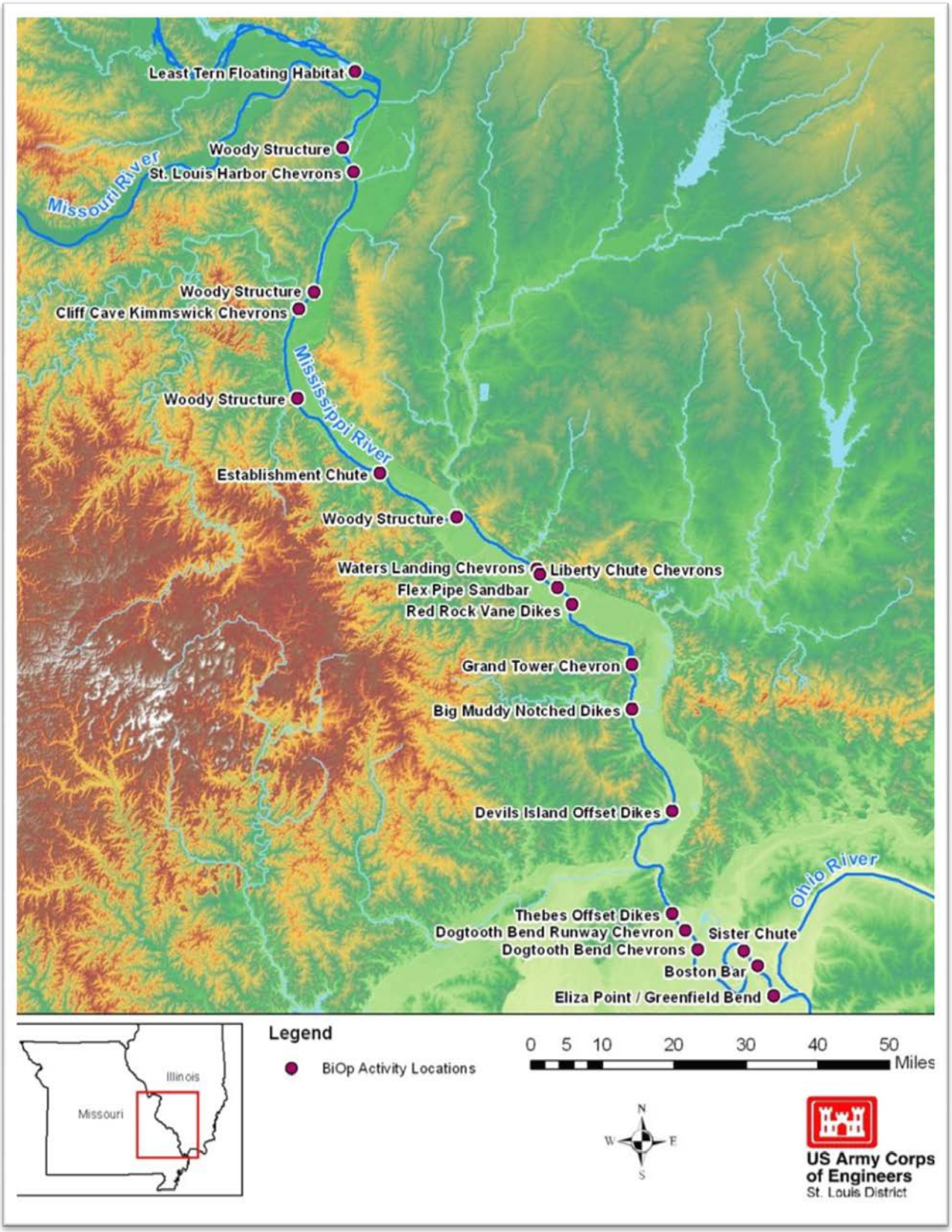
In April 1998, Region 3 of the U.S. Fish and Wildlife Service (FWS) and Mississippi Valley Division (MVD) of the U.S. Army Corps of Engineers (Corps) entered into formal Section 7 consultation under the Endangered Species Act. The consultation covered the continuation of operation and maintenance activities on the Upper Mississippi River Nine Foot Navigation Channel. Specifically addressed within the consultation were operation and maintenance direct effects, navigation traffic indirect effects, recreation indirect effects, and cumulative effects. The direct effects of operation and maintenance included navigation channel dredging, dike and revetment maintenance, water level management, and management of Corps lands. A 1998 baseline was established for the effects and a fifty-year evaluation period (to 2048) was used.

Formal consultation was concluded in August 2000, when the MVD Commander sent a letter to the Director of Region 3 FWS setting forth an implementation plan for the Corps project that would accommodate the findings of the FWS's Biological Opinion. The species of concern covered in the biological opinion that are germane to the St. Louis District include:

Decurrent False Aster – Likely to be adversely affected, but not jeopardized
Indiana Bat – Impacts negligible or offset by management actions; No incidental take
Interior Least Tern – Incidental take with Reasonable and Prudent Measures (RPM)
Pallid sturgeon – Jeopardy with Reasonable and Prudent Alternatives (RPA), incidental take, and RPMs.

FY12 Activities:

The following is an outline of St. Louis District activities for fiscal year 2012. This was the twelfth year of implementation activities under the Biological Opinion. For the immediate future, funding and manpower requirements will continue to be addressed on a year by year basis.



Locations of Biological Opinion activities covered in this report.

1. **River Resources Action Team (RRAT) - Executive Team (Pallid Sturgeon - RPA 2 & 4, Term and Condition 4; Least Tern - Term and Condition 4).** The RRAT held a formal Executive Team meeting on 25 January 2012. Topics of discussion included the Government Accountability Office Report and the District's associated Environmental Assessment on river training structures, the three-year plan for the Avoid and Minimize Program, and the three-year plan for the Biological Opinion Program.

2. **River Resources Action Team – Technical Team (Pallid Sturgeon - RPA 2 & 4, Term and Condition 4; Least Tern - Term and Condition 4).** The Technical Team considered the August 22-23, 2012 boat trip as its yearly meeting. The RRAT annual coordination boat trip was held on a covered barge pushed by the MV Pathfinder as they traveled from Lock and Dam 22 at Saverton, MO to the St. Louis District Service Base. Topics discussed included river training structure construction and modification projects, new endangered mussel species, mussel habitat studies, scour at L&D 24 and 25, sturgeon research, multiple ecosystem restoration projects, dredging program and flexible dredge pipe update, hydropower, HSR model efforts, A&M program status, NESP status, EMP and LTRM status, BiOp program status and pallid sturgeon studies update, least tern nesting, Indiana bat management, new invasive species management, biological and physical monitoring associated with ARRA-funded river training structures, GAO report on the river training structures program, pinnacle rock removal, ESTL Ecosystem Restoration, Environmental Pool Management, the Missouri River Water Reallocation Study, and partner agency updates.

3. **Pallid Sturgeon Habitat, Life History, and Population Demographics work (Pallid Sturgeon - RPA 1).** No field work was funded this FY as the focus shifted to completion of the pallid sturgeon conservation and restoration plan prior to further field investigations. Field work is anticipated to resume in FY13 according to recommendations in the conservation and restoration plan.

   Recent publications associated with District-funded pallid sturgeon research:

   Boley, R.M. and E.J. Heist. 2011. Larval surveys indicate low levels of endangered pallid sturgeon reproduction in the Middle Mississippi River. Transactions of the American Fisheries Society, 140:6, 1604-1612.

   Koch, B., R.C. Brooks, A. Oliver, D. Herzog, J.E. Garvey, R. Hrabik, R. Colombo, Q. Phelps, and T. Spier. 2012. Habitat selection and movement of naturally occurring pallid sturgeon in the Mississippi River. Transactions of the American Fisheries Society, 141:1, 112-120.

   Phelps, Q.E., G.W. Whitledge, S.J. Tripp, K.T. Smith, J.E. Garvey, D.P. Herzog, D.E. Ostendorf, J.W. Ridings, J.W. Crites, R.A. Hrabik, W.J. Doyle, and T.D. Hill. 2012. Identifying river of origin for age-0 *Scaphirhynchus* sturgeons in the Missouri and Mississippi rivers using fin ray microchemistry. Can. J. Fish. Aquat. Sci., 69:1-12.

Sechler, D.R., Q.E. Phelps, S.J. Tripp, J.E. Garvey, D.P. Herzog, D.E. Ostendorf, J.W. Ridings, J.W. Crites, and R.A. Hrabik. 2012. Habitat for age-0 shovelnose sturgeon and pallid sturgeon in a large river: interactions among abiotic factors, food, and energy intake. North American Journal of Fisheries Management, 32:1, 24-31.

Seibert, J.R., Q.E. Phelps, S.J. Tripp, and J.E. Garvey. 2011. Seasonal diet composition of adult shovelnose sturgeon in the Middle Mississippi River. The American Midland Naturalist, 165(2):355-363.

4. **Pallid Sturgeon Conservation and Restoration Plan (Pallid Sturgeon - RPA 2).** The development of this plan continued in FY12. Draft chapters on population monitoring and island/sandbar creation were submitted to FWS for review. Finalizing these chapters as well as chapters on stone dike alterations, side channel restoration, and habitat monitoring in addition to overall completion of the conservation and restoration plan are anticipated to occur in FY13.

5. **St. Louis Harbor chevrons, UMR River Miles (RM) 183.0-182.4(R) (Pallid Sturgeon - RPA 3 & 4, Term and Condition 2; Least Tern - RPM 1, Term and Condition 2).** No further fish monitoring is planned. A final report will be initiated in the future.

6. **Cliff Cave – Kimmswick dike alteration and chevron construction site, RM 168-156.6 (Pallid Sturgeon - RPA 3 & 4, RPM 1, Terms and Conditions 2 & 4; Least Tern - RPM 1, Terms and Conditions 2 & 4).** During FY12, re-dressing of structures was completed and additional material was removed from the notches. Additional removal of material will be performed in FY13 if water levels allow. Post-construction physical monitoring is scheduled for FY14.

   General Background: An HSR model study for this reach was completed in FY06 (on-line report available here). The Biological Assessment for this contract has been completed. This project was selected from the Corps' 2002 Stone Dike Alteration Project Report. The purpose of the HSR study was to design structural modifications to the existing dike fields to enhance the aquatic habitat diversity and flow dynamics within the reach. The study was performed to address two separate sediment transport goals. The first goal was to create island and side channel aquatic habitat within the dike field. The second goal was to maintain current depths in the navigation channel to assure the need for additional dredging would not arise. A team participation meeting was held at the Applied River Engineering Center in St. Louis, Missouri, prior to the testing of alternatives to outline objectives and concerns in the study reach. It was brought to the team's attention that the bar on the right descending bank between RM 165.0-164.0(R) contained unique Pallid Sturgeon habitat. It was recommended that, if at all possible, no structures detrimental to this habitat be used in the final design. At this meeting the team decided on two areas of emphasis. These two areas were along the left descending bank (LDB) downstream of dike 163.0(L) and on the LDB downstream of dike 160.9(L). Alternative design analysis concluded that at Cliff Cave the Corps should notch a number of existing dikes and construct four chevrons, and at Kimmswick, three chevrons should be

constructed. Construction of the three Kimmswick chevrons was completed in 2009. Construction of the four Cliff Cave chevrons was completed in 2011.

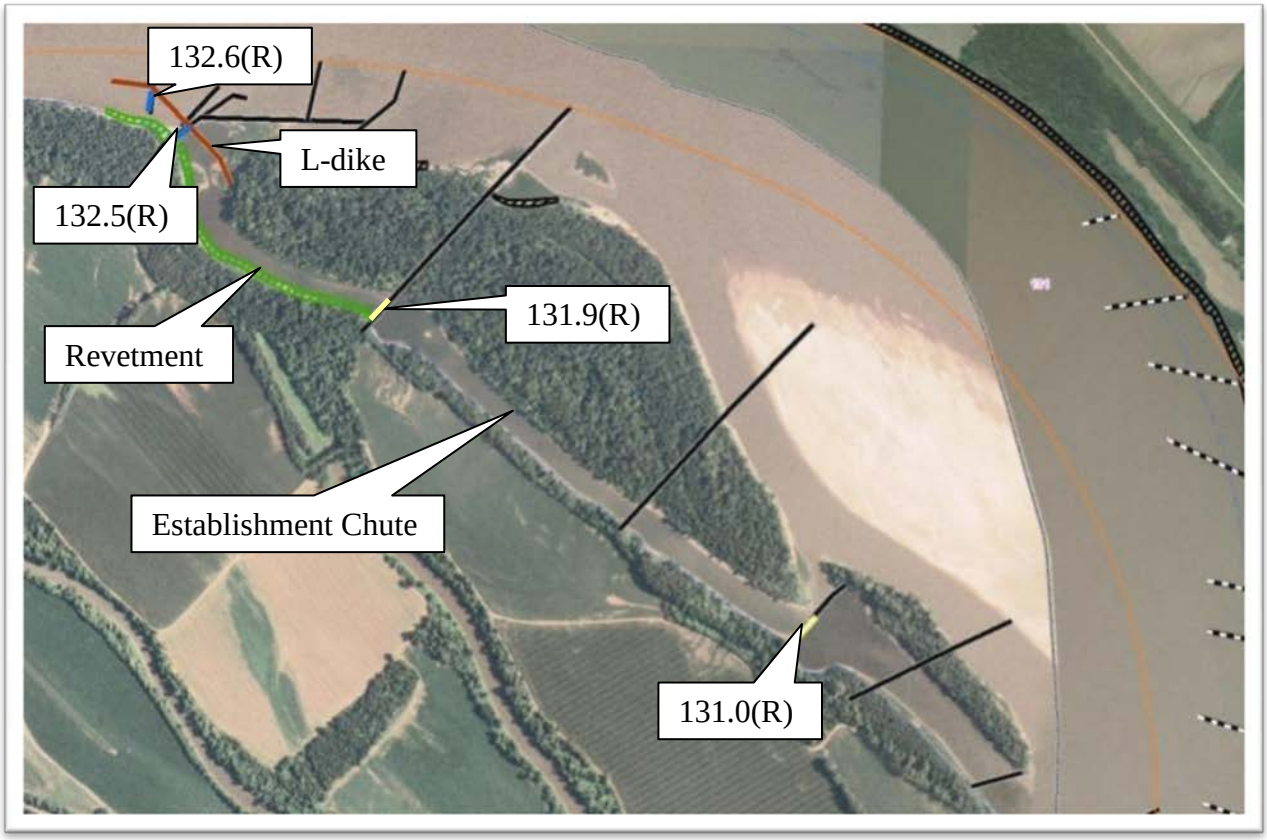
Cliff Cave – Kimmswick chevrons (RM 162L (top photo) and RM 160L (bottom photo)) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

7. **Fort Chartres/Establishment Island new chevrons and rootless dike between RM 132.5-129.5(R) (Pallid Sturgeon - RPA 3 & 4, Term and Condition 2; Least Tern - RPM 1, Term and Condition 2).** Post-construction monitoring by the Missouri Department of Conservation began in February of FY09 and continued thru 2011. A summary report is anticipated in FY13.

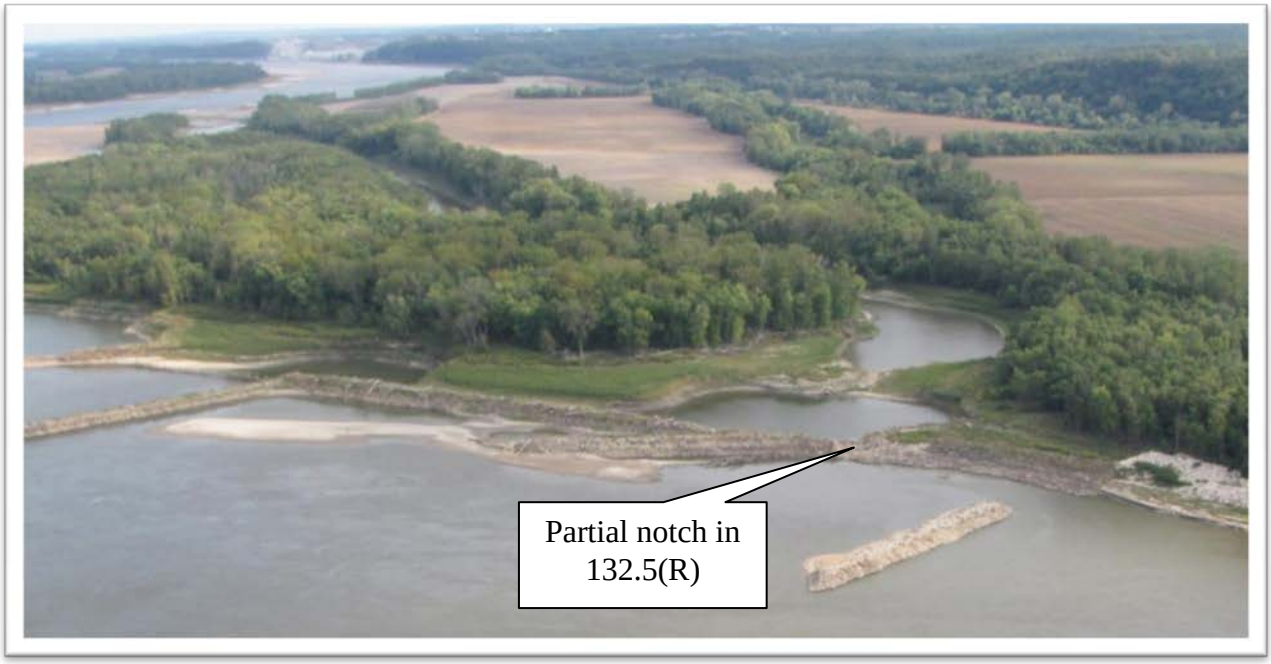
   General Background: This reach of the river has been experiencing a dredging problem for many years. This contract was awarded in FY06 and five of six structures were completed. The two blunt-nosed chevrons were constructed at RM 130.05 and 129.9(R). The spur dikes and rootless dike were constructed between RM 132.0(R) and 132.5(R). No further construction is planned for this phase of the project after construction of a rootless dike at RM 130.2(R) was completed in FY07. This structure was planned to be a chevron; however, construction difficulties necessitated the change to a rootless dike. This change was coordinated with all partners. This work is intended to eliminate the need to dredge and add environmental features. Recent data shows that the scour holes that develop when the chevrons get over-topped are occupied by a number of fish species throughout the year. Pre-construction monitoring (biological & physical) was conducted by the Missouri Department of Conservation between 2002 and 2004 and a final report was submitted to the Corps in 2007. Preliminary results show that despite some environmental variation, there are some consistencies in species/habitat use at island complexes, setting the stage for post-construction evaluation at Establishment Island. It was also suggested that further analyses (ordination) may be needed to better explain the distribution and habitat use by fish species and guilds when comparing pre- and post-construction distributional patterns.

8. **Establishment Chute HSR Study, RM 134.0-128.0 (Pallid Sturgeon - RPA 3 & 4, RPM 1, Terms and Conditions 2 & 4; Least Tern - RPM 1 and 3, Term and Condition 2).** This study was completed in September 2011 (on-line report available here). The recommended design includes placement of a 1,400-foot Side Channel Enhancement Dike (SCED) upstream of Establishment Chute to facilitate water movement through the chute; notching existing dikes 132.6(R) and 132.5(R) at the upper end of the chute; and notching closure structures 131.9(R) and 131.0(R) in the middle and lower end of the chute. Construction started in FY12 with the partial notching of dike 132.5(R), but only approximately 10% of the notch was completed due to low river levels. Assuming adequate river levels return, construction of the project is expected to be completed in FY13.

   General Background: The St. Louis District initiated this study of the Middle Mississippi River between Miles 134.0 and 128.0, in January 2010. This study was funded by the Avoid and Minimize Program. The objective of the study was to evaluate environmental design alternatives for diversifying aquatic habitat within and around Establishment Chute without negatively impacting the adjacent point bar or the navigation channel. The selected alternative is projected to provide increased depth and depth diversity within the chute.



Establishment Chute recommended design.



Location of partial notch in dike 132.5(R) completed in FY12.

9. **Waters Landing HSR Study, RM 106.0-100.0 (Pallid Sturgeon - RPA 3 & 4, Term and Condition 2; Least Tern - RPM 1, Term and Condition 2).** This study was completed in January 2009 (on-line report available here). The recommended design includes removal of existing dike 104.4(R), construction of three chevrons at RM 104.4, 104.0, and 103.7(R), and extension and notching of dikes 104.0 and 103.5(R). Dikes 104.0 and 103.5(R) were extended and notched in FY10. Dike 104.4(R) was shortened and chevrons 104.4(R), 104.0(R), and 103.7(R) were constructed in FY11 and FY12. This completed construction activities associated with this study.

   General Background: The St. Louis District initiated this sedimentation improvement study of the Water's Landing reach of the Middle Mississippi River between RM 106.0 and 100.0 near Chester, Illinois, in May 2008. The study reach was selected from the Stone Dike Alterations Project Report. The main objective of the study was to develop and evaluate design alternatives that would enhance the environmental diversity within the dike fields, in particular around RM 104.0 – 102.5(R). A number of fish species use deep pools, slow, shallow channels, and bar formations to fulfill various life history requirements. This type of habitat can be cultivated by altering existing dikes, i.e. notching, increasing or decreasing length and/or height, or by adding new structures, i.e. dikes, chevrons, weirs, or by using a combination of alterations and new structures. Along with the primary objective, a secondary goal was to alleviate repetitive channel maintenance dredging.

Waters Landing chevrons (RM 104R) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

10. **Flexible/floating pipe for dredging, RM 103 (Pallid Sturgeon - RPA 3 & 4, RPM 2; Least Tern – RPM 2.** 2400 feet of flexible pipeline for the Dredge Potter was purchased in FY09. The floating flexible pipe can be used to create islands and/or sandbars near shore or behind chevrons and generally gives more options for placing dredged material for ecological benefits. Work was completed in FY11 on creating a temporary spill barge necessary to support the dredge pipe at the point of discharge. The spill barge was successfully tested in September 2011. A permanent spill barge is currently in the process of being procured.

    In order to prioritize locations where the flexible pipe might be used for a pilot project to create shallow sandbar or island habitat, St. Louis District personnel coordinated with agency stakeholders and Corps dredge personnel in FY11. Manskers Landing (RM 103) and Vancil Towhead (RM 67.5) were determined to be the best potential locations for a pilot project to be executed in Fall 2011 based on dredging needs, operational considerations, and compatibility with river training structures. Accordingly, flex pipe was used to create an ephemeral island at RM 103 in early November 2011 (see images below). Approximately 100,000 cubic yards of material was utilized to create the island which was initially constructed to a maximum elevation of approximately 352 feet (approximately +15 LWRP) and approximately 10 acres in size.

    Pre- and post-construction bathymetric surveys were conducted to track erosion of the habitat over time (see bathymetric survey data below). The island was inundated briefly in late December 2011 and briefly again in early February 2012 (see chart below). Field observation of the island in late February showed erosion of the island down to an approximate maximum elevation of 348 feet. River levels then rose and inundated the island for approximately four consecutive months. Bathymetric surveys and field observation of the island in May, July, and September 2012 all showed approximate maximum elevations of 342 feet.

    Fish sampling was conducted post-construction to characterize fish use of the habitat. The site was sampled four times post-construction: 22 February 2012 (island exposed), 25 May 2012 (island submerged), 9 July 2012 (island submerged), and 10 September 2012 (island exposed). During each sample, four trawl runs and four electrofishing runs were made, two on the navigation channel side of the island and two on the bank side. 625 fish representing 18 species from 8 families were collected in total (see table below).

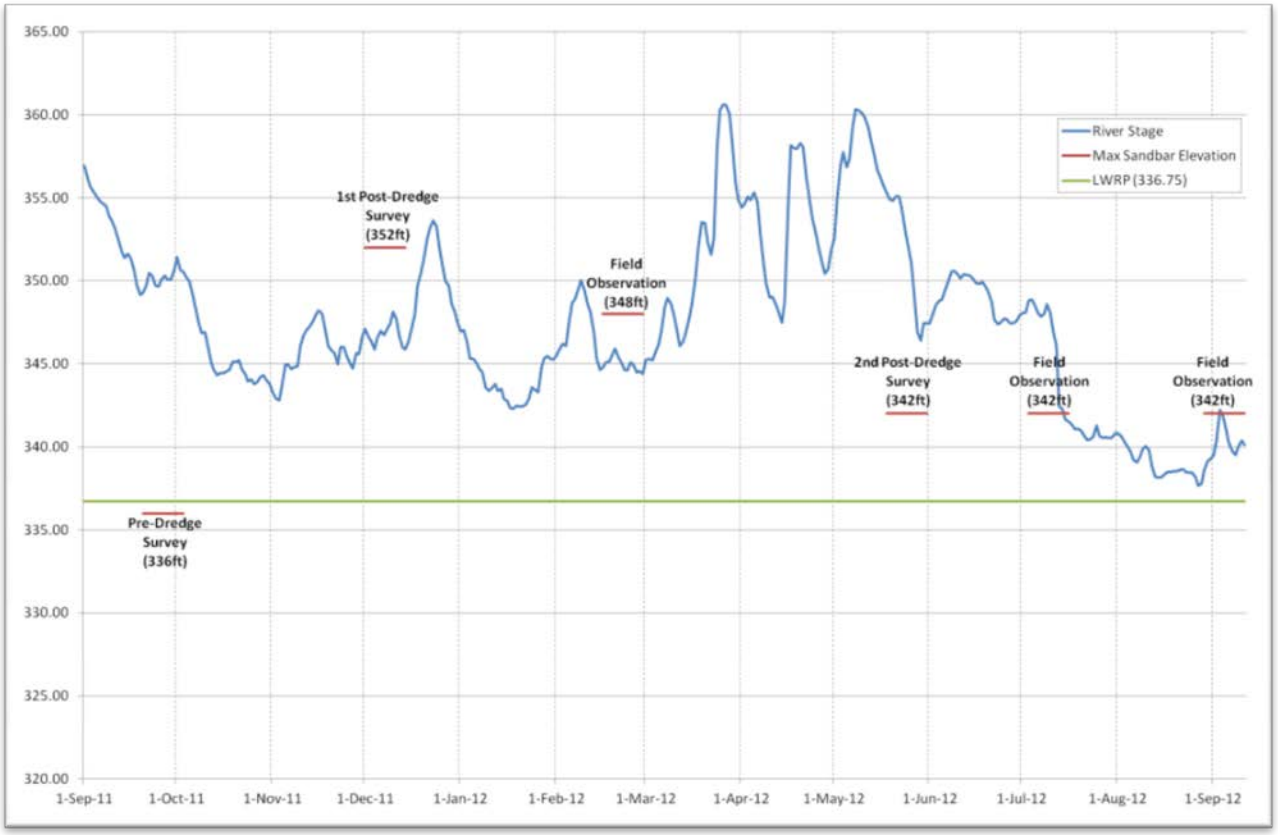
    The flex pipe test operation was considered successful and confirmed the viability of the flex pipe as a tool for habitat creation while maintaining the navigation channel. The District hopes to utilize the flex pipe on a more regular basis for habitat creation projects, either as part of regular maintenance dredging activities or for restoration-specific purposes. The desire for the near future is to select a site for a longer-term, larger-scale biological and bathymetric study to determine the impacts of island/sandbar creation on the fish community and associated habitat. Close coordination between District personnel and agency partners will be required in selection of a study site and design of study protocols.

8 November 2011 – Initiation of Construction (river stage approximately 345)

7 December 2011 – Approximately 1 month after construction (river stage approximately 346; size approximately 10 acres; top elevation approximately 352)

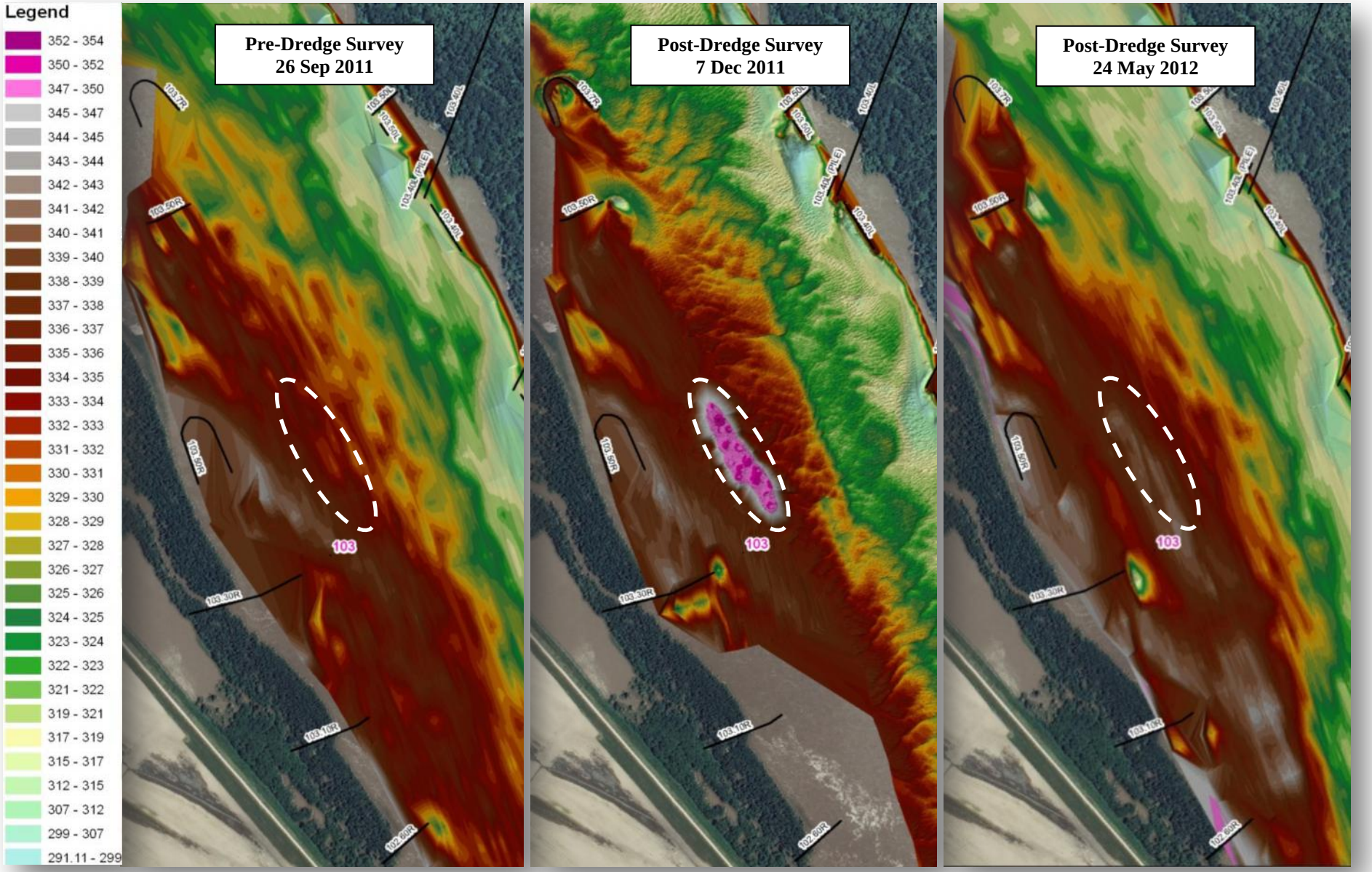
22 February 2012 – After two periods of complete inundation (river stage approximately 345; top elevation approximately 348)

10 September 2012 – After 4 months of complete inundation (river stage approximately 340; top elevation approximately 342)



Flex pipe sandbar elevations through time in relation to river stage and low water reference plane.

Flex Pipe Sandbar (RM 103R) during low-water fly-over September 2012 (river stage approximately 337).



Bathymetric surveys of flex pipe sandbar location pre- (one survey) and post-construction (two surveys).

Fish species collected by trawling and electrofishing at flex pipe sandbar location post-construction.

	Species	Trawling	Electrofishing
22 February 2012 Sample (sandbar exposed)			
Goldeye	*Hiodon alosoides*		2
Gizzard shad	*Dorosoma cepedianum*		3
Grass carp	*Ctenopharyngodon idella*		2
Silver chub	*Macrhybopsis storeriana*	3	
Emerald shiner	*Notropis atherinoides*		1
25 May 2012 Sample (sandbar submerged)			
Shovelnose sturgeon	*Scaphirhynchus platorynchus*	1	
9 July 2012 Sample (sandbar submerged)			
Goldeye	*Hiodon alosoides*	3	
Sturgeon chub	*Macrhybopsis gelida*	6	
Silver chub	*Macrhybopsis storeriana*	1	
Blue catfish	*Ictalurus furcatus*	3	
Channel catfish	*Ictalurus punctatus*	2	
10 September 2012 Sample (sandbar exposed)			
Longnose gar	*Lepisosteus osseus*		4
Shortnose gar	*Lepisosteus platostomus*		3
Gizzard shad	*Dorosoma cepedianum*		5
Shoal chub	*Macrhybopsis hyostoma*	9	
Emerald shiner	*Notropis atherinoides*	97	1
River shiner	*Notropis blennius*	1	
Channel shiner	*Notropis wickliffi*	446	
River carpsucker	*Carpiodes carpio*		5
Blue sucker	*Cycleptus elongatus*	1	4
Shorthead redhorse	*Moxostoma macrolepidotum*		1
Blue catfish	*Ictalurus furcatus*	1	
Channel catfish	*Ictalurus punctatus*	1	9
Freshwater drum	*Aplodinotus grunniens*		10

11. **Red Rock Landing – Phase 5.** During July and August of 2007 three chevrons were constructed at UMR miles 100.1, 100.0 and 99.9(L). The primary purpose was to address dredging concerns of the main channel just south of Liberty Chute. Location of the chevrons was coordinated with agency and stakeholder partners to address concerns of increased siltation at the downstream end of Liberty Chute where pallid sturgeon have been captured.

Liberty Chute chevrons (RM 100L) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

During FY 11, construction of vane dikes 96.9(R), 96.8(R), and 96.6(R) was completed. This stretch of river has a history of chronic dredging problems. The vane dikes are expected to improve navigation, add environmental diversity, and reduce the need to dredge at this site. Post-construction biological and physical monitoring took place in FY12. A report summarizing the results will be distributed when complete. Although it is difficult to draw conclusions from the limited sampling that has taken place, the vane dikes appear to be creating some unique flow and sedimentation patterns when compared to traditional wing dikes, which may benefit the MMR fish community by adding habitat diversity.

Vane dikes (RM 96R) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

12. **Grand Tower HSR Study RM 84.0-79.0 (Pallid Sturgeon – RPA 4).** Based on this study, chevron 82.0(L), weirs 82.5(R) and 82.4(R), and dikes 81.85(L) and 81.65(L) were constructed during FY09. Dike 80.6(L) may be constructed in FY14 if funds are available. This HSR study was conducted in 2004 to evaluate and propose design modification to existing stone dike and/or weir structures and the introduction of new structures for the purpose of improving navigation conditions and reducing dredging through the Grand Tower area (on-line report available here). An alternative that included the construction of two weirs, extending an existing dike but leaving a notch, construction of three new dikes and construction of one chevron was recommended. This alternative created the most environmental benefits with the possible creation of a secondary channel that has both upstream and downstream connectivity with the main channel.

Grand Tower chevron and notched dike (RM 82L) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

13. **Devils Island – Phase 4.** During FY11, construction of offset dikes 59.8(R), 59.6(R), 59.5(R), 59.3(R), 59.0(R), 58.7(R), and 58.3(R) was completed. This stretch of river has a history of chronic dredging problems. The offset dikes are expected to improve navigation, add environmental diversity, and reduce the need to dredge at this site. Post-construction biological and physical monitoring took place in FY12. A report summarizing the results will be distributed when complete. Although it is difficult to draw conclusions from the limited sampling that has taken place, the offset dikes appear to be creating some unique flow and sedimentation patterns when compared to traditional wing dikes, which may benefit the MMR fish community by adding habitat diversity.

Devils Island offset dikes (RM 59-58R) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

14. **Thebes Reach HSR Study RM 46-36 (Pallid Sturgeon – RPA 3 & 4, RPM 1; Least Tern – RPM 1).** In FY07 the St. Louis District initiated a study of the Upper Mississippi River between RM 43.0 and 35.0, approximately nine miles downstream of Cape Girardeau, Missouri. The final report was completed in April 2010 (on-line report available here). Alternative 5 offset dikes 39.4R, 39.1R, 38.9R, and 38.6R were constructed in FY12. It is anticipated that offset dikes will create unique flow and sedimentation patterns when compared to traditional wing dikes. Physical monitoring will be completed in the future.

Thebes Reach offset dikes (RM 39R) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

15. **Dogtooth Bend – Phase 3, RM 40.0-20.0.** During FY10, construction of chevrons 36.7(L), 36.5(L), 36.2(L), 35.9(L), 32.8(R), 32.6(R), and 32.4(R) took place. No new construction took place in FY11. This reach of the river has been experiencing a dredging problem for many years. This work is expected to improve navigation, add environmental features, and eliminate the need to dredge at this site. Post-construction biological and physical monitoring took place in FY12. A report summarizing the results will be distributed when complete. Although it is difficult to draw conclusions from the limited sampling that has taken place, the chevron dikes appear to be creating some unique flow and sedimentation patterns when compared to traditional wing dikes, which may benefit the MMR fish community by adding habitat diversity. Runway chevron 36.2(L) in particular appears to be creating diverse flow and sedimentation patterns (a runway chevron differs from a traditional chevron in having extended, notched legs as seen in the figure below).

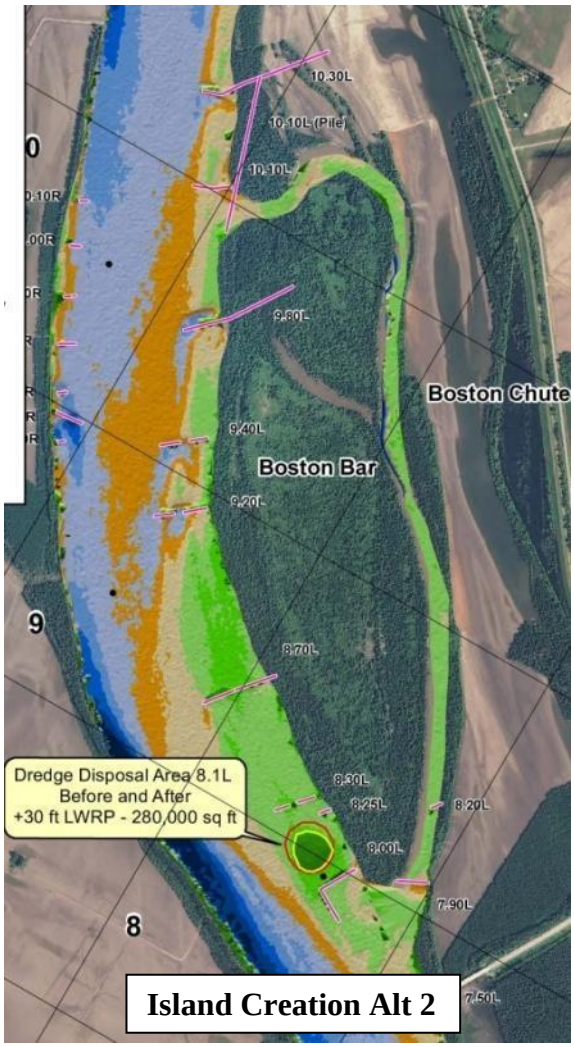
Dogtooth Bend chevrons (RM 36L) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

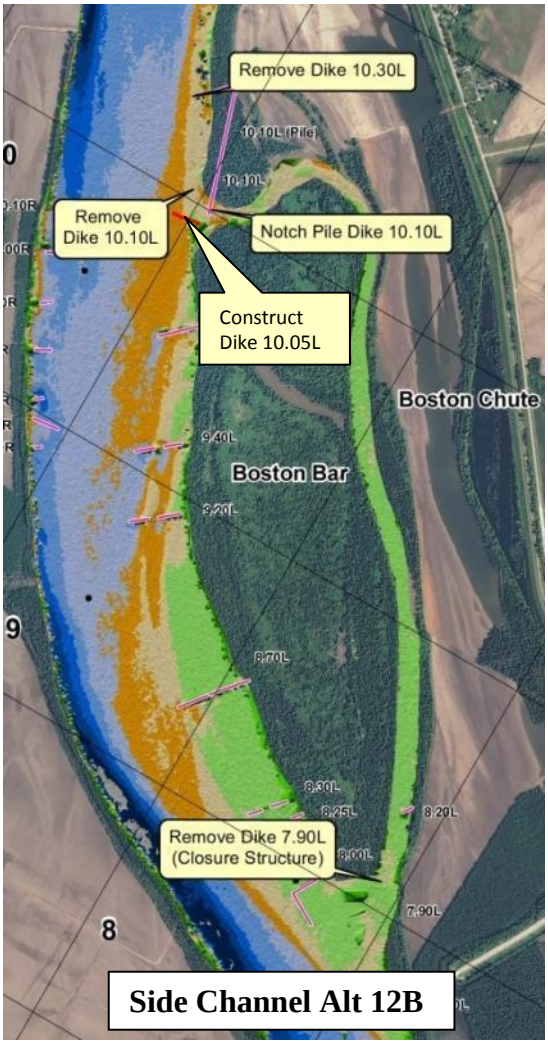
16. **Environmental dredging at Sister Chute RM 14.5-12.0(R) (Pallid Sturgeon - RPA 3 & 4, Term and Condition 4; Least Tern - Term and Condition 4).** Dredging at the lower end of Sister Chute, RM 12.0(R), was completed in FY07 (October 2006). Post-construction bathymetric surveys took place in 2006, 2008, 2009, and 2011. A summary report is scheduled for completion in FY13. The results of the report and associated coordination with partner agencies will determine the future direction of the project.

    General Background: After initial coordination and evaluation with state and federal stakeholders, it was decided to dredge the lower end of Sister Chute with the primary purpose of creating overwintering fish habitat. The project is also being conducted to specifically benefit the pallid sturgeon by providing backwater habitat that is anticipated to provide an improved food base. In FY05, the Corps prepared an EA and Tier II BA for this effort and secured the necessary section 401 and 404 permits (CWA). The dredge cut created a channel to connect the open river area at the lower end of the chute to the deep water hole below dike 12.4(R) for better connectivity throughout critical over wintering timeframes. The dredge cut is also anticipated to provide other aquatic species with greater potential use of the side channel for resting, spawning, and feeding opportunities. Restoration of side-channels is one of the seven types of habitat restoration suggested by the FWS in the Biological Opinion. In addition, side channel restoration has been a priority of natural resource agencies.

Lower end of Sister Chute (RM 12R) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage) – highlighted area was dredged in October 2006.

17. **Boston Bar HSR Study RM 12-6. (Pallid Sturgeon – RPA 3 & 4, RPM 1; Least Tern – RPM 1).** In FY11 the St. Louis District initiated a sedimentation study of the Upper Mississippi River between RM 12 and 6 (on-line report available here). The study was designed to analyze potential dredge disposal locations for island creation adjacent to Boston Bar and to analyze potential structural alternatives for increasing flow in Boston Chute. The study looked at 10 potential locations for island creation and concluded that Alternative 2 (see image below), consisting of a 280,000-square-foot island at RM 8.1(L), was the best alternative due to the fact that it did not show significant erosion and maintained its design height. For structural alternatives in the side channel, the study considered 11 alternatives designed to increase flow in Boston Chute without introducing additional sediment, without negatively impacting the navigation channel, and without removing pile dikes 10.10(L) and 8.20(L) within Boston Chute. Alternative 12B was recommended as the most desirable alternative and consisted of: notching pile dike 10.10L; removing dike 7.90(L), dike 10.10(L), and dike 10.30(L); and constructing dike 10.05(L) at the tip of Boston Bar. Construction of the side channel features is expected to take place in FY14. No definite plans are in place for placement of dredge material.





18. **Eliza Point / Greenfield Bend – Phase 2, RM 20-0.** During FY11, construction of W-dike 4.2(L) and multiple roundpoint structure (MRS) 4.0(L) was completed. This reach of the river has been experiencing a dredging problem for many years. This work is expected to improve navigation, add environmental features, and reduce the need to dredge at this site. Post-construction biological and physical monitoring took place in FY12. A report summarizing the results will be distributed when complete. Although it is difficult to draw conclusions from the limited sampling that has taken place, the structures appear to be creating some unique flow and sedimentation patterns when compared to traditional wing dikes, which may benefit the MMR fish community by adding habitat diversity.

W-dike and multiple roundpoint structure (RM 4L) during low-water fly-over September 2012 (river level -2.5 on St. Louis gage).

19. ***Boltonia decurrens* (Decurrent False Aster).** A summary report of ten years of decurrent false aster inventory surveys is expected to be completed by Southern Illinois University Edwardsville personnel in FY13.

20. **Interior Least Tern (Term and Condition 3).** Educational outreach for the Least Tern Floating Habitat Project and partnership continued with the Audubon Society in FY12. Barges were moved to a new breeding season location to enhance monitoring capabilities and public viewing from the St. Louis Audubon Center. Barge monitoring and driving surveys were conducted for arriving least terns in April/May and continued throughout the summer. Least terns first arrived on May 22nd of 2012. Nesting on the barge was confirmed on June 11th when 5 nests, 15 eggs, and 10 adults were observed. On June 25, 10 nests, 16 eggs, 9 chicks, and 12 adults were observed. On July 9, 12 nests, 5 eggs, and 9 chicks were observed. On July 12, 24 flying least terns were observed. It is estimated that a minimum of 12 chicks successfully fledged this year. The predator exclusion fences appeared to work as

there was no evidence of predation. Plans for FY13 include placement of an infrared live-feed web cam.

21. **Emergency Dredging Biological Assessment (Pallid Sturgeon - Term and Condition 5**). The Biological Opinion contains Terms and Conditions to be implemented should dredging become necessary during the 12 April through 30 June timeframe. No dredging was required during this period for FY12.

22. Indiana Bat Survey. In FY12, Indiana bat mist net surveys were conducted at 14 locations and digital call recording surveys were conducted at 15 locations on the Mississippi River between Calumet Creek and the Chain of Rocks Canal. Overall, the survey captured 275 bats of 10 species, 14 of which were Indiana bats and one of which was a grey bat. The Indiana bats and grey bat were captured at Batchtown Landing, Calhoun Point, Dog Island, Piasa Island, Piasa Creek, and Red's Landing. Thirteen of the fourteen Indiana bats and the grey bat were banded. Plans for FY13 include revising the SOW for the FY12 surveys and adding radio telemetry for a monitoring contract to be performed in FY 14.

23. Woody Structure Monitoring (Pallid Sturgeon - RPA 4 and RPM 1). In September 2012, St. Louis District personnel conducted 10-year follow-up monitoring of wooden pile dikes, wood bundles, and woody debris in dikes that were constructed in 2001 and 2002 (see table below) in order to increase habitat diversity and address a perceived lack of woody debris in the MMR. Overall, the pile dikes and woody bundles appeared to be relatively intact after 10 years and are providing fish and macroinvertebrate habitat, catching and retaining drifting organic debris, and increasing overall habitat diversity within the MMR. The wood logs placed within dikes appear shorter-lived, with only 6 of the original 12 logs being re-located during the 2012 survey. However, the logs, whether still in place or not, do not appear to have compromised the integrity of the dikes. A summary report of the 2012 woody structure monitoring will be distributed when complete.

Wood pile dike at RM 187.3L in 2003 (left) and 2012 (right).

Woody structure placement locations in the Middle Mississippi River.

Site #	River Mile	Location	Structure	Placement Date
1	187.3L	Between dikes	23 log pile "dike"	December 2001
2	186.0L	Between dikes	35 bundles	Dec 2001, March 2002
3	165.5R	Behind L-dike	9 bundles	August 2001
4	165.1R	Between dikes	6 bundles	August 2001
5	165.0R	Between dikes	23 log pile "dike"	August 2001
6	163.6R	Sandbar	27 log pile "dike"	August 2001
7	148.3-147.3L	Calico chute	12 bundles	July 2001
8	119.2R	In upstream side of dike	1 log	January 2002
9	119.0R	In upstream & downstream side of dike	2 logs	January 2002
10	118.3R	In downstream side of dike	2 logs	January 2002
11	118.1R	In downstream side of dike	2 logs	January 2002
12	117.9R	In downstream side of dike	2 logs	January 2002
13	117.6R	In downstream side of dike	2 logs	January 2002
14	117.5R	In upstream side of dike	1 log	January 2002

Projected FY13 Activities

Based on current projections of FY13 funding in the St. Louis District, we anticipate proceeding with the following work. However, these are projections only, and may require adjustment in the event adequate funding cannot be maintained, water levels are not in the range needed for construction, etc. Not all of these items will be completed in the next FY as some of them are multi-year continuing efforts and others may require extensive outside coordination.

1. Continue coordination with the **RRAT Technical Team** and **RRAT Executive Team**. Continue work on refining coordination efforts through the RRAT framework.

2. The **Pallid Sturgeon Conservation and Restoration Plan** effort will continue in cooperation with MDOC, IDNR and FWS. A draft conservation and restoration plan is expected to be completed in FY13.

3. **Pallid Sturgeon Habitat, Life History, and Population Demographics work** (ERDC/SIU-C) is expected to resume in FY13 contingent upon a population monitoring plan being completed in early FY13.

4. **St. Louis Harbor chevron construction, RM 183.0-182.4(R)**. Post construction monitoring has been completed. A summary report may be initiated in FY13.

5. **Cliff Cave – Kimmswick dike alteration and chevron construction site, RM 168.0-156.6.** Continue to deepen notches in adjacent dikes in FY13.

6. **Fort Chartres/Establishment Island new chevrons and rootless dike between RM 132.5-129.5(R).** A post-construction monitoring report by the Missouri Department of Conservation is expected in FY13.

7. **Establishment Chute HSR Study, RM 134.0-128.0.** Construction on Establishment Chute is expected to continue and possibly be completed in FY13 contingent on adequate river levels.

8. **Devils Island – Phase 4.** No further post-construction biological monitoring is expected to take place. Bathymetric surveys will continue periodically.

9. **Thebes Reach HSR model study, RM 46.0-36.0**. Bathymetric surveys will be conducted around the newly constructed offset dikes at some point in the future.

10. **Dogtooth Bend – Phase 3, RM 40.0-20.0**. No further post-construction biological monitoring is expected to take place. Bathymetric surveys will continue periodically.

11. **Environmental dredging at Sister Chute RM 14.5-12.0(R).** A summary report is scheduled for completion in FY13. The results of the report and associated coordination with partner agencies will determine the future direction of the project.

12. **Boston Bar HSR model study RM 12-6.** Construction of the side channel features is expected to take place in FY14. No definite plans are in place for placement of dredge material.

13. **Eliza Point / Greenfield Bend – Phase 2, RM 20-0**. No further post-construction biological monitoring is expected to take place. Bathymetric surveys will continue periodically.

14. **Red Rock Landing – Phase 5.** No further post-construction biological monitoring is expected to take place. Bathymetric surveys will continue periodically.

15. **Flexible/floating pipe for dredging.** Selection of a dredge disposal site for longer-term pre- and post-construction biological monitoring is planned for FY13. Continued opportunistic use of the flexible dredge pipe during routine maintenance dredging is expected to continue in FY13. Use of the flexible dredge pipe specifically for habitat restoration will also be considered.

16. ***Boltonia decurrens* (Decurrent False Aster).** A summary report of ten years of inventory surveys should be completed in FY13.

17. **Least Tern**. Educational outreach and monitoring with the Audubon Society is expected to continue in FY13. The floating island will continue to be monitored for successful nesting and fledging. An infrared live-feed web cam is also expected to be installed for the FY13 nesting season.

18. **Indiana Bat.** Plans for FY13 include revising the SOW for the FY12 surveys and adding radio telemetry for a monitoring contract to be performed in FY 14.