CHAUTAUQUA REFUGE
HABITAT REHABILITAITON AND ENHANCEMENT PROJECT
INSPECTION OF COMPLETED WORKS
2017

I. PROJECT:

Chautauqua Refuge Habitat Rehabilitation and Enhancement Project (HREP)

II. AUTHORITY:

Upper Mississippi River Restoration (UMMR)

III. LOCATION:

Illinois River, Miles 124-130, Mason County, Illinois

IV. PREVIOUS REPORTS:

Reports listed are posted at this website:
http://www.mvr.usace.army.mil/Missions/Environmental-Protection-and-Restoration/Upper-Mississippi-River-Restoration/Habitat-Restoration/Rock-Island-District/Chautauqua-Refuge/

Definite Project Report with Integrated Environmental Assessment, Lake Chautauqua Habitat Rehabilitation and Enhancement Project, Rock Island District Corps of Engineers, June 1991.

Operation and Maintenance Manual, Lake Chautauqua Rehabilitation and Enhancement Project, Rock Island District Corp of Engineers, April 2005

Performance Evaluation Report, Lake Chautauqua Rehabilitation and Enhancement, Rock Island District Corps of Engineers, July 2005.

Post Construction Performance Evaluation Report, Lake Chautauqua Rehabilitation and Enhancement, Rock Island District Corps of Engineers, 2016.

Bowyer, M.W., J.D. Stafford, A.P. Yetter, C.S. Hine, and M.M. Horath. 2005. *Moist soil seed production for waterfowl at Chautauqua National Wildlife Refuge, Illinois.* American Midland Naturalist 154:331-341.

Georgi, M.M. and S.P. Havera. 1998. *1997-1998 aerial waterbird inventories of Chautauqua National Wildlife Refuge and Peoria Lake Environmental Management Program sites*.
Illinois Natural History Survey, Center for Wildlife Ecology, Havana, IL. 19pp.

1999. *1998-1999 aerial waterbird inventories of Chautauqua National Wildlife Refuge and Peoria Lake Environmental Management Program sites*. Illinois Natural History Survey, Center for Wildlife Ecology, Havana, IL. 25pp.

2000. *1999-2000 aerial waterbird inventories of Chautauqua National Wildlife Refuge and Peoria Lake Environmental Management Program sites*. Illinois Natural History Survey, Center for Wildlife Ecology, Havana, IL. 26pp.

Hagy, H.M., R.V. Smith, A.P. Yetter, C.S. Hine, and M.M. Horath. 2012. *Vegetation assessment of the South pool of Chautauqua National Wildlife Refuge*. Illinois Natural History Survey, Champaign, IL. 15pp.

Lemke, A.M. and M.A. Pegg. 2001. *Progress Report: Lake Chautauqua Bioresponse Study, 2000*. Illinois Natural History Survey, LTRMP Havana Field Station, Havana, IL. 68pp.

Pegg, M.A., K.S. Irons, T.M. O'hara, and M.A. McClelland. 2005. *Lake Chautauqua habitat rehabilitation and enhancement project fisheries response*. IL Natural History Survey, Contract Report submitted to U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL. 27pp.

2006. *Initial response of a floodplain lake fish community to water level stabilization.* Ecology of Freshwater Fish 15:40-47

Stoeckel, J.A., K.S. Irons, K.C. Boggs, and B. Cross. 1998. *Progress Report: Lake Chautauqua Fish Production Study, 1998*. Submitted to U.S. Army Corps of Engineers, Rock Island District by IL Natural History Survey, La Grange Long Term Resource Monitoring Program, Havana, IL. 34pp.

V. PROJECT GOAL & OBJECTIVES:

Goals	Objectives	Project Features
Enhance Fishery Habitat Enhance Waterfowl Habitat	Increase areal extent of submersed and emergent vegetation for waterfowl Reduce sedimentation Reduce fatality from botulism	Pump station servicing the Upper and Lower Lakes Stop log structure (Lower Lake) Replace radial gate water control structure (Upper Lake) Raise elevation of cross dike and Upper Lake levee Excavate drainage channels (Lower Lake) Submerged side channel entrance and stone closure structure Boat ramp and access road for access to Upper Lake

VI. MONITORING PLAN EVALUATION CRITERIA:

Goal/Objective	Enhancement Feature	Unit	Year 0 without Alternative	Year 50 Target with Alternative	Feature Measurement Reference Table 6-2
Enhance Migratory Waterfowl Habitat					
Increase areal extent of submergent and emergent vegetation for waterfowl through water control	Aquatic vegetation bed	Acres	200	3,250	Perform Vegetation Transects
	Improved water quality	Mg/l suspended solids	200	50	Discontinued
	Perimeter levee and cross dike	Linear feet of eroded levee	20,400	0	Perform levee system transects and profiles

VII. SIGNIFICANT EVENTS SINCE LAST INSECTION

Significant events at the project site are listed in Table 3 below. These high water levels are listed in descending elevations. Figure 1 below shows water stages at Havana, IL for the last 4 years. Water levels have reached flood stage of 438.4 ft. NGVD 29 sixteen times since 2013.

Table 3: Significant Events at site

High water Elevations Since Project Completion http://water.weather.gov//ahps2/hydrograph.php?wfo=ilx&gage=havi2&view=1,1,1,1,1,1,1,1	
Date	**Elevation (ft.) NGVD 29**
04/25/2013	452.18
07/01/2015	451.64
01/04/2016	451.20
05/08/2017	446.98
04/12/2017	443.72
07/05/2014	441.74
03/17/2014	441.58
02/27/2014	441.50
03/17/2013	441.25
01/28/2017	440.52
09/03/2016	440.16
05/19/2016	439.65
05/13/2013	439.31
07/29/2017	438.89
09/13/2014	438.76
03/18/2015	438.47

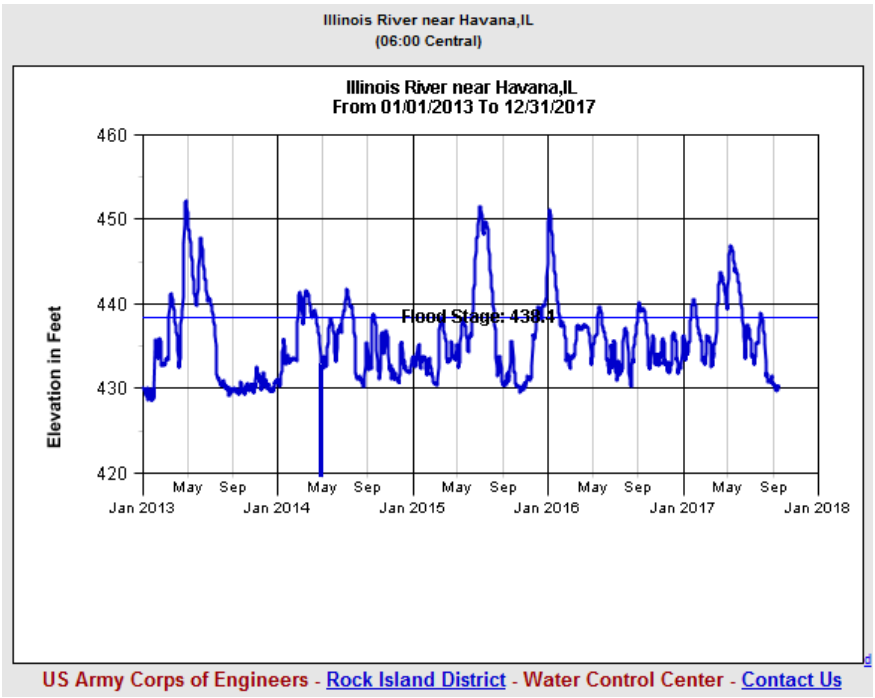


Figure 1: Illinois River near Havana, IL elevation from 2013 to 2017

VIII. PROJECT SPONSOR UPDATES

Some of the items mentioned by the USFWS at the site inspection included the following:

1. The modified stop logs/gates were really interesting. If you have any more details about how you built these and why they work, I would love to include that in the lessons learned.
2. Trying to get the ditch constructed in the upper lake. (last year? Equipment removed from site because needed elsewhere)
3. Drainage ditch along lateral levee filled in.
4. Missing bolts on cellular structure (because people are bored)
5. Debris removal at cellular structure (because beavers are annoying)
6. Ideas to keep mud from building in bulkhead slots
7. CA6 and rock replacement on levee top
8. Levee repairs following wave wash damage.
9. Osprey nest deflector on power pole near pump station.
10. Concerns with entering permitted confined space and Refuge limitations.
11. 3 by 3 box culver changed to 48 inch gate.
12. Rock migration near stoplog structure into lake
13. Pump station costs for maintenance (we have a lot of documentation about water levels in the 2016 report, but I am not certain if we have any costs).
14. Willow control
    a. Willow drowning (years?)
    b. Willow stockpiling
    c. Willow burning
    d. Aerial spraying

IX. DATE OF FIELD VISIT:

September 6, 2017. Temperatures were in the 70s, and skies were mostly sunny. No precipitation occurred. Water elevation in Havana were approximately 430.03 ft

X. ATTENDEES:

Table x lists outlines the list of personnel who conducted the site inspection.

