

FAP 308 (US 67)  
Sect. (3BR)M-1  
Job No: D-92-026-13  
SN 081-9905  
Seq. No. 18438A  
Contract No. 64J48  
Rock Island Co.

# **CONSERVATION PLAN AND IMPLEMENTING AGREEMENT**

## **US 67 (Centennial Bridge) over the Mississippi River Scour Countermeasure Project for Pier #3**

Prepared for:

Illinois Department of Transportation  
Region 2, District 2  
819 Depot Ave.  
Dixon, IL 61021

On behalf of:

Federal Highway Administration  
Illinois Division  
3250 Executive Park Drive  
Springfield, IL 62703

September 2017

# TABLE OF CONTENTS

a) Introduction.....	1
b) Conservation Plan.....	1
1) Description of the impact likely to result from the proposed taking .....	1
A) Legal Description.....	1
B) Biological data on the affected species .....	1
Butterfly Mussel.....	1
Black Sandshell Mussel .....	2
C) Description of the activities that will result in the taking .....	3
D) Explanation of anticipated adverse effects .....	4
(1) Direct and Indirect Effects .....	4
(a) Relocation .....	4
(b) Construction.....	5
(2) Cumulative Effects .....	6
2) Measures the applicant will take to minimize and mitigate the impact and the funding that will be available .....	7
A) Plans to minimize the area affected by the proposed action, and the estimated number of individuals of an endangered or threatened species that will be taken and the amount of habitat affected.....	7
B) Plans for management of the area affected by the proposed action that will enable continued use of the area by endangered or threatened species.....	7
C) Description of all measures to be implemented to minimize or mitigate the effects of the proposed action on endangered or threatened species .....	7

D) Plans for monitoring the effects of measures implemented to minimize or mitigate the effects of the proposed action on endangered or threatened species.....	8
E) Adaptive management practices used to deal with changed or unforeseen circumstances .....	8
F) Verification that adequate funding exists .....	9
3) Description of alternative actions considered.....	9
4) Data and information to indicate the proposed taking will not reduce the likelihood of the survival of the endangered species.....	9
5) Implementing Agreement .....	10
Literature Cited .....	11
Table 1 – List of freshwater mussels collected from the Mississippi River at the Centennial Bridge .....	13
Figure 1 – Location Map.....	14
Figure 2 – Proposed Project – Plan View .....	15
Figure 3 – Proposed Project – Elevation Views .....	16
Figure 4.1 – Mussel Survey Location Points for Butterfly .....	17
Figure 4.2 – Mussel Survey Location Points for Black Sandshell .....	18
Figure 5 – Mussel Survey and Relocation Areas.....	19
Appendix A – Mussel Survey Report for the Centennial Bridge .....	20
Appendix B – Permit #S-16-034 to collect, tag, and relocate freshwater mussels.....	21
Appendix C – Special Provisions .....	22

## **a) Introduction**

The Illinois Department of Transportation (IDOT) and the Federal Highway Administration (FHWA) are proposing a Scour Countermeasure project on Pier #3 of the Centennial Bridge carrying US 67 over the Mississippi River between Rock Island, Illinois and Davenport, Iowa. This emergency scour mitigation is needed only at Pier #3, and the project work area is not expected to extend more than 100 feet in any direction from Pier #3. The rest of the bridge is not part of this project.

A mussel survey was conducted via diving on June 15, 2017 and led by personnel from INHS and Ecological Specialists, Inc. (ESI), as requested by IDOT. The purpose of the survey was to collect and relocate all of the mussels in the proposed project construction limits. A total of 64 live individuals representing eight species were collected, including one individual of the state-threatened Butterfly mussel (*Ellipsaria lineolata*) and 16 individuals of the state-threatened Black Sandshell mussel (*Ligumia recta*). One relict shell of Butterfly was also collected. No other mussels collected during this present survey are listed as endangered or threatened at the state and federal level. (Tiemann 2017 – see report in Appendix A). The current status of threatened and endangered species are taken from U.S. Fish and Wildlife Service (USFWS) (1996, 1997) and the Illinois Endangered Species Protection Board (IESPB) (2015).

## **b) Conservation Plan**

Incidental taking of Illinois state-listed endangered and threatened species shall be authorized by the Illinois Department of Natural Resources (IDNR) only if the applicant submits a conservation plan that satisfies all criteria established in 17 Ill. Adm. Code § 1080.10.

### **1) Description of the impact likely to result from the proposed taking -**

A) Legal Description – This project consists of a Scour Countermeasure for Pier #3 of US 67 (Centennial Bridge) across the Mississippi River, Rock Island County, Illinois. The project is located at Latitude 41.51468° N, Longitude 90.58147° W; Second Principal Meridian; Township 18N, Range 2W, Sections 26 and 35 (Figure 1). The Centennial Bridge crosses Pool 16 of the Mississippi River near River Mile 482. The river is approximately 14 feet deep at this location and flows in a west-southwesterly direction. The Centennial Bridge and associated right-of-way, which includes the action area, is owned by the State of Illinois.

B) Biological data on the affected species – The butterfly and black sandshell are currently listed as threatened by the State of Illinois. State listed species are protected under the Illinois ESPA and regulatory authority lies with the IDNR.

#### **Butterfly Mussel (*Ellipsaria lineolata*)**

##### Species Description

The butterfly mussel is approximately 4 inches in length and is listed as threatened in Illinois. Cummings and Mayer (1992) indicate the shell of the



butterfly is somewhat triangular, thick, solid, and compressed. The anterior end is broadly rounded and the posterior end is pointed. The shell is smooth, yellow or yellowish green, with scattered brown rays that are usually broken into V-shaped or irregular rectangular blotches (see picture in Appendix A, Figure 5). Old shells have faint brown rays or are rayless. The beak cavity is shallow to moderately deep.

#### Habitat Requirements

This species was historically widely distributed in large streams in gravel or firm sand (Cummings and Mayer 1992). However, it has disappeared from many areas where it formerly occurred and is now uncommon in much of the Midwest. Within Illinois, the butterfly is found sporadically in the Mississippi River upstream of its confluence with the Missouri River, and in the Rock, Illinois, and Ohio Rivers (Cummings and Mayer 1997; Tiemann et al. 2007; Appendix A, Figure 5). Live specimens of the butterfly have been documented more than 10 times in the Mississippi River in Rock Island County since 2000 (data from INHS Mollusk Collection).

#### Life History

The reproductive cycle of the butterfly is similar to that of other native freshwater mussels. Phylogenetically, this species is in the Tribe Lampsilini, inclusive of species which typically have a periodic life history strategy. This strategy is characterized by a moderate to high growth rate, moderate life span, low to moderate age at maturity and fecundity, small to moderate adult size, and typically are long-term brooders. This species is considered bradyctictic, meaning females are gravid from autumn to the following early summer (i.e., overwinter glochidia) (Watters et al. 2009). Males release sperm into the water column. The sperm are then taken in by the females through their siphons during feeding and respiration. The females retain the fertilized eggs in their gills until the glochidia fully develop. The glochidia are released into the water and within a few days they must attach to the appropriate species of fish, which they parasitize for a short time while they develop into juvenile mussels. The breeding season is between May and September (Baker, 1928) and glochidial release has been reported during June and July (Waller and Holland-Bartels 1988) and May and September (Surber 1912). Reproduction is attempted annually. The freshwater drum (*Aplodinotus grunniens*), green sunfish (*Lepomis cyanellus*), and sauger (*Sander canadensis*) are known hosts of glochidia of the butterfly mussel (Watters et al. 2009).

### **Black Sandshell Mussel (*Ligumia recta*)**

#### Species Description

The black sandshell mussel is approximately 8 inches in length and is listed as threatened in Illinois. Cummings and Mayer (1992) indicate the shell of this species is elongate, solid, and moderately compressed with a rounded anterior end. The posterior end is pointed in males and saber-shaped in females. The

shell is smooth and shiny and is dark green, brown, or black with green rays visible on some individuals (see picture in Appendix A, Figure 6). The beak cavity is shallow.

#### Habitat Requirements

This species was historically widely distributed in medium to large rivers in riffles or raceways in gravel or firm sand (Cummings and Mayer 1992). However, it is now uncommon in much of the upper Midwest. Within Illinois, the black sandshell is found sporadically in the northern half of the state as well as in the Ohio River (Cummings and Mayer 1997; Tiemann et al. 2007; Appendix A, Figure 6). Live specimens of the black sandshell have been documented more than 10 times in the Mississippi River in Rock Island County since 2000 (data from INHS Mollusk Collection).

#### Life History

The reproductive cycle of the black sandshell is similar to that of other native freshwater mussels. Phylogenetically, this species is in the Tribe Lampsilini, inclusive of species which typically have a periodic life history strategy. This strategy is characterized by a moderate to high growth rate, moderate life span, low to moderate age at maturity and fecundity, small to moderate adult size, and typically are long-term brooders. This species is considered bradytic, meaning females are gravid from autumn to the following early summer (i.e., overwinter glochidia) (Watters et al. 2009). Males release sperm into the water column. The sperm are then taken in by the females through their siphons during feeding and respiration. The females retain the fertilized eggs in their gills until the glochidia fully develop. The glochidia are released into the water and within a few days they must attach to the appropriate species of fish, which they parasitize for a short time while they develop into juvenile mussels. The breeding season is between May and September (Baker, 1928) and glochidial release has been reported during June and July (Waller and Holland-Bartels (1988) and May and September (Surber 1912). Reproduction is attempted annually. The sauger (*Sander canadensis*), walleye (*Sander vitreus*), black basses (*Micropterus spp.*), crappie (*Pomoxis spp.*), sunfishes (*Lepomis spp.*), and a few other small-bodied fishes are likely host species for the black sandshell (Watters et al. 2009).

C) Description of the activities that will result in the taking – The IDOT and the FHWA are proposing a Scour Countermeasure for Pier #3 of the Centennial Bridge which carries US 67 across the Mississippi River, Rock Island, Illinois. Pier #3 is located on the northern edge of the navigation channel. Since the navigation channel must be maintained and remain open to river traffic during all construction activities, all work will take place from a barge which will be anchored within 100 feet of the Pier #3. The construction limits will occur within 100 feet of the pier. Care will be taken so as not to obstruct or impede any commercial or recreational boat traffic. Therefore, this construction activity will not impact river traffic in the channel.

The proposed project consists of excavating 7.5 feet below the channel bottom and replacing the excavated material with 2.5 feet thick of sand-filled geotextile containers (93 feet by 145 feet). This will be covered by rock riprap that is five feet in thickness (125 feet by 177 feet) (Figures 2 and 3). The riprap will be flush with the channel. All work will be conducted with a backhoe from a standard barge which is 200 feet by 35 feet in size and has a 9 foot draft. The barge will be anchored by spudding, typically at the corners at each end of the barge, and will be within the construction limits. The construction limits will extend approximately 100 feet in each direction from the edge of Pier #3. The total area of the construction limits is 225 feet by 276.5 feet, which is 62,212.5 square feet. The bridge will remain open during construction of the Scour Countermeasure around Pier #3.

Approximately 0.51 acre (5,350 cubic yards) of streambed will be excavated by utilizing a backhoe on top of floating barges. The excavated material will be discharged to an approved upland waste site. Dredged material will not be placed back into the river. The location of this site will be determined by the contractor. The perimeter of the upland site shall be protected with silt fence until vegetated. The streambed will be restored back to its pre-construction elevations.

A mussel survey was conducted via diving on June 15, 2017. The purpose of the survey was to collect and relocate all of the mussels in the proposed project construction limits. A total of 64 live individuals representing eight species were collected and relocated, including one individual of the state-threatened Butterfly mussel (*Ellipsaria lineolata*) (Figure 4.1) and 16 individuals of the state-threatened Black Sandshell mussel (*Ligumia recta*) (Figure 4.2) (Table 1). One relict shell of Butterfly was also collected. No other mussels collected during this survey are listed as endangered or threatened at the state or federal level.

Per the signed agreement with the IDNR (permit #S-16-034, see Appendix B), all state listed individuals were passive integrated transponder (PIT) tagged and all mussels collected were relocated to an area about two miles upstream at the tail of Sylvan Island (Latitude 41.51161° N, Longitude 90.53898° W), which is the same relocation area as the I-74 Bridge project (IDOT Sequence No. 19030) (ESI, 2014).

D) Explanation of anticipated adverse effects –

(1) Direct and Indirect Effects

(a) Relocation. On June 15, 2017, prior to construction activities, all mussels were relocated from a 100-foot (30 meter) area around Pier #3 (Figures 4.1, 4.2 and 5). The survey area extended 100 feet in all directions from Pier #3, but given the heterogeneous substrates near the pier, the majority of search time was focused on substrates located within 10 feet of Pier #3 (Tiemann, 2017).

All freshwater mussels were identified, measured, enumerated, and state listed mussels affixed with PIT tags. All mussels were relocated to an area of suitable habitat upstream from the project area in Sylvan Slough (Figure 5).

During the mussel relocation a total of 64 mussels were found and relocated. Although the area of the construction limits was extensively searched by divers, it is estimated that up to 10% of mussels more than 1 inch in length could be missed. Mussels that could be missed would be crushed. In addition, a 5% mortality of the relocated mussels could occur. Seventeen state listed mussels were relocated. The total estimated take due to mussels being crushed as a result of being missed, or not surviving the relocation is one (1) black sandshell mussel and one (1) butterfly mussel. IDNR has granted concurrence that no additional relocation effort is necessary.

(b) Construction. Direct effects of construction include mortality of individuals left behind following the relocation efforts (or two state listed mussels).

Fish hosts may be temporarily displaced from the area due to increased activity associated with construction; however, no host fish habitat will be permanently destroyed. Though effects to fish hosts are expected to be temporary and minor, construction and relocation activities may indirectly result in the loss of up to one year of reproduction due to stress and/or disturbance to mussels. At water depths greater than six feet, the effects to mussels as a result of propeller wash due to construction barges are expected to be discountable.

Indirect effects to these species as a result of construction activities also include the potential for increased sedimentation.

Dredging and filling will result in a change to the substrate, though the extent and duration of these changes are not entirely known. Little information exists specifically regarding the return of substrate to pre-dredging conditions (ESI, personal communication). The post-dredging substrate will likely remain unstable for some time after dredging and filling, as organic matter, biofilms, etc. require time to return to the substrate. Several studies have reported recolonization of dredged areas by mussels, which may be an indicator of substrate recovery. Eckblad (1999) surveyed sites in the Upper Mississippi River that had been dredged less than or equal to 5 years previously, and collected mussels from 4 of the 12 sites; a total of 14 species was observed at all sites dredged in the past 5 years. Mussels were also recovered from nearly half of sites that had been dredged less than or equal to 10 years previously and greater than or equal to 15 years previously (Eckblad 1999).

Recolonization does appear to include listed species; live Higgins eye pearlymussels were found by Miller and Payne (1992) near Prairie du Chien, Wisconsin, in an area dredged 8 years earlier, and by Fuller (1980) in the St. Croix River (Minnesota) near a frequently dredged channel (USFWS 2000).

Ecological Specialists, Inc. (ESI) has been monitoring a small dredged area in Pool 19 of the Mississippi River since 2014 to determine the rate of recovery of mussels relative to a nearby undisturbed reference area (Heidi Dunn, personal communication). The dredged area was divided into two segments, one of which was dredged in 2012, while the other was dredged in November 2013. Care was taken to restore bottom contours after dredging. The dredged area recolonized quickly with juveniles; juvenile density in October 2015 (2 years after the last dredging event) was 12.7 unionids/m<sup>2</sup> (95% CI: 8.2 to 17.2). Although adult density remains low (1.8± 0.8 unionids/m<sup>2</sup>), it has steadily increased across all sampling events, suggesting more mussels are becoming established in the dredged area. In addition, the average length of mapleleaf (*Quadrula quadrula*) juveniles (the most abundant species) has increased across all sample events, suggesting that the juveniles that initially colonized the area are remaining in the area and growing (ESI, unpublished data). Results of this project thus far suggest that mussels may begin to move into disturbed areas in as little as a few years, though additional time will likely be needed for the community to return to pre-dredging conditions (Heidi Dunn, personal communication).

Several factors may contribute to the time it takes for mussels to recolonize the dredged and filled area within the action area, including post-dredging contours and how closely they match pre-dredging conditions. The dredged area near Pier #3 may also be repopulated via downstream movement of mussels from known upstream aggregations (e.g. the upstream relocation area, Sylvan Slough). In addition, some mussels are present in Sylvan Slough that could provide a source of glochidia/juveniles to be dispersed via host fish movement (ESI, personal communication).

In summary, potential adverse effects to mussel species include mortality, disturbance, and stress to the animals as a result of relocation and construction activities, temporary disruption to reproduction, and temporary displacement of host fish.

## (2) Cumulative Effects

No plans for future State, tribal, local or private projects within or immediately adjacent to the aquatic action area are known. Within the aquatic action area, ongoing water quality issues such as siltation and

chemical pollution unrelated to the Centennial Bridge Countermeasure for Pier #3 project will continue to affect mussels.

**2) Measures the applicant will take to minimize and mitigate the impact and the funding that will be available -**

A) Plans to minimize the area affected by the proposed action, and the estimated number of individuals of an endangered or threatened species that will be taken and the amount of habitat affected - The aquatic action area was limited to the construction footprint around Pier #3 of the Centennial Bridge. A discussion of the project activities is in b)1)C) of this Conservation Plan. The construction area is limited to no more than 100 feet in all directions from Pier #3. Approximately 0.51 acre (5,350 cubic yards) of suitable mussel habitat will be dredged and filled around Pier #3. Project-specific Special Provisions were developed by IDOT to avoid and minimize effects to mussel species (Appendix C). Take estimates and the number of state listed mussels relocated are listed in b)1)D)(1) of this Conservation Plan.

B) Plans for management of the area affected by the proposed action that will enable continued use of the area by endangered or threatened species – During construction, approximately 0.51 acre (5,350 cubic yards) of streambed will be excavated by utilizing a backhoe on top of floating barges. The excavated material will be discharged to an approved upland waste site. Dredged material will not be placed back into the river. The location of this site will be determined by the contractor. The perimeter of the upland site shall be protected with silt fence until vegetated. The streambed will be restored back to its pre-construction elevations by replacing the excavated material with sand-filled geotextile containers below a riprap blanket as described in more detail in 1)C). All construction activities will take place underwater within 100 feet around Pier #3. The Department’s erosion and sediment control policy will be followed and will be in compliance with the U.S. Army Corps of Engineers Sections 401, 404, and 408 permits, the water quality certification policies of IEPA, and the requirements within the NPDES construction permit. All of these permits are pending the receipt of the Incidental Take Authorization (ITA). It is anticipated that the areas affected by dredging and placement of fill will return to pre-construction conditions in time and mussels will recolonize the area. This is explained in more detail in 1)D)(1)(b).

C) Description of all measures to be implemented to minimize or mitigate the effects of the proposed action on endangered or threatened species – Conservation measures for the mussel species included relocating the mussels from the aquatic action area around Pier #3 prior to construction. This was completed on June 15, 2017. The relocation process is described above in 1)C) and 1)D). Recently, Tiemann et al. (2016) suggested short-distance relocations are a viable minimization tool for protecting freshwater mussels at bridge construction sites, and their methodology was followed for this present mussel relocation in Sylvan Slough.

Project-specific Special Provisions were developed by the IDOT (Appendix C) to avoid and minimize potential effects to mussel species. In addition to the relocation efforts described above, these measures include:

(1) Barges and water craft used for construction activities shall be inspected for the presence of zebra mussels prior to placing the barges into the Mississippi River and shall be completely out of water for 10 days to ensure properly drying and reduce potential infestation by zebra mussels.

(2) The contractor will be responsible for implementing measures to prevent debris from falling in the river. Debris will not be allowed to collect at the bottom of the river. The contractor will remove any debris from the water or river bed as soon as practicable during the same work day in order to prevent the accumulation of potentially polluted materials. Construction inspectors will be present during construction activities to ensure compliance with IDOT Special Provisions (Appendix C).

The Special Provisions (Appendix C) also address measures to avoid and minimize effects to water quality which also protect mussel species.

Mitigation to the maximum extent practicable is required by the Act. As mitigation for the potential taking of black sandshell and the butterfly mussels, the IDOT shall provide compensatory mitigation to bring conservation benefit to the species potentially impacted by the project in the amount of \$16,742. Compensatory mitigation shall be directed to the Illinois Wildlife Preservation Fund to support mussel propagation research.

D) Plans for monitoring the effects of measures implemented to minimize or mitigate the effects of the proposed action on endangered or threatened species - All PIT tagged individuals will be monitored with an aquatic PIT tag reading system on two occasions – at one year, and at three years post-release. All data associated with this survey, PIT tagging, and results of post-translocation monitoring are stored in the INHS Mollusk PIT tag database, Champaign.

E) Adaptive management practices used to deal with changed or unforeseen circumstances – Mussel relocation is dependent on the flow and volume of water in the river at that time. For this reason, the mussel relocation was delayed by a month until June 15, 2017, until the water levels and the current conditions were lower. Potential mussel relocation beds were carefully screened to assure that habitat was suitable for transplanted mussels and that risks of external threats to the relocation beds (siltation, chemical spills) are minimized. The Sylvan Slough was chosen for the relocation site because the habitat was suitable for these species of mussels and it is a short distance upstream from the Centennial Bridge. These factors minimize impacts to the relocated mussels. The relocation was done according to accepted standards to minimize mussel mortality.

F) Verification that adequate funding exists – All proposed mitigation will be completed as part of, and not separate from, the construction of the project and in many cases will also be conditions of other permits (e.g. NPDES). Therefore, funding for the mitigation will be included in funding for the overall project. IDOT and FHWA commit to funding construction of the project, and by extension, funding of the mitigation.

**3) Description of alternative actions considered** – The proposed action was selected after carefully evaluating alternatives, including the No-Action Alternative. The proposed Scour Countermeasure design was engineered to repair the scour damage caused by the river on Pier #3. This proposed construction plan is described in b)1)C) of this Conservation Plan. This design has the smallest area of impact around the pier. The other build alternate would require the replacement of the entire bridge, which would have an impact to mussels under the entire length of the bridge.

The No-Action Alternative was also considered and was defined as no repairs on Pier #3. Selection of the No-Action Alternative would have meant no mussels would have been impacted by the project because no repairs would be made. However, the alternative would not meet the purpose and need of the US 67 Centennial Bridge Scour Countermeasure project, which was to repair the scour damage on Pier #3. The project will also prevent further scour damage around Pier #3. The current NBIS 113 rating for the Centennial Bridge is a “3”, which indicates the bridge is scour critical and unstable based on assessed or calculated scour conditions. Upon completion of this project, the rating will be increased to a “7”. Failure to implement this project may require closure of the bridge. Failure to implement the project and the increased scour damage may cause this bridge to collapse.

**4) Data and information to indicate the proposed taking will not reduce the likelihood of the survival of the endangered species** – The project area around Pier #3 was surveyed on June 15, 2017. The mussels in the project area were collected and relocated to Sylvan Slough. A total of 64 live individuals representing eight species were collected and relocated, including one state-threatened Butterfly and 16 state-threatened Black Sandshell. No other mussels collected during this survey are listed as endangered or threatened at the state or federal level. It was estimated that up to 10% of the mussels could have been missed. Mussels that could be missed would be crushed. Another 5% mortality could occur of the relocated mussels. The total estimated take due to mussels being crushed as a result of being missed, or not surviving the relocation is one (1) black sandshell mussel and one (1) butterfly mussel. The risk of “incidental take” does exist. The aquatic action area is not the only location in Illinois where the affected species are found, and very few mussels were collected in this action area. In addition to Sylvan Slough, these species are found in other locations along the Illinois portion of the Mississippi River as well as in some inland rivers. Therefore, the incidental taking of the Butterfly and Black Sandshell will not reduce the likelihood of the survival of the species in the wild in Illinois.



**5) Implementing Agreement  
For  
Conservation Plan  
For the State-threatened Butterfly, *Ellipsaria lineolata*, and the State-threatened  
Black Sandshell, *Ligumia recta*, which inhabit the Mississippi River  
in the vicinity of the Proposed Scour Countermeasure Repair Project  
of Pier #3 of the US 67 (Centennial) Bridge across the Mississippi River  
in Rock Island, IL in Rock Island County, IL.**

The Illinois Department of Natural Resources (IDNR) is responsible for the review of this Conservation Plan and for subsequent issuance of the Incidental Take Authorization. The Illinois Department of Transportation is responsible for all biological clearance coordination and recommendations related to the project. IDOT is also responsible for securing authorization for the incidental take; securing all permits, Section 404 and Office of Water Resources; inspection of the work and contractor compliance with the contract documents.

The activities in the conservation plan will be implemented prior to construction (i.e. relocating the mussels) and after construction is completed (i.e. monitoring the relocated mussels). Construction is estimated to begin in the spring of 2018 and be completed in approximately three months. Progress reports will be provided to IDNR within 90 days of each monitoring event.

IDOT is authorized by the Illinois Highway Code to carry out its duties of providing safe and efficient highways for Illinois citizens.

The Illinois Department of Transportation exclusively abides by the National Environmental Policy Act and all associated federal and state environmental laws in carrying out their mission of performing the most environmentally sensitive methods of transportation planning and engineering. The Butterfly and Black Sandshell are listed as threatened in Illinois. They are thus covered by the Illinois Endangered Species Act of 1972 only. Compliance under the federal Endangered Species Act of 1973 is not required for these species. No known local regulations are pertinent to this conservation plan.



---

Kevin Marchek, P.E.  
Region Two Engineer  
Illinois Department of Transportation

10-30-2017

Date

## LITERATURE CITED

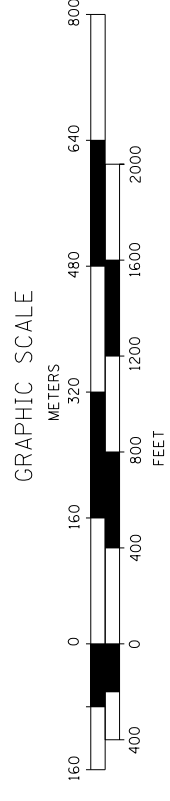
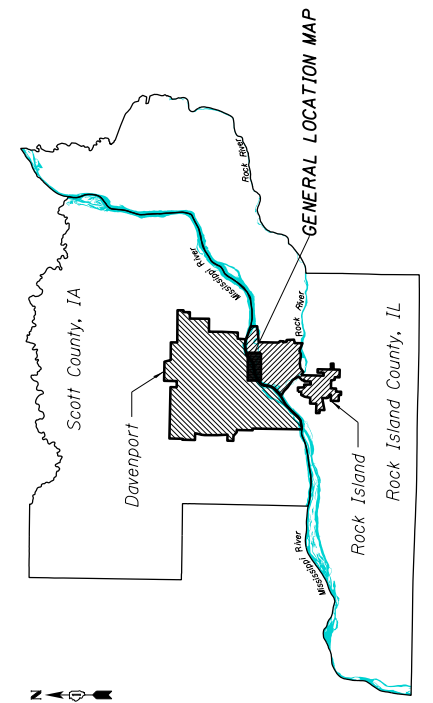
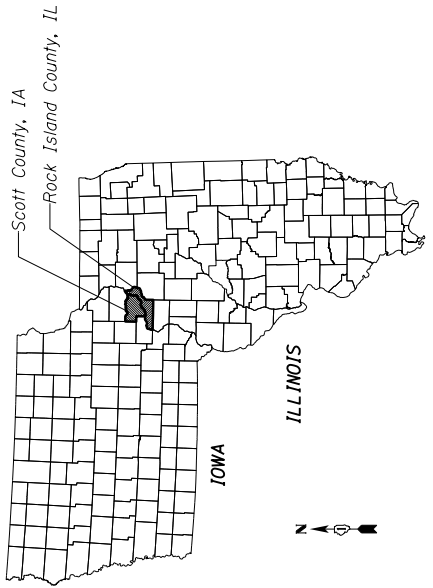
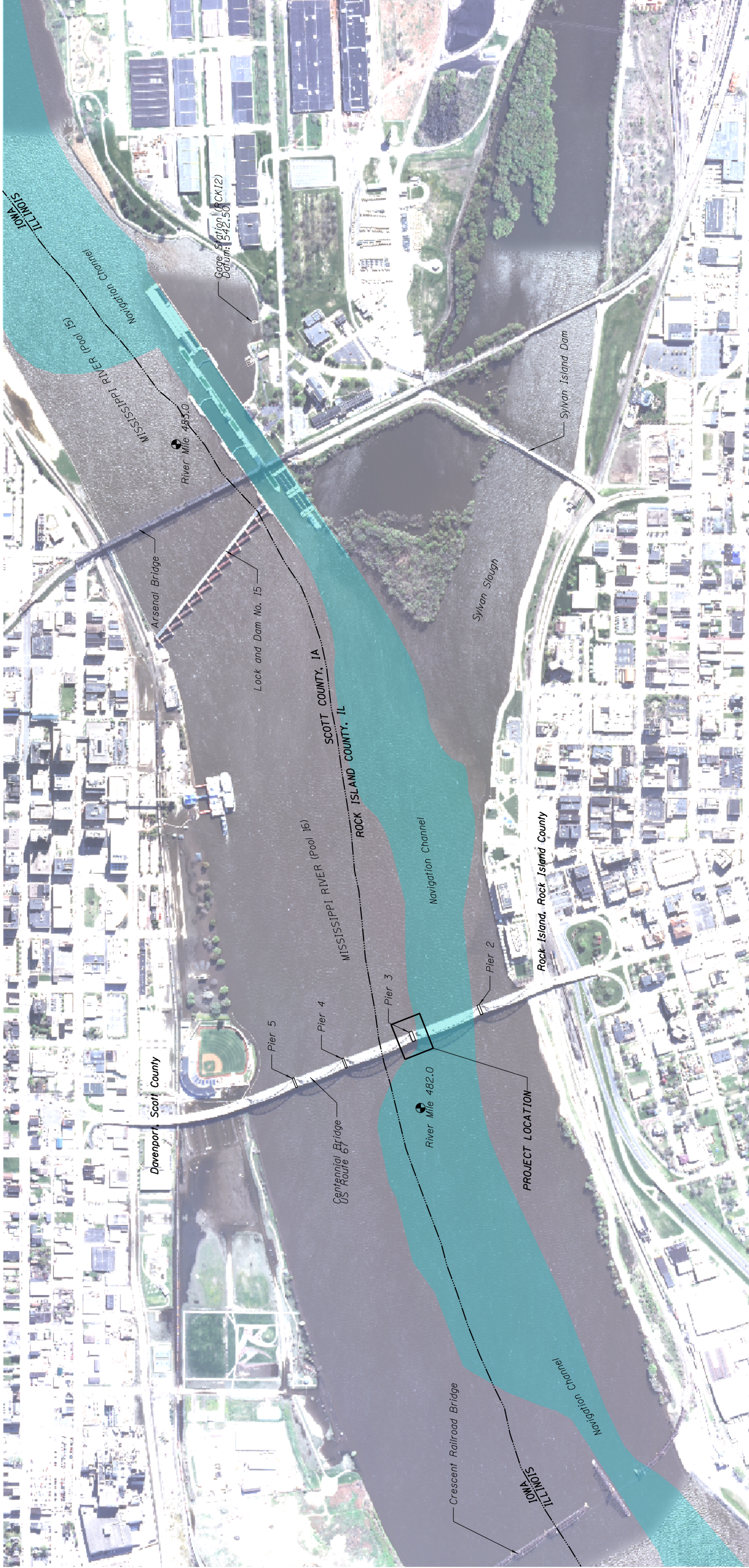
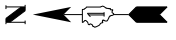
- Baker, F.C. 1928. The Fresh Water Mollusca of Wisconsin, Part II. Pelecypoda. Bulletin of the Wisconsin Geological and Natural History Survey. NO. 70. 496 pp.
- Cummings, K.S. and C.A. Mayer. 1992. Field guide to freshwater mussels of the Midwest. Illinois Natural History Survey Manual 5. xiii +194 pp.
- Cummings, K.S. and C.A. Mayer. 1997. Distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionacea). Pp. 129-145, *in* K.S. Cummings, A.C. Buchanan, C.A. Mayer, and T.J. Naimo, eds. Conservation and Management of Freshwater Mussels II: Initiatives for the Future. Proceedings of a UMRCC Symposium, 16-18 October 1995, St. Louis, MO. Upper Mississippi River Conservation Committee, Rock Island, IL. 293 pp.
- Eckblad, J. 1999. Evaluation of unionid mussel colonization of dredge cuts and dredged material placement sites in Pools 11-22 of the Upper Mississippi River. Prepared for U.S. Army Corps of Engineers, Rock Island District. 42 pp. + appendices.
- Ecological Specialists, Inc. (ESI). 2014. Final Report: Unionid Survey for Replacement of the Interstate 74 Bridge over the Mississippi River, Illinois-Iowa. 40 pp.
- Fuller, S.L.H. 1980. Freshwater mussels (Mollusca: Bivalvia: Native musselae) of the Upper Mississippi River: observations at selected sites within the 9-foot navigation channel project for the St. Paul District, U.S. Army Corps of Engineers, 1977-1979. Vols. I and II. Academy of Natural Sciences, Philadelphia, Pennsylvania.
- Illinois Endangered Species Protection Board. 2015. Checklist of endangered and threatened animals and plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 18 pp. Published online at <http://www.dnr.state.il.us/espb/index.htm>.
- Miller, A.C., and B.S. Payne. 1992. The effects of increased commercial navigation traffic on freshwater mussels in the Upper Mississippi River: 1989 studies. Technical Report EL-91-3, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
- Surber, T. 1912. Identification of the glochidia of freshwater mussels. U.S. Bureau of Fisheries Doc. 771:1-10.
- Tiemann, J.S., K.S. Cummings, and C.A. Mayer. 2007. Updates to the distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionacea). Transactions of the Illinois State Academy of Science 100:107-123.
- Tiemann, J.S., M.J. Dreslik, S.J. Baker, and C.A. Phillips. 2016. Assessment of a short-distance freshwater mussel relocation as viable tool during bridge construction projects. Freshwater Mollusk Biology and Conservation 19:80-87.

- Tiemann, J.S. 2017. Survey for freshwater mussels in the Mississippi River at the U.S. Highway 67/Centennial/IDOT FAP 308 Bridge, Rock Island County, Illinois (IDOT Sequence No.: 18438A; Job No. D-92-026-13; S.N. 081-9905). INHS/IDOT Statewide Biological Survey & Assessment Program Report 2017:59. 18 pp.
- U.S. Fish and Wildlife Service (USFWS). 1996. Endangered and threatened species, plant and animal taxa; proposed rule. Part III. 50 CFR Part 17. Federal Register 61(40):7596-7613. February 28.
- U.S. Fish and Wildlife Service (USFWS). 1997. Endangered and threatened wildlife and plants. Federal Register, 50 CFR Part 17.11 and 17.12. October 31, 1996. 46 pp. [This document is a compilation and special reprint, current as of October 31, 1996, that was printed by the U.S. Government Printing Office in 1997].
- U.S. Fish and Wildlife Service (USFWS). 2000. Biological opinion for the operation and maintenance of the 9-foot navigation channel on the Upper Mississippi River system. 244 pp.
- Waller, D.L. and L.E. Holland-Bartels. 1988. Fish hosts for glochidia of the endangered freshwater mussel *Lampsilis higginsii* Lea (Bivalvia: Unionidae). Malacological Review 8:119-122.
- Watters, G.T., M.A. Hoggarth, and D.H. Stansbery. 2009. The freshwater mussels of Ohio. Ohio State University Press, Columbus, Ohio. 421 pp.

**Table 1.** List of freshwater mussels collected from the Mississippi River at the Centennial Bridge around Pier #3 by INHS and Ecological Services, Inc., personnel on June 15, 2017. Data from the survey includes the number of individuals found alive and the one species found as fresh-dead (FD). Special designation includes those species listed as state-threatened in Illinois (ST) (Tiemann 2017).

<b>Scientific name</b>	<b>Common name</b>	<b>This survey</b>
<i>Amblema plicata</i>	Threeridge	14
<i>Quadrula (Amphinaias) pustulosa</i>	Pimpleback	19
<i>Ellipsaria lineolata</i> <sup>ST</sup>	Butterfly	1
<i>Lampsilis cardium</i>	Plain Pocketbook	6
<i>Leptodea fragilis</i>	Fragile Papershell	FD
<i>Ligumia recta</i> <sup>ST</sup>	Black Sandshell	16
<i>Megalonaias nervosa</i>	Washboard	2
<i>Obliquaria reflexa</i>	Threehorn Wartyback	3
<i>Obovaria olivaria</i>	Hickorynut	3
Total number of individuals		64
Total number of extant species		9



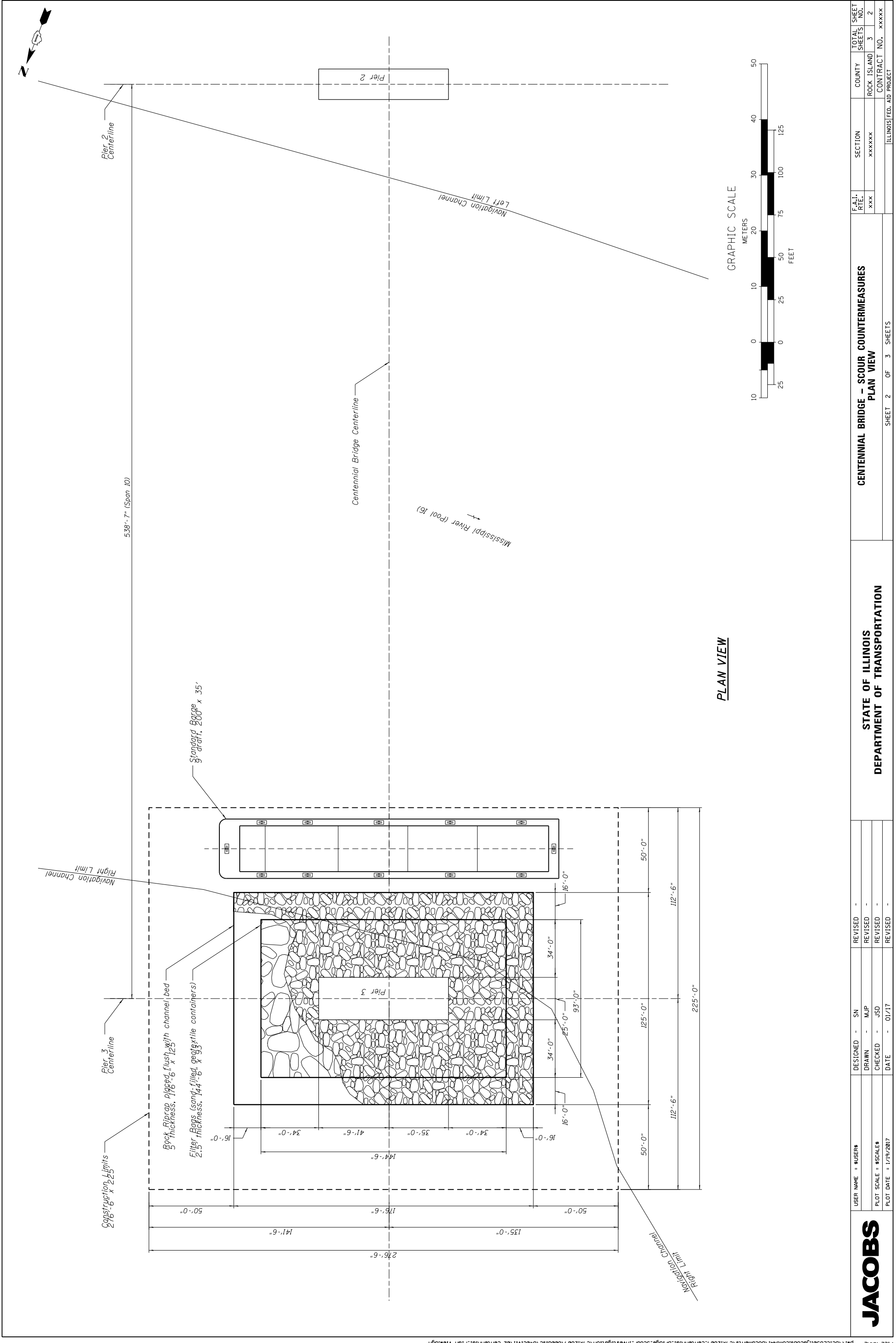


<b>JACOBS</b> USER NAME : #USERS DESIGNED : SN DRAWN : MJP CHECKED : JSD DATE : 01/17	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		CENTENNIAL BRIDGE - SCOUR COUNTERMEASURES GENERAL LOCATION MAP		F.A.I. R.T.E. XXX	SECTION XXXXXX	COUNTY ROCK ISLAND	TOTAL SHEETS 3	SHEET NO. 1
	PLOT SCALE : #SCALES PLOT DATE : 1/19/2017		SHEET 1 OF 3 SHEETS		ILLINOIS FED. AID PROJECT CONTRACT NO. XXXXX				

Figure 1

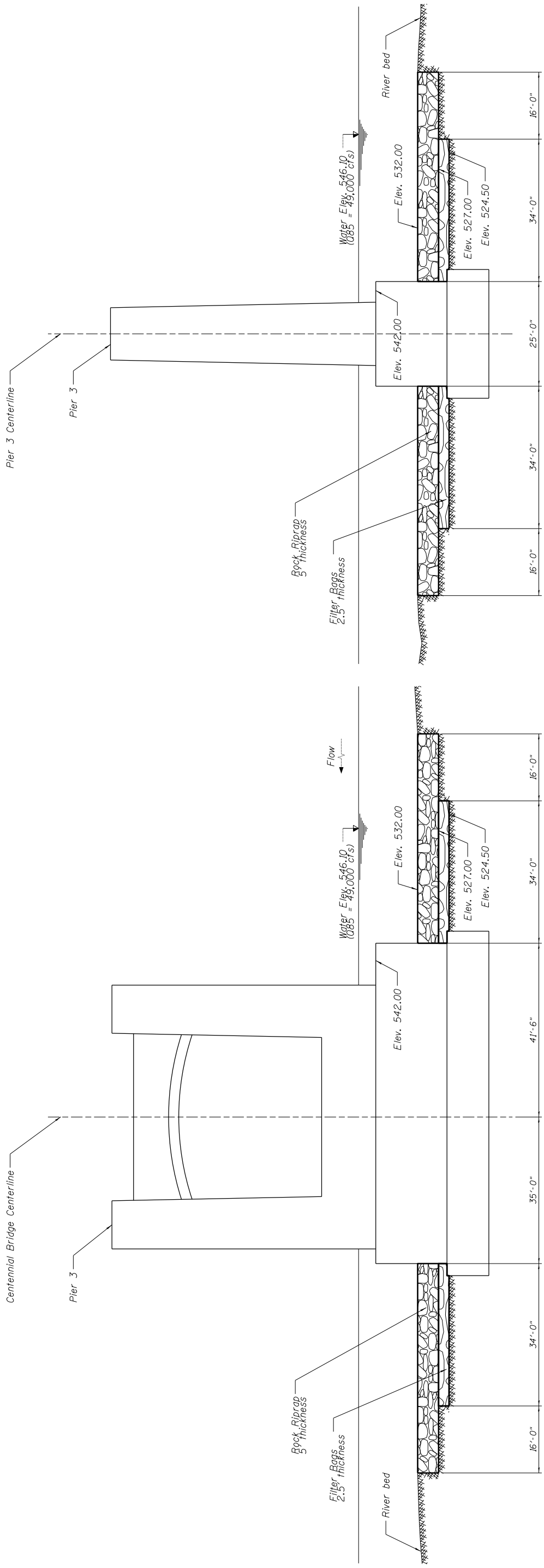
FILE NAME = p:\DCL\US01\jacobson\Documents\Centennial\_Bridge\_Scour\_Investigation\C9X12609\600d1ac64d0c111\01-Centennial-General\_Planning



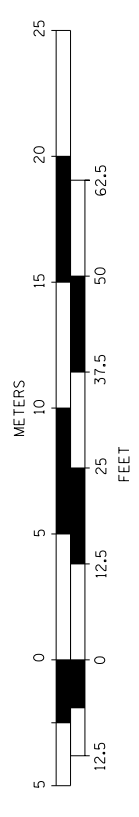


STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		CENTENNIAL BRIDGE - SCOUR COUNTERMEASURES PLAN VIEW		F.A.I. RTE.:	SECTION:	COUNTY:	TOTAL SHEETS:	SHEET NO.:
				xxx	xxxxxx	ROCK ISLAND	3	2
				ILLINOIS FED. AID PROJECT		CONTRACT NO. xxxxx		xxxxx
				SHEET 2 OF 3 SHEETS				

Figure 2



**ELEVATION VIEWS**



**Figure 3**

<b>JACOBS</b>		USER NAME = #USERS DRAWN = MJP CHECKED = JSD DATE = 01/17		DESIGNED = SN REVISIONS: <table border="1"> <tr><td>REVISION</td><td>-</td></tr> <tr><td>REVISION</td><td>-</td></tr> <tr><td>REVISION</td><td>-</td></tr> <tr><td>REVISION</td><td>-</td></tr> </table>		REVISION	-	REVISION	-	REVISION	-	REVISION	-	STATE OF ILLINOIS DEPARTMENT OF TRANSPORTATION		CENTENNIAL BRIDGE - SCOUR COUNTERMEASURES ELEVATION VIEWS		F.A.I. RTE. = XXX SECTION = XXXXXX COUNTY = ROCK ISLAND TOTAL SHEETS = 3 SHEET NO. = XXXX	
REVISION	-																		
REVISION	-																		
REVISION	-																		
REVISION	-																		
ILLINOIS FED. AID PROJECT																			

FILE NAME = p:\DCL\US01\jacobson\Documents\Centennial Bridge Scour Investigation\C912609\Centennial Bridge Scour Countermeasures\Elevation Views.dgn

Figure 4.1

GPS Dive Locations where Butterfly Mussel was Found

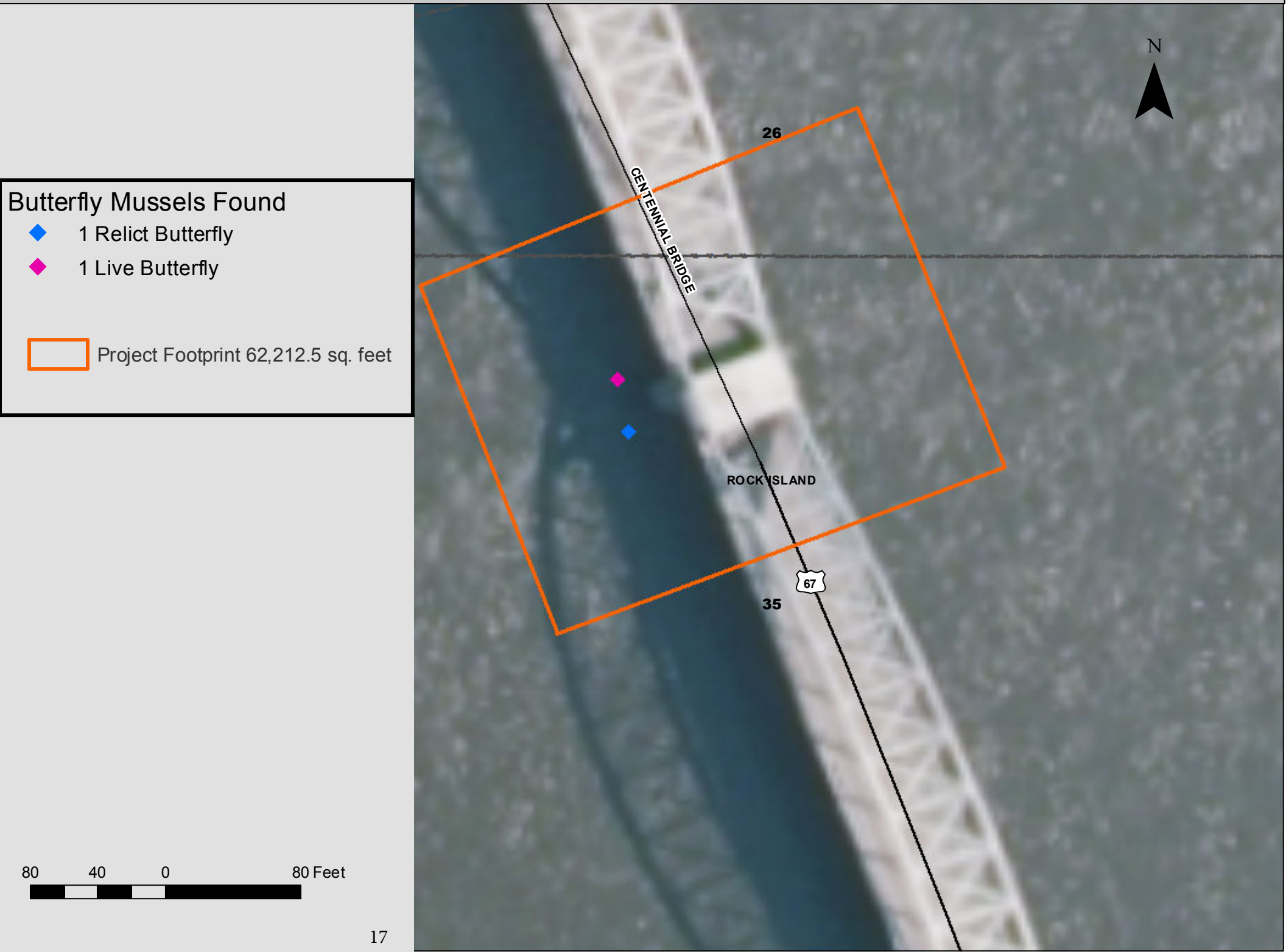
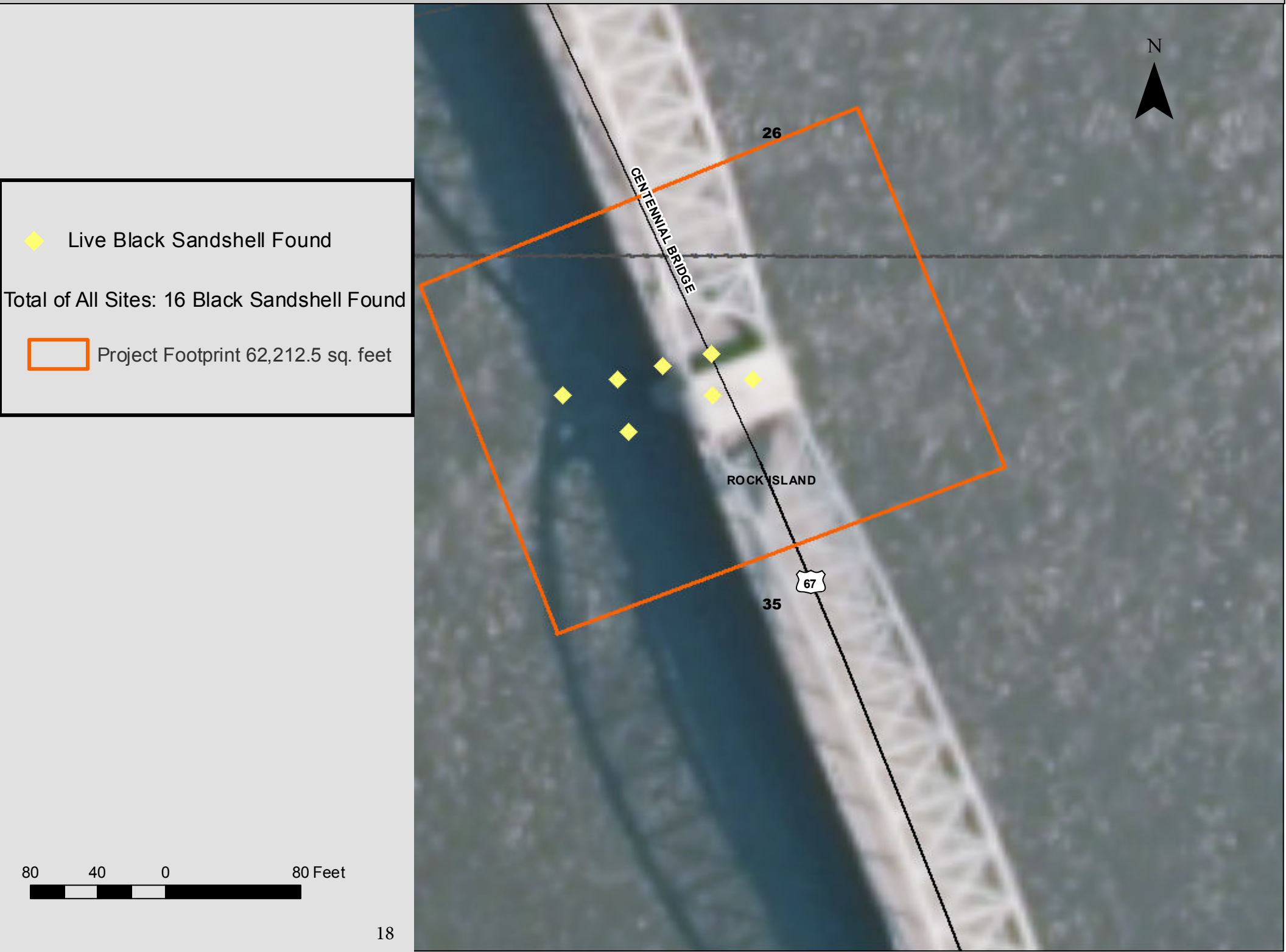
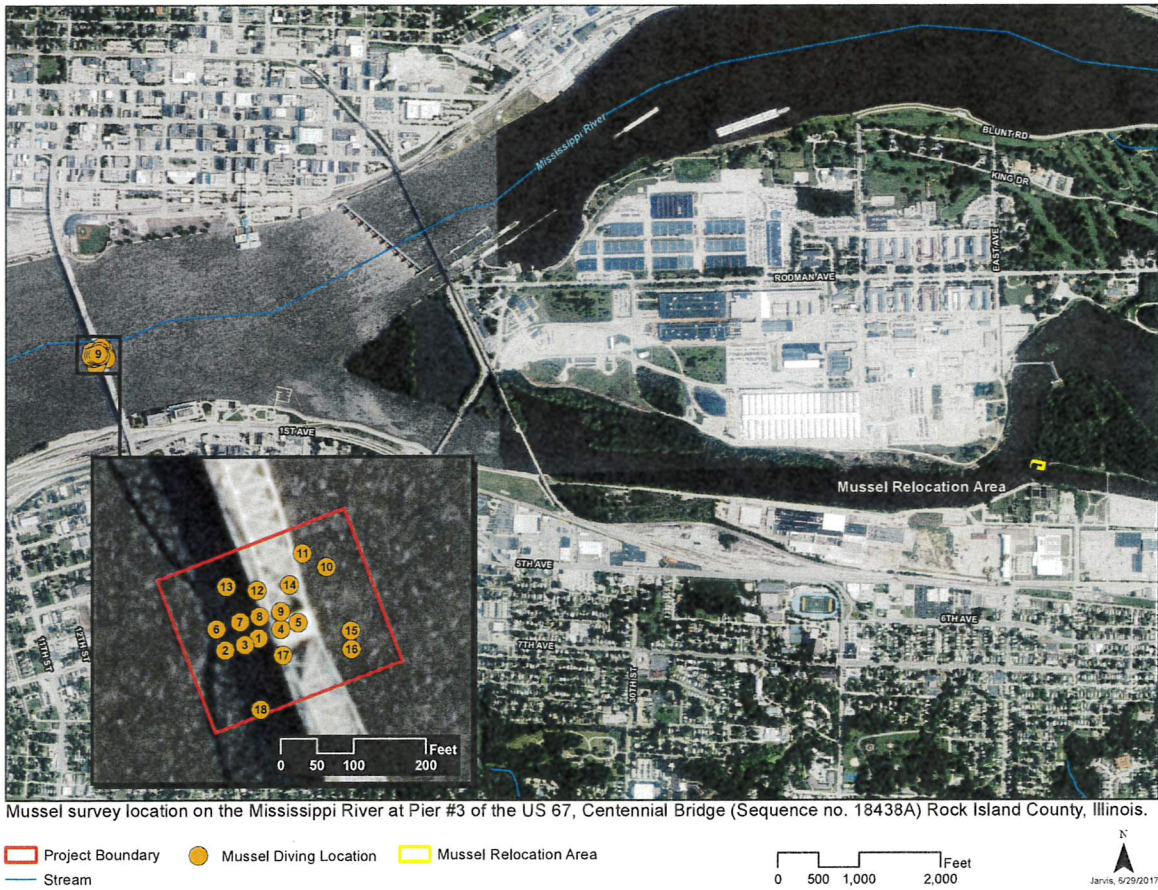




Figure 4.2

GPS Dive Locations where Black Sandshell Mussel was Found





Aerial image of Centennial Bridge over Mississippi River. Orange dots show where the mussel survey was conducted by INHS and ESI on June 15, 2017. The yellow box shows where the mussels were relocated to an area in Sylvan Slough (Tiemann 2017).

**Figure 5**

## **Appendix A**

### **Mussel Survey Report for the Centennial Bridge (Tiemann 2017)**



## **Survey for Freshwater Mussels in the Mississippi River at the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge, Rock Island County, Illinois**

IDOT Sequence No. 18438A; Job No. D-92-026-13; S/N 081-9905



Prepared by:  
Jeremy S. Tiemann

**INHS/IDOT Statewide Biological Survey & Assessment Program**  
Program Report 2017:59

18 August 2017



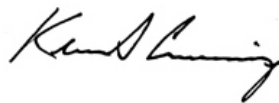


## PROJECT SUMMARY

This report is submitted in response to a request made by Kimberly Kessinger and Susan Hargrove of the Illinois Department of Transportation (IDOT) to Wendy Schelsky of the Illinois Natural History Survey (INHS) for a freshwater mussel survey at Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge [IDOT Sequence Number 18438A; Job No. D-92-026-13; S/N 081-9905] over the Mississippi River in the City of Rock Island, Rock Island County, Illinois (Latitude 41.51468° N, Longitude 90.58147° W). An emergency scour mitigation is needed only at Pier 3; per the plan sheet and shapefiles, the project work area is not expected to exceed more than 100 feet in any direction from Pier 3. The rest of the bridge is not part of this project.

The mussel survey was conducted via diving on 15 June 2017 and led by personnel from INHS and Ecological Specialists, Inc. (ESI). A total of 64 live individuals representing eight species were collected, including one individual of the state-threatened Butterfly (*Ellipsaria lineolata*) and 16 individuals of the state-listed Black Sandshell (*Ligumia recta*). One relict shell of Butterfly was collected. No other mussels collected during this present survey either live or dead are listed as threatened or endangered at the state or federal level.

Per the signed agreement with the Illinois Department of Natural Resources (permit # S-16-034), all state listed individuals were PIT tagged and all mussels collected were relocated to an area ~2 miles upstream at the tail of Sylvan Island (Latitude 41.51161° N, Longitude 90.53898° W), which is the same relocation area as the Sylvan Slough project (IDOT Sequence No. 19030; INHS Project No. FS-1032) from 2016 (Tiemann 2016). This area was chosen as the relocation area because habitat was similar, a known diverse mussel fauna was present, and it is located outside of the project area and possible negative influences from construction activities. After translocation, PIT tagged individuals will be monitored with an aquatic PIT tag reading system per the signed agreement.



Report Approved By: Kevin Cummings, Further Studies Aquatics  
Group Coordinator-Malacologist

Surveys Conducted By: Jeremy S. Tiemann, Aquatic Zoologist  
Ecological Specialists, Inc.

Edited by: Mark J. Wetzel, INHS Research Affiliate

GIS Layers: Janet L. Jarvis, GIS and Remote Sensing Specialist

Illinois Natural History Survey  
Statewide Biological Survey and Assessment Program  
1816 South Oak Street  
Champaign, Illinois 61820

# TABLE OF CONTENTS

Project summary .....	1
Introduction .....	4
Project location .....	4
Habitat characterization.....	4
Background .....	5
Methods .....	5
Results and discussion.....	5
Acknowledgements.....	6
Literature Cited .....	7

## Tables

<b>Table 1</b> – List of freshwater mussels recorded from the Mississippi River at the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge, Rock Island, Rock Island County, Illinois, by INHS and Ecological Services, Inc., personnel on 15 June 2017 .....	8
--	---

## Figures

<b>Figure 1</b> – Aerial image of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge over the Mississippi River in the City of Rock Island, Rock Island County, Illinois, where a freshwater mussel survey was conducted by INHS and Ecological Services, Inc., personnel on 15 June 2017 .....	9
<b>Figure 2</b> – Hydrograph stage height in feet from 13 - 18 June 2017 for the U.S. Army Corps of Engineers stream gage at Mississippi River at Lock and Dam 15, Rock Island, Illinois, which located near the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge .....	10
<b>Figure 3</b> – Ecological Services, Inc., diver collecting freshwater mussels at Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge crossing the Mississippi River in the City of Rock Island, Rock Island County, Illinois on 15 June 2017 .....	11
<b>Figure 4</b> – State-threatened Black Sandshell after having PIT tags glued to their shells .....	12
<b>Figure 5</b> – The state-threatened Butterfly and its distribution in Illinois .....	13
<b>Figure 6</b> – The state-threatened Black Sandshell and its distribution in Illinois.....	14

## Appendices

- Appendix 1.** This appendix cover page references < **18438A\_Mussel\_Survey\_GIS.zip** > containing an ArcGIS shapefile with sampling point information for the site discussed in this report. Specifically, this shapefile includes site information for Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge over the Mississippi River in the City of Rock Island, Rock Island County, Illinois, where a survey for freshwater mussels was conducted by Ecological Specialists, Inc., and INHS personnel on 15 June 2017 ..... 15
- Appendix 2.** Permit # S-16-034 from Illinois Department of Natural Resources to the Illinois Natural History Survey granting the Survey permission to collect, tag, and relocate freshwater mussels at bridge construction projects ..... 16

**Cover photo** Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge over the Mississippi River in the City of Rock Island, Rock Island County, Illinois, where a freshwater mussel survey occurred by INHS and Ecological Services, Inc., personnel on 15 June 2017. Photograph is facing upstream (J.S. Tiemann photo).

## INTRODUCTION

This report is submitted in response to a request made by Kimberly Kessinger and Susan Hargrove of the Illinois Department of Transportation (IDOT) to Wendy Schelsky of the Illinois Natural History Survey (INHS) for a freshwater mussel survey at Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge over the Mississippi River in the City of Rock Island, Rock Island County, Illinois [IDOT Sequence Number 18438A; Job No. D-92-026-13; S/N 081-9905; Contract No. 64J48; INHS Project No. FS-1032]. An emergency scour mitigation is needed only at Pier 3 per the plan sheet and shapefiles. The project work area is not expected to exceed more than 100 feet in any direction from Pier 3. The remaining bridge structure, including the other support piers, are not part of this project; furthermore, the areas directly under and adjacent to the other bridge piers will not be affected by the proposed scour mitigation at bridge Pier 3. In this report, we summarize the results of the freshwater mussel survey conducted at the Pier 3 on 15 June 2017.

## PROJECT LOCATION

This project consists of one area:

The Mississippi River at Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge in the City of Rock Island, Rock Island County, Illinois (Latitude 41.51468° N, Longitude 90.58147° W; Second Principal Meridian: Township 18N Range 2W, Sections 26 and 35) (**Cover Photo**; **Figure 1**). The Mississippi River flows in a west-southwesterly direction at this location.

**Appendix 1** references a shapefile with sampling point information for the proposed stream crossing, as discussed in this report.

## HABITAT CHARACTERIZATION

During our site visit on 15 June 2017, the Mississippi River at the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge (**Cover Photo**) was >1800 feet wide with depths ranging from 1 to 13+ feet deep. However, only 100 feet of the river in all directions of Pier 3 was sampled for this project. The mean depth within the area surveyed was approximately >10 feet deep. Substrates within 10 feet of Pier 3 were a heterogeneous mixture of boulder, cobble, gravel and sand, whereas substrates from 10-100 feet away from the pier were predominantly silted sand; some trash was present throughout the project area. Stream temperature was around 78° F. Gauge height was around 10 feet, which is slightly higher than average water levels (**Figure 2**), and discharge was around 100,000 cubic feet per second ([NOAA gauge](#)<sup>1</sup>).

---

<sup>1</sup> The National Oceanic & Atmospheric Administration's Advanced Hydrologic Prediction Services gauge for the Mississippi at Rock Island was used to determine discharge = <http://water.weather.gov/ahps2/hydrograph.php?wfo=dvn&gage=rcki2>



## BACKGROUND

A literature review and a search of the INHS Mollusk Collection's and the Ohio State University Museum of Biological Diversity – Mollusc Division (OSUