

**ANDALUSIA REFUGE
INSPECTION OF COMPLETED WORKS
2017**

I. PROJECT

Andalusia Refuge Habitat Rehabilitation and Enhancement Project (HREP)

II. AUTHORITY

Upper Mississippi River Restoration (UMRR) Program

III. LOCATION

Pool 16, Upper Mississippi River, Miles 462.9-463.0, Rock Island County, IL

IV. PREVIOUS REPORTS

Reports listed below 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/Andalusia-Refuge/>

Definite Project Report with Integrated Environmental Assessment (R-5), Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River System Environmental Management Program, Pool 16, Upper Mississippi River, Rock Island County, Illinois, July 1989.

Operation and Maintenance Manual, Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River Environmental Management Program, Pool 16, River Mile 462.0-463.0, Rock Island County, Illinois, June 1994.

Post-Construction Performance Evaluation Report (PER5F), Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River System Environmental Management Program, Pool 16, Upper Mississippi River Mile 462.0-463.0, Rock Island County, Illinois, February 1996.

Post-Construction Supplemental Performance Evaluation Report (SPER501F), Andalusia Refuge Rehabilitation and Enhancement, upper Mississippi River System Environmental Management Program, Pool 16, Mississippi River Miles 462.0-463.0, Rock Island County, Illinois, August 1998.

Post-Construction Performance Evaluation Report- Year 8 (2000), Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River System Environmental Management Program, Pool 16, Mississippi River Miles 462.0-463.0, Rock Island County, Illinois, June 2001.

Post-Construction Performance Evaluation Report- Year 8 (2000), Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River System Environmental Management Program, Pool 16, Mississippi River Miles 462.0-463.0, Rock Island County, Illinois, April 2002

Post-Construction Performance Evaluation Report- Year 10 (2002), Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River System Environmental Management Program, Pool 16, Mississippi River Miles 462.0-463.0, Rock Island County, Illinois, July 2003

Post-Construction Performance Evaluation Report- Year 23 (2015), Andalusia Refuge Rehabilitation and Enhancement, Upper Mississippi River System Environmental Management Program, Pool 16, Mississippi River Miles 462.0-463.0, Rock Island County, Illinois, July 2016

V. PROJECT GOAL & OBJECTIVES:

The project goals and objectives were outlined in the original Definite Project Report and are summarized in Table 1 below.

Table 1: Project Goals and Objectives

Project Goals and Objectives		
Goals	Objectives	Project Features
Enhance Aquatic Habitat	Increase reliable food production area	8,600 foot perimeter levee
	Improve reliable resting/feeding water area	Pump station Water Control Structure
Enhance Migratory Fowl Habitat	Improve Dissolved Oxygen concentrations	8,600 feet of drainage channels
	Restore lentic-lotic cross sectional area	9 acres of islands
	Restore deep aquatic habitat	Dead Slough dredging
	Reduce Sedimentation	1,100 foot access channel between Sisco Chute and Dead Slough Diversion ditch and access road

VI. MONITORING PLAN EVALUATION CRITERIA:

Table 2 was copied from the following report: U.S. Army Corps of Engineers, Rock Island District, Upper Mississippi River Restoration, Environmental Management Program, Performance Evaluation Report, Andalusia Refuge Habitat Rehabilitation and Enhancement, 2015.

No changes or discussion of these tables was made during this site assessment.

Table 2: Performance Evaluation and Monitoring Schedule

Goal	Objective	Enhancement Measure	Units	Year 0	Year 50 Target	Feature Measurement
Enhance Migratory Waterfowl Habitat	Increase reliable food production area (moist soil species)	Provide water control	Acres	0	130	Vegetation Transects
	Increase reliable resting and feeding water area	Mechanical dredging	Acres	0	50	Hydrographic Soundings
Enhance Aquatic Habitat	Restore deep aquatic habitat	Mechanical dredging	Ac-ft	0	40	Hydrographic Soundings
	Restore lentic-lotic habitat access cross-sectional area	Mechanical dredging	Ft ²	0	180	Hydrographic Soundings
	Improve DO concentration during critical stress periods	Mechanical dredging and gated inlet structure	Mg/L (min) (max) (avg)	<4	≥4	Water Quality Testing at Stations
	Reduce sedimentation in refuge	Construct levee and divert	Ac-ft year	11	4.2	Hydrographic Soundings

VII. SIGNIFICANT EVENTS SINCE LAST INSPECTION

Recent significant high water events are compiled in Table 3 below.