Name	Office	Title	Number
Kara Mitvalsky	USACE	Environmental Engineer	309-794-5623
Charlene Carmack	USACE	Biologist	
Leo Keller	USACE	Water Quality	
Heng-Wei Tsai	USACE	Hydraulics	
Bob Barry	USFWS	Refuge Manager	
Ron Fisher	USFWS		
Sharonne Baylor	USFWS	Environmental Engineer	
Sarah Schmuecker	USFWS	RIFO Biologist	

XI. SITE VISIT AND RECENT SPONSOR OBSERVATIONS:

1. Levee

The sponsor has considered raising the levee and/or adding a spillway. The river has been significantly higher over the past few years, and it is difficult to fill the interior prior to overtopping. Additional spillways could aid in quicker filling.

The sponsor asked if the Corps could review the operational plan to see if they should be opening the gates sooner when the river starts to come up.

Wave wash erosion occurs near the interior top of the levee before the water levels even out. The FWS repairs these areas, and reseeds as much as possible. Since the interior water is not able to drop quickly, it is difficult to establish good turf vegetation along the toe of the levee. The Corps sent the service some other seed mixes to try, ones that are used on flood control levels. The FWS places riprap when possible. The roadstone on top of the levee washes away during overtopping events. This is pulled back and replenished once the levee dries and funding is available.

Significant willow growth was occurring in the lower lake and along the levee toe. Water was held high for 3 years to kill off the trees. The trees were removed and stockpiled and should be burned in the next year. Aerial spraying for new growth was planned for this fall.

2. Spillways

The spillways were constructed of gabion baskets. The FWS coated the roadway with concrete to make driving over it easier. The baskets are holding up well.

3. Water Control Structure (South)

Erosion of rock and material is also noted along the downstream water control structure. Minor modifications to the water control structure gate has occurred due to difficulties with operating stoplog structures. These changes help the service better control water levels through this structure.

4. Cellular Water Control Structure (North)

This water control continues to work well. Some vandalism of bolts has occurred (people remove them and throw them into the water). Debris, some from beavers, was noted in the gate openings. These are challenging to remove as there is no land access, and the logs need to be removed from a boat or a person in waders when the water is low.

5. Pump Station

As noted in previous performance evaluation reports, higher river elevations make it difficult to use the pump station, and in general water is controlled by opening gates at the pump station itself. A permitted confined space is associated with the pumps station and gates. FWS are not allowed to enter these permitted spaces and recommended future projects do not include these.

6. Drainage Channels

Surveys of these channels were obtained in 2012/2014. Depths remain to drain the southern unit. Just upstream of the bisecting berm, the channel has been excavated by the FWS but has filled back in with sediment. The FWS would like to construct a channel to assist with draining the northern unit, however, low pressure equipment (floating excavator) or a dredge during high water would be required to complete the work.

7. Water Quality

Water quality monitoring was last performed by Corps staff in the summer of 2009, primarily for dissolved oxygen at Station 129.4T. Per the O&M Manual, Station 129.4T is the only post-construction monitoring station for this project. At that time there were no issues with dissolved oxygen concentrations. Prior to that, there was no monitoring since the summer of 2001. The summers of 2001 and 2009 are the only continuous monitoring years performed by Corps staff.

Per Section E of the most recent post-construction PER, Dave Bierl (USACE Water Quality and Sedimentation Section, retired) spoke with Bob Berry (USFWS) regarding water quality monitoring within the Chautauqua Refuge. Mr. Berry told Mr. Bierl that he was not aware of any water quality monitoring performed by the USFWS. Notes from Mr. Bierl, dated 2013, state that USACE staff spoke with Thad Cook who worked in Havana since 1992. Mr. Cook indicated that he was not aware of any water quality monitoring at Lake Chautauqua.

During the site inspection on 06 Sep 17, Leo Keller (USACE Water Quality and Sedimentation Section) spoke with Bob Berry regarding water quality monitoring, the fishery at Lake Chautauqua, and water level management. Mr. Berry stated that due to frequent high water events from 2006 to 2011 and the carp that those events brought in, the north and south pools were no longer managed for fish. He went onto say that managing for fish was never a main objective of the project anyway. Therefore, the pools are frequently drawn down, when possible, to establish habitat for waterfowl and raised in order to inundate the willow stand that has emerged over the past couple of years. With no fish considerations, the USFWS doesn't see a need for water quality monitoring at the project. Currently, the Corps has no plans to restart monitoring as well.

8. Wildlife and Fish Habitat

Despite the continuing challenges of operating and maintaining water level management infrastructure, the project continues to function in support of the refuge goal to provide fall and spring feeding and resting habitat for migratory waterfowl. This function has been substantially limited over the past two decades by the increased magnitude and frequency of Illinois River flood events and the inability to effectively use pumping to counteract the effects of adverse river conditions. At the time of the 2017 site inspection, moist soil vegetation was only beginning to emerge in portions of the upper and lower lakes. Many acres remained as mudflats at the onset of the fall migration season, preventing the refuge from achieving its full potential for waterfowl food productivity. Currently there is little topographic diversity in either unit aside from the constructed drainage channel in the lower pool. Restoration of some topographic diversity through selective excavation and placement within the upper pool could be considered as a potential remediation measure in the future.

Even though the upper and lower units are no longer being managed to directly benefit fisheries, they do provide a minor indirect benefit to Illinois River aquatic habitat and native fish species by creating a death trap for Asian carp that enter the pools during high water events. A noticeable number of carcasses were present in the remaining puddles at the lower ends of both pools at the time of the site visit.

The small stand of canopy trees near the southwest corner of the upper pool, decimated by repeated high water events since the beginning of project construction in the 1990s, is now completely gone. During previous PER site inspections a few standing dead trees persisted, and for a time these provided nesting habitat for bald eagles. While the trees once used as nest sites within the upper pool are now gone, the refuge and surrounding river floodplain forests continue to provide feeding, roosting, and nesting areas for bald eagles, and the number of nesting pairs of eagles in the Illinois River valley and the rest of the state continues to increase. With respect to other raptor species of concern, Refuge staff recently modified the tops of the pump station power poles to prevent nesting attempts by osprey and provided alternative artificial nesting structures nearby adjacent to the perimeter levee, which have been used by the ospreys.

XII. MONITORING AND REPORTS:

No specific monitoring or reports were identified since the last project inspections.

XIII. SUMMARY:

Overall, the Chautauqua HREP appears to be generally meeting its goals and objectives through continued operation and maintenance by the USFWS.

High water since construction has made it difficult for the USFWS to drain the refuge and promote moist soil plant growth to provide a food source for migratory waterfowl. The lower lake had a significant intrusion of willows, which the USFWS was able to control through sustained high water and removal of trees. The water control structure can incrementally change water levels within this lake, or flood the lake to prevent damage from larger floods on the River. Various gates and stoplog configurations have been developed to assist in the management of this system during the higher river levels.

The Upper Lake is managed by an interior gate/lift/pump system, and has had high water for several years. Water had recently dropped as noted during the site inspection, exposing mudflats critical for shorebird habitat.

Spillways and the levee system continue to be maintained by the Service. Erosion from overtopping events and wind/wave damage are repaired routinely.

As the lakes drain, invasive carp species are unable to survive, an unanticipated benefit to the project.

Varying elevations within the lakes support different wetland species once the mud flats are exposed, providing different food sources for migratory waterfowl.

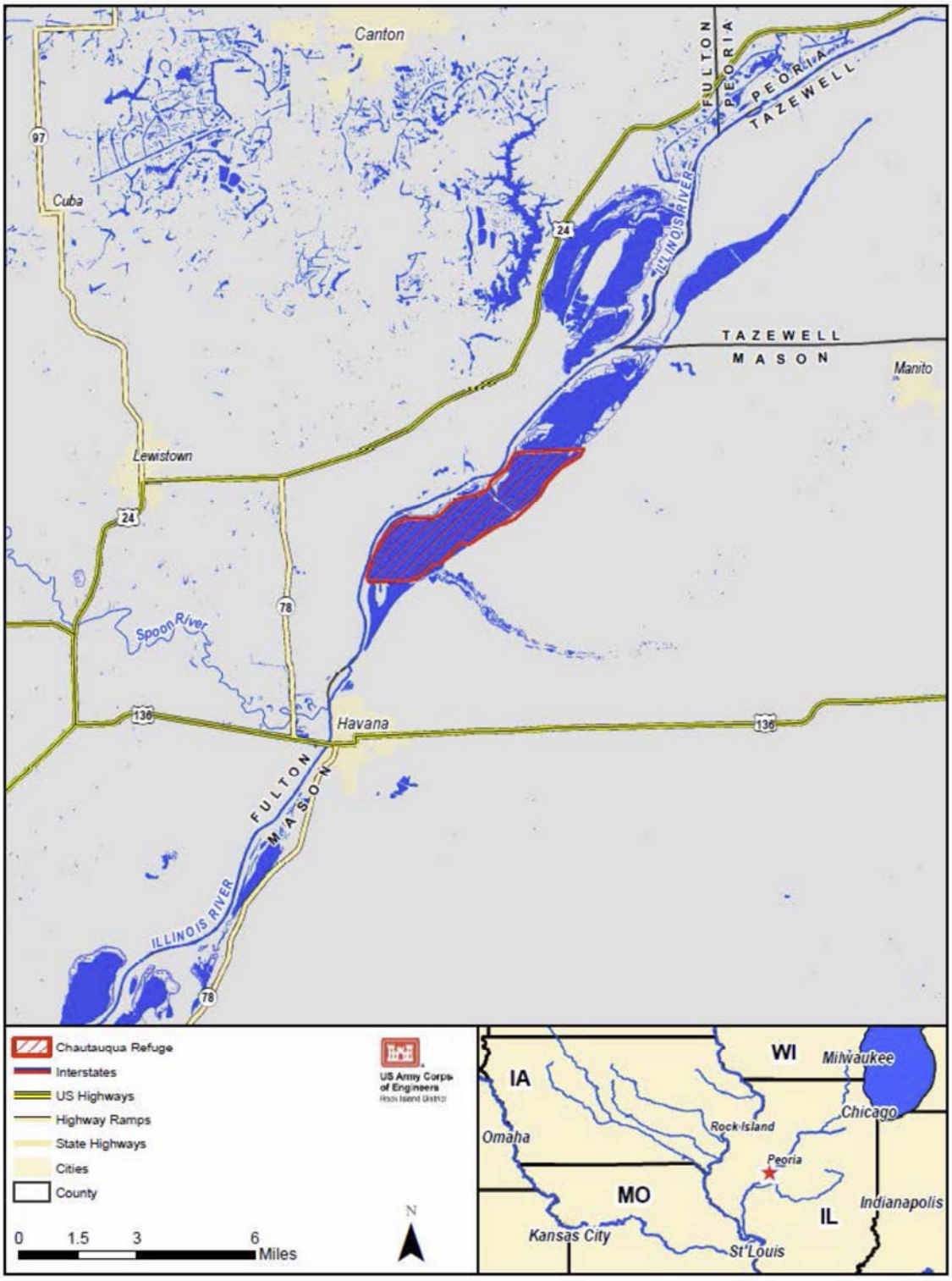
XIV. RECOMMENDATIONS:

Continue to manage water levels and invasive species control.

XV. LESSONS LEARNED:

Do not construct permitted confined space facilities.
Size spillway to protect interior from overtopping.
Ensure pumps are designed such that they will be able to function in a variety of water levels.
Stoplog structure are difficult to operate and are often modified.
Drainage of large wetland areas without interior channels or drains is very challenging.

Attachment A
Site Maps


Canton
Cuba
Lewistown
Havana
Manito
Spoon River
ILLINOIS RIVER
FULTON
PEORIA
TAZEWELL
MASON
97
24
78
136
Chautauqua Refuge
Interstates
US Highways
Highway Ramps
State Highways
Cities
County
US Army Corps of Engineers
Rock Island District
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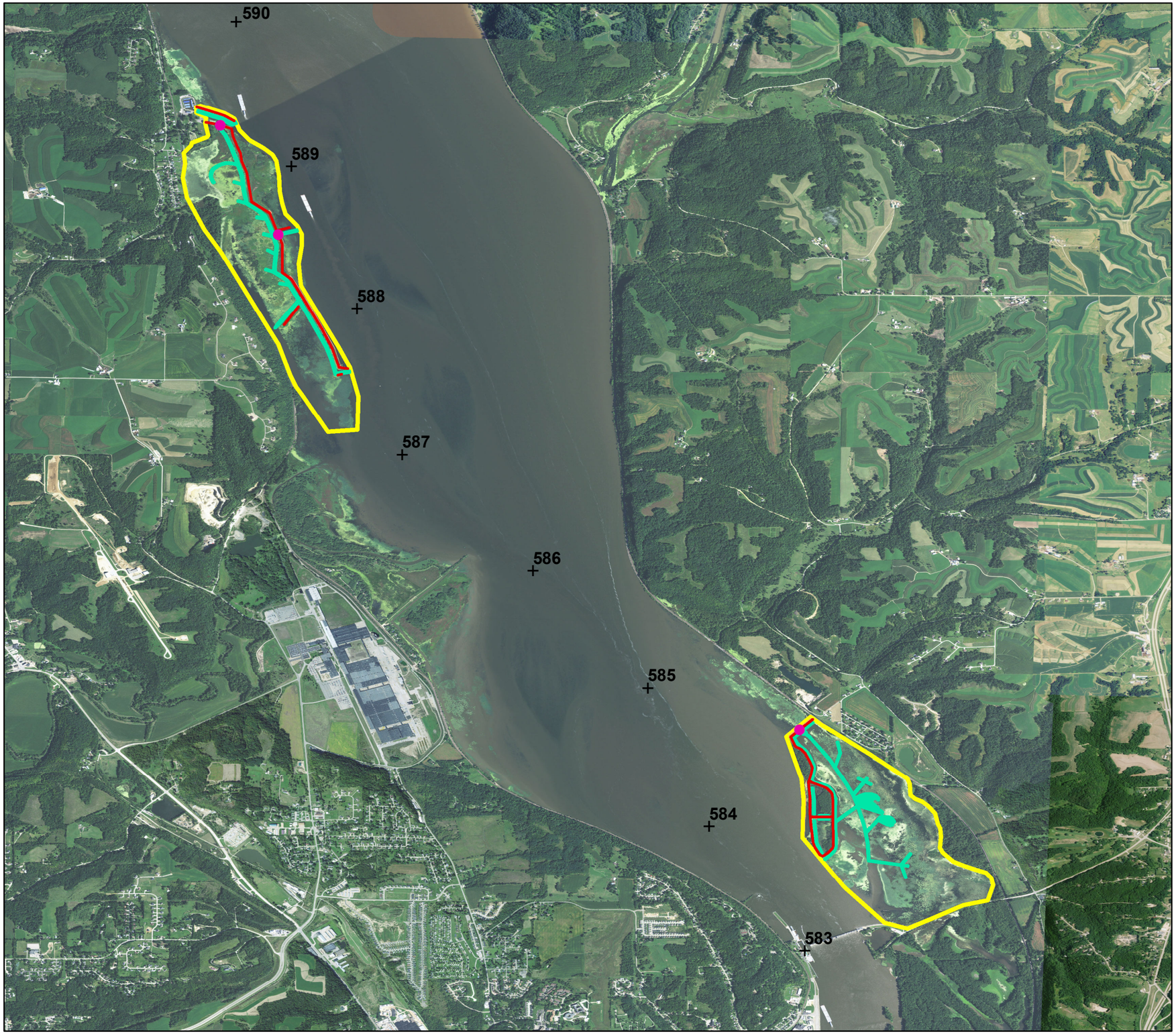


Legend

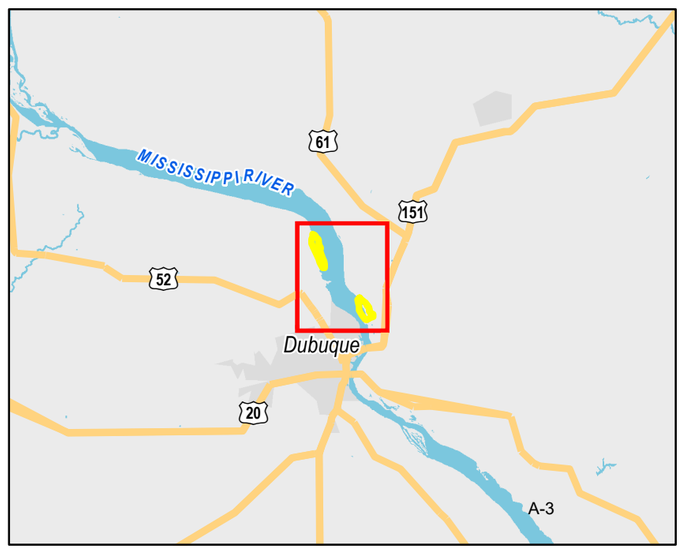
- Water Control Structure
- Embankment Centerline
- Dredging Event
- Revetment
- Project Boundary
- River Miles

US Army Corps of Engineers®
Rock Island District

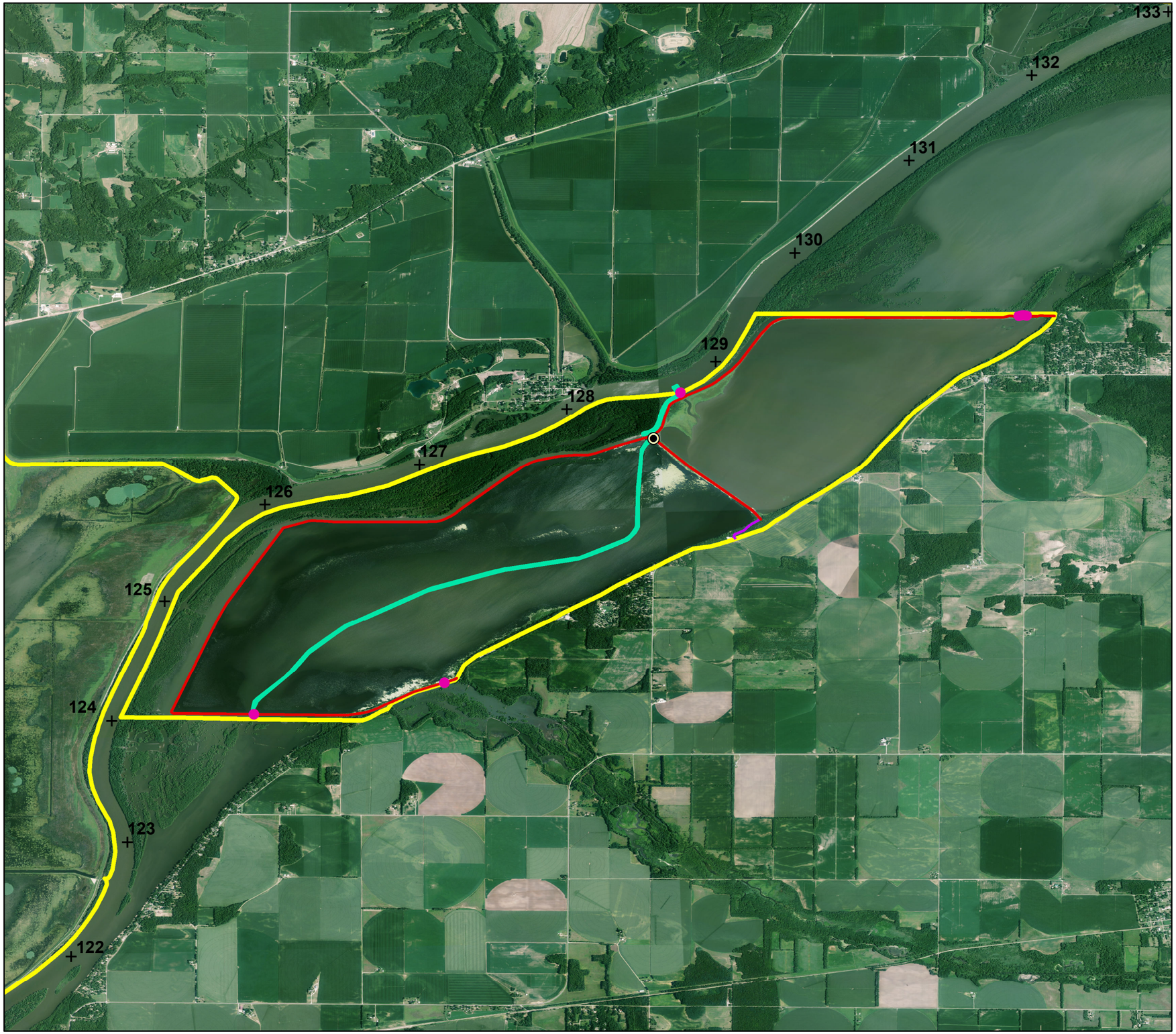
0 0.35 0.7 1.05 1.4 Miles

N W E S

-- Location Map --



Chautauqua Refuge



Legend

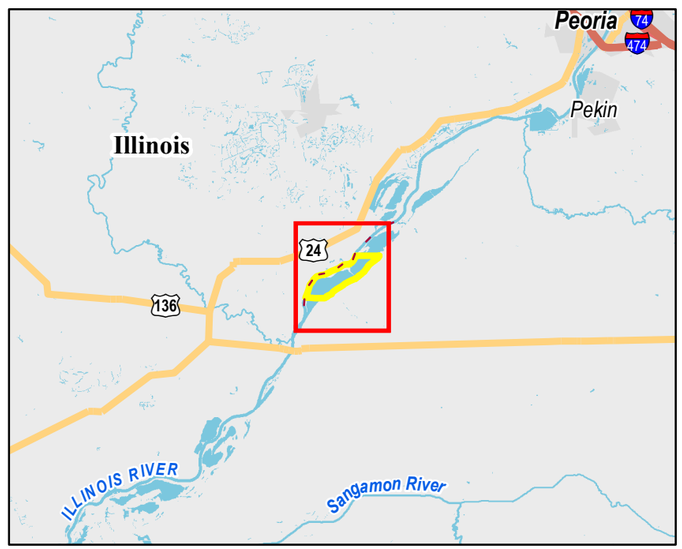
- Pump Station
- Water Control Structure
- Embankment Centerline
- Access Road
- Dredging Event
- Project Boundary
- River Miles

US Army Corps of Engineers
Rock Island District

0 0.4 0.8 1.2 1.6 Miles

N W E S

-- Location Map --



Attachment B
Site Visit Photos

Figure 1: Site Inspection Team

Figure 2: Water Control Structure

Figure 3: Lower Lake

Figure 4: Upper Lake

Figure 5: Carp in Upper Lake (near pump station)

Figure 6: Pump Station

Figure 7: Spillway

Figure 8: Willows

Figure 9: Levee Roadstone (Typical)

Figure 10: Nesting Deflectors

Figure 11: Artificial Nests

Figure 12: Cellular Structures

Figure 13: Beaver Intrusion on Cellular Structure

Figure 14: WCS Vandal

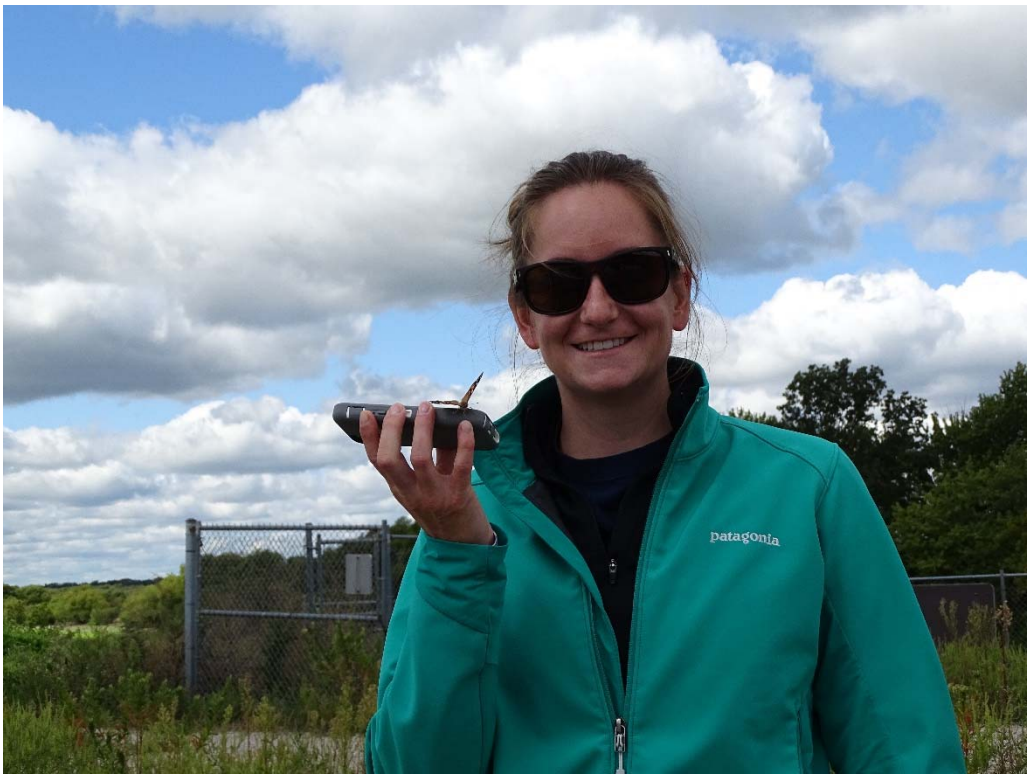


Figure 15: Monarch and Biologist

Figure 16: Gar

Figure 17: Upper Lake

Figure 18: Refuge Sign