Table 3: Recent High Water Events at the Site

All high water elevations exceeding flood stage (elevation 549.16 MSL) at the Andalusia Refuge since project completion are shown below. All these events also exceeded the overflow section of the Perimeter Levee (elevation 550.8 MSL).

High Water Elevations Since Project Completion	
Date	Elevation at Fairport gage (RM 463.5): 535.16 ft. MSL 1912
4/20/97	555.51
4/22/13	555.76
4/23/11	556.48
7/5/14	557.62
6/17/08	558.28
4/25/01	558.50

VIII. PROJECT SPONSOR UPDATES

Activities conducted since the 2015 PER by the Illinois Department of Natural Resources (ILDNR) are chronicled below. Also included are events impacting operation of the HREP.

- Pump removed for repairs in February 2016
- Pump repair completed July 2017
- Mississippi River flooding late August and early September 2106. Water control structure opened in late August to relive pressure from levee. Water control structure closed at the end of September and then water was retained throughout duck season.
- Refuge drained June 2017 but had to water control structure due to Mississippi River flooding in July.
- Mississippi River flooding in July and August 2017.
- Refuge drained in August 2017.

IX. DATE OF FIELD VISIT: September 28, 2017, Sunny, upper 60's °F

X. ATTENDEES

Table 4 outlines the list of personnel who visited the site in 2017.

Table 4: 2017 Site Visit Attendees

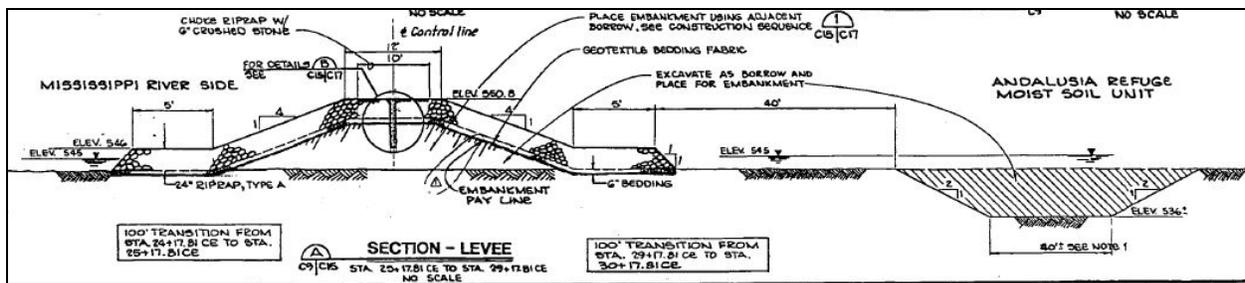
Name	Office	Title	Number
Kara Mitvalsky	USACE – Rock Island	Environmental Engineer	(309) 794-5623
Steve Gustafson	USACE – Rock Island	Environmental Protection Specialist	(309) 794-5202
Arthur Neal	ILDNR – Springfield, IL	Civil Engineer	(217) 782-2605
Lawrence Patterson	ILDNR – Springfield, IL	Federal Programs Coordination Manager	(217) 782-9211
Elizabeth Bruns	USACE – Rock Island	Hydraulic Engineer	(309) 794-5762
Julie Millhollin	USACE – Rock Island	HREP Project Manager	(309) 794-5214
Ben Vandermyde	USACE – Rock Island	Forester	(309) 794-4522
Sally Flatland	USFWS- Port Louisa NWR	Refuge Manager	(319) 523-6982
Tom Vandemore	ILDNR – Springfield, IL	Site Superintendent	(815) 454-2328
Anna Flintrop	USACE – Rock Island	Intern	NA
Mackenzie Briggs	USACE – Rock Island	Intern	NA
Chris Borchardt	USACE – Rock Island	Intern	NA
Sara Schmuecker	USFWS –Rock Island	Fish & Wildlife Biologist	(309) 757-5800

XI. OBSERVATIONS

Perimeter Levee:

The levee had adequate vegetation cover and has been periodically mowed. Portions of the riverside toe of the levee were undercut, with 2 to 4 feet tall cutbanks. Flooding and wavewash action were speculated as the cause of the levee undercutting. Repairs have been conducted on the levee by the ILDNR due to frequent flooding and overtopping. As-built elevations of the perimeter levee range from 551.8 to 552.8 feet MSL. One chronic breach area is present just downstream (approximate Station 41+00) of the Dead Slough Access Channel. This area has been repaired several times, but is currently a depression in the levee approximately 10 feet wide and 2 feet deep.

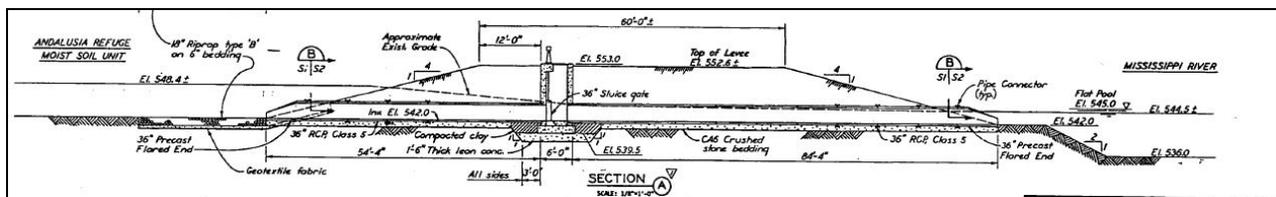
Figure 1. Typical Levee Design Section (Sheet C-15, O&M Manual)



Water Control Structure:

The water control structure is operational and has been used in the recent past. However, it is affected by the sedimentation occurring in Dead Slough and requires periodic cleaning out. The invert elevation of the control structure conduit is 542. Survey transects conducted in 2014 indicated the bed elevation of Dead Slough near the area of the water control structure ranged from 542 to 544 feet MSL.

Figure 2: Water Control Structure Design Section (Sheet S-1, O&M Manual)

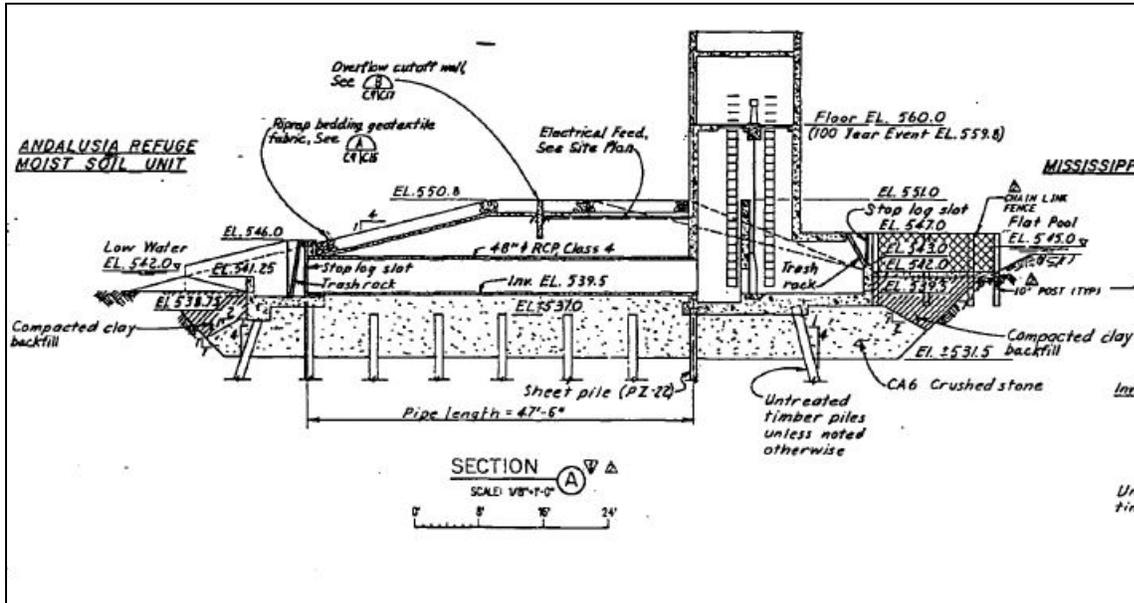


Pump Station:

The pump station is operational at the time of this report. Repair of the inflow pump occurred in 2016 and 2017, with the pump available for use in June 2017. The German made KSB outflow pump is repaired but not installed yet. Due to the lack of an overhead crane on the pump station building, additional coordination in terms of renting a crane is required for pump repairs. The sponsor noted issues with excess heat in the electric panel, possibly due to poor insulation characteristics of the building. Historically there have been issues with excess vegetation and

debris accumulating on the pump station intakes. Periodic dredging near the intakes is also required.

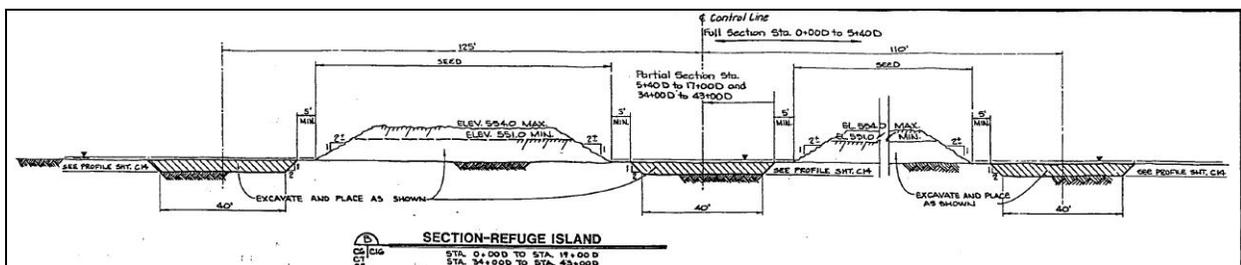
Figure 3: Pump Station Design Section (Sheet S-3, O&M Manual)



MSMU Drainage Channels/Islands:

Based on survey transects conducted in 2014, at least one foot of sedimentation has occurred within the MSMU drainage channels since construction. Due to frequent flooding, water level management in the MSMU has proven difficult. The nesting islands contained goose nests initially, but since then have been overtaken by willow trees. No waterfowl surveys have been conducted, but the refuge manager reports significant waterfowl usage during the migration season.

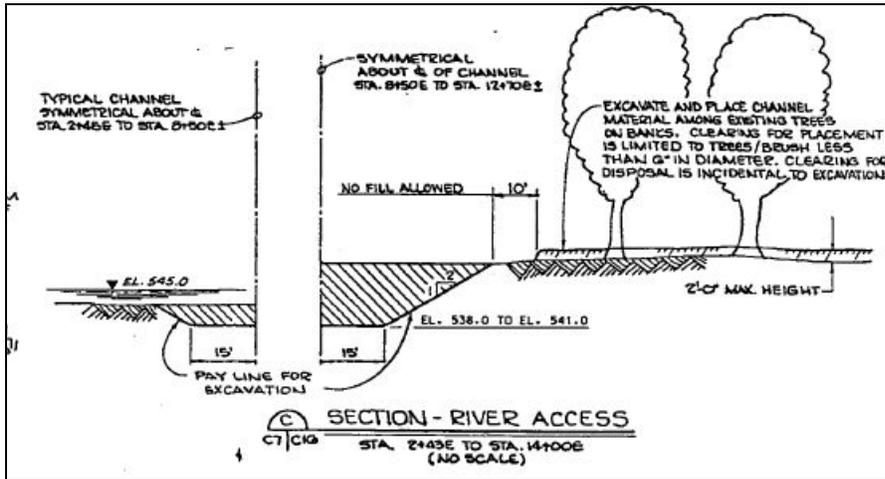
Figure 4: Channels and Islands Design Section (Sheet C-16, O&M Manual)



Lentic-Lotic Access Channel:

The access channel is currently infilled with sediment. At the time of the site inspection, portions of the bed of the access channel were visible, due to low water condition. The access channel has been dredged in the past, but no dredging has occurred in the past 10 years.

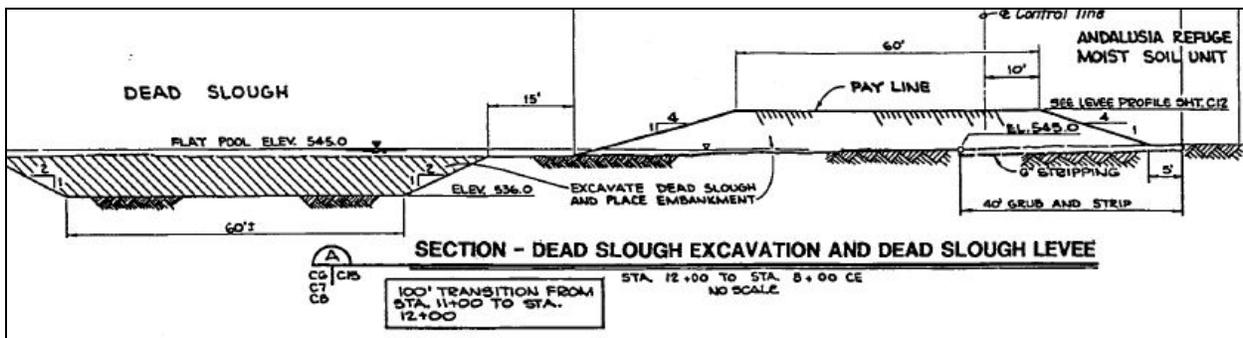
Figure 5: Access Channel Design Section (Sheet C-16, O&M Manual)



Deep Aquatic Habitat:

Deep aquatic habitat was dredged to elevation 536, nine feet below the flat pool elevation. Based on survey transects conducted in 2014 approximately six feet of sedimentation has occurred since construction.

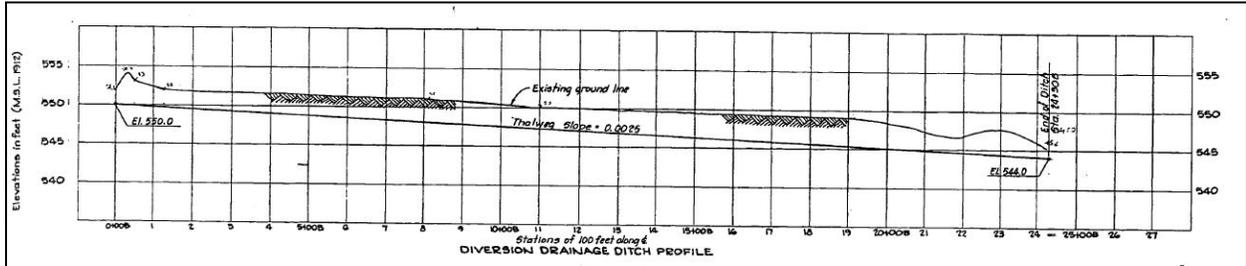
Figure 6: Dead Slough Aquatic Habitat Design Section (Sheet C-15, O&M Manual)



Diversion Drainage Ditch:

The diversion channel is periodically infilled with sand and gravel, and has been excavated over 20 times since project construction.

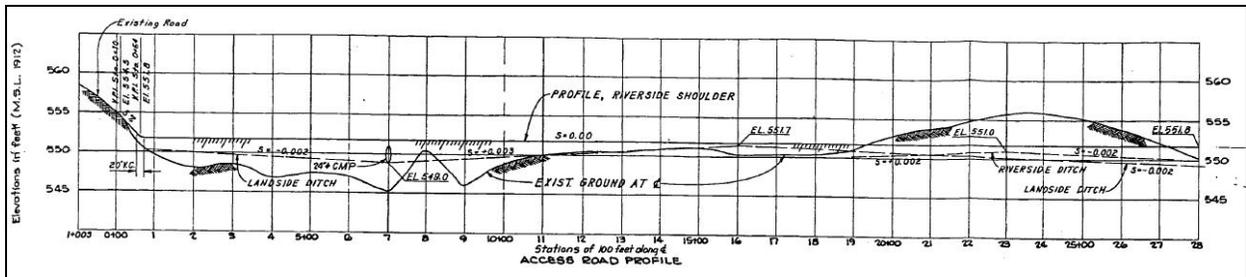
Figure 7: Drainage Ditch Design Profile (Sheet C-13, O&M Manual)



Access Road:

The 3,600 foot long access road into the Refuge needs continual maintenance to stay open. Runoff from the adjacent bluff brings significant sediment onto the road, and has filled in the roads drainage network.

Figure 8: Access Road Design Profile (Sheet C-13, O&M Manual)



XII. REPORTS AND STUDIES

No reports or studies have occurred since the PER completed in 2015.

XIII. SUMMARY

The HREP is not meeting the objectives outlined in the DPR regarding deep aquatic habitat, lentic-lotic habitat cross section area, reliable food production area, and sedimentation reduction. However, adequate dissolved oxygen levels and resting/feeding water area have been maintained. Further assessments of the HREP are not recommended given the current status of the HREP features, except for a more in-depth investigation of the causes of the higher than anticipated sedimentation rates.

XIV. RECOMMENDATIONS

- Repair perimeter levee depression and wavewash damage.
- Reinstall refurbished KSB pump.

XV. LESSONS LEARNED

- Consider adding overhead cranes when designing pump stations with limited road access.
- Based on the rapid infilling of the Dead Slough dredge cuts, further research in placement of overwintering habitat at HREP's.

Attachment A

Site Visit Photos

Access Road to HREP
(need to be cleared of mud post flood)



Inlet to Pump Station



View Upstream of pump station



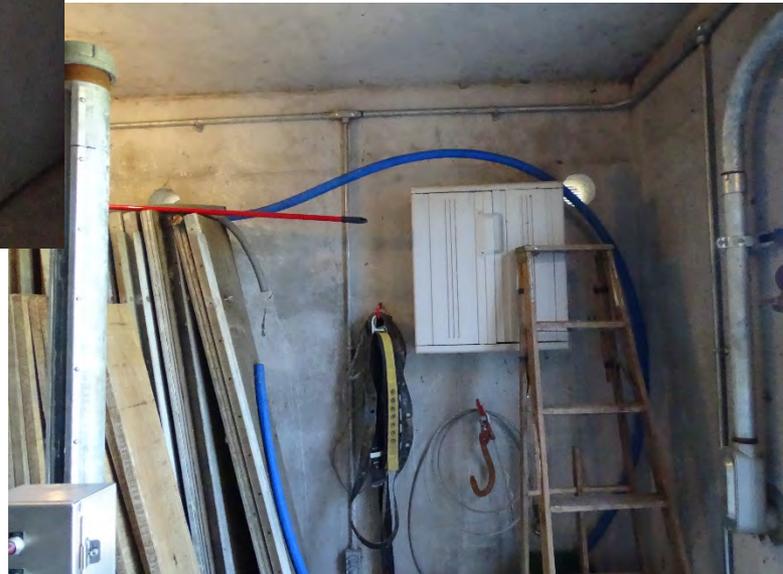
View Downstream of the Pump Station



Pump Station (upstream side) and looking down at downstream gate



Pump Station Interior: Second Story



Pump Station Roof



View from roof of Pump Station (upstream and downstream)



Overflow structure and associated embankment



Access Road and forest leading to dredge cuts



South inlet to Dead Slough and Dead Slough Perimeter Levee



Erosion across Dead Slough Levee



Erosion on riverside of Dead Slough Levee



Dead Slough Lentic-Lotic Access Channel (two views)

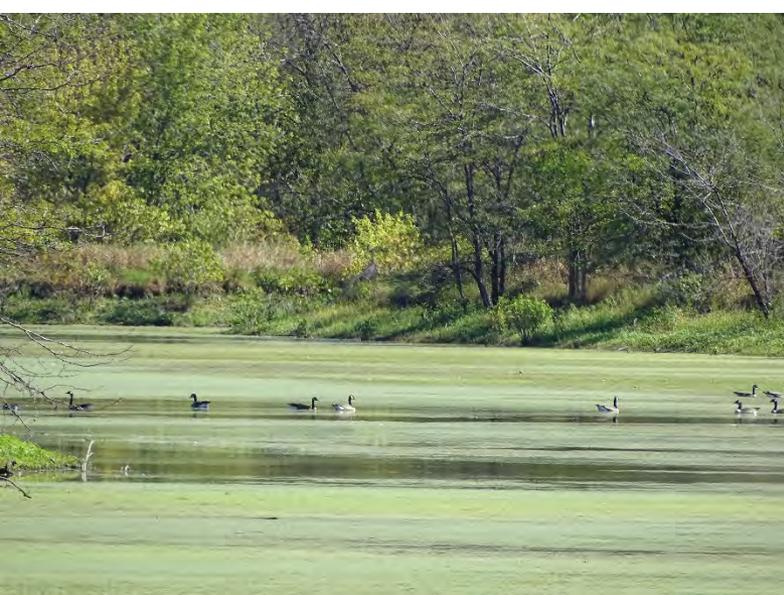


Dead Slough Levee water control structure: culvert/controls

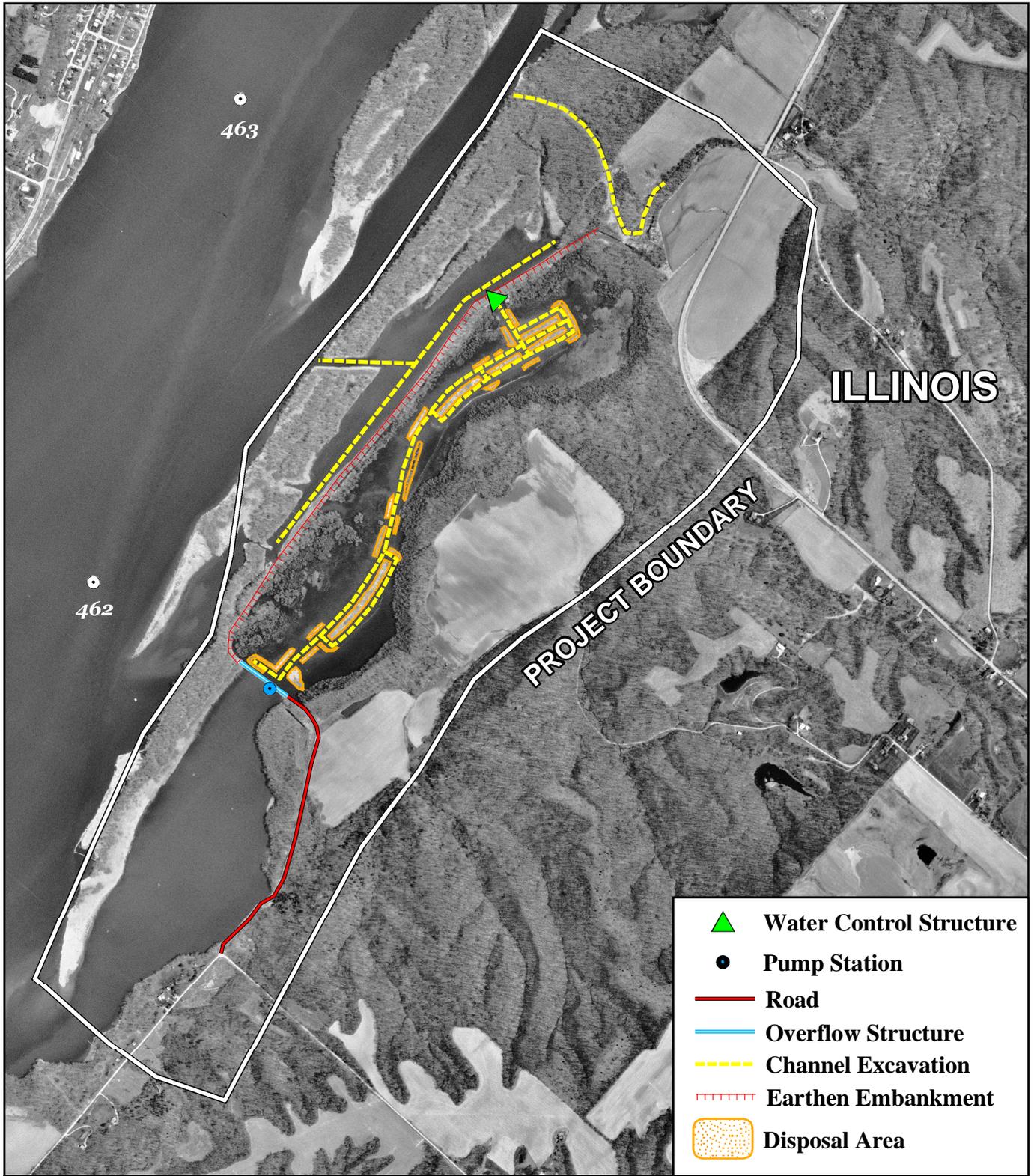


Site Inspection Team





Attachment B
Site Plan and Monitoring Plan Plates



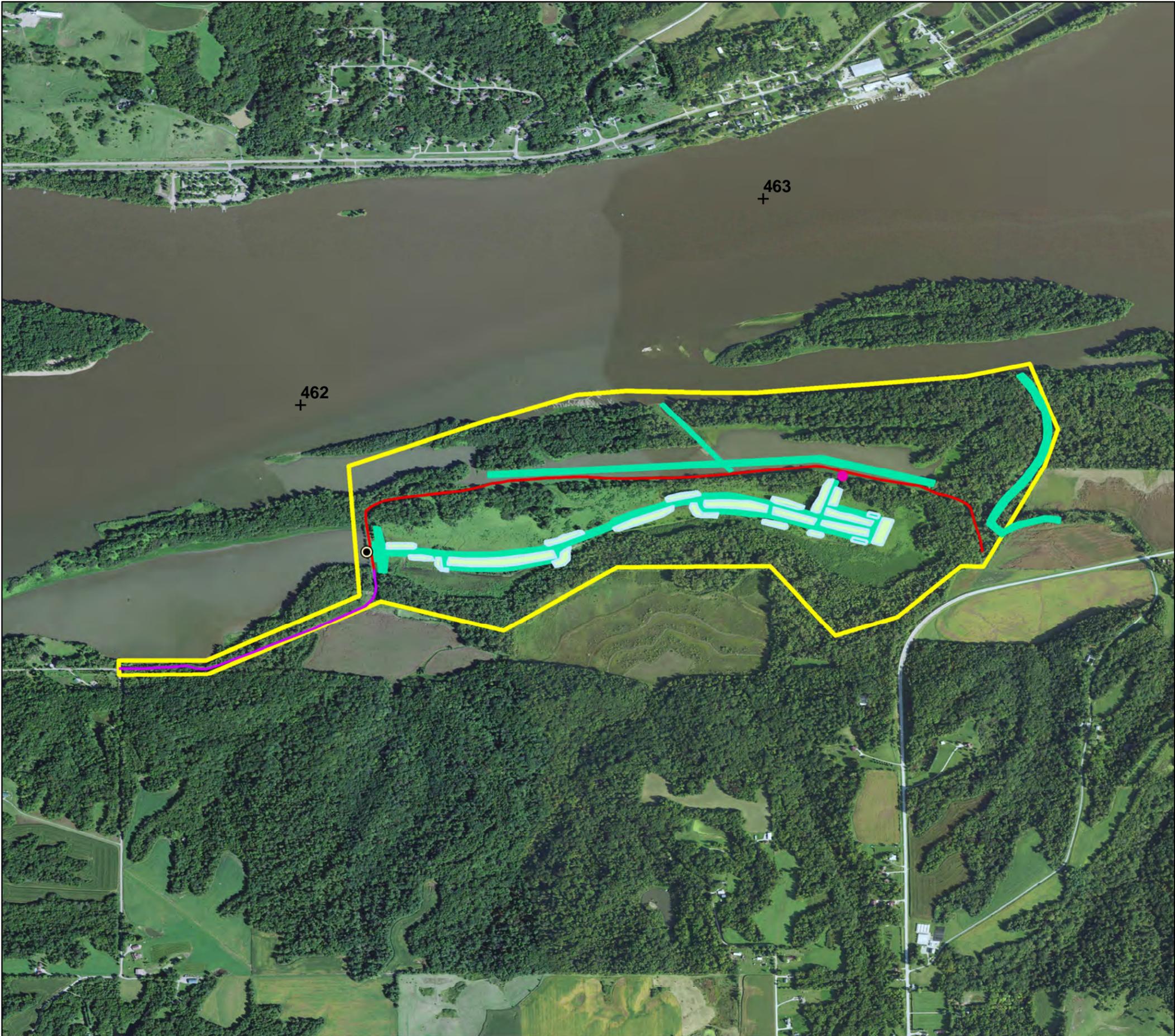
Andalusia Refuge



Project Location



Andalusia Refuge

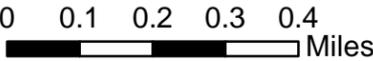


Legend

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



US Army Corps of Engineers
Rock Island District



-- Location Map --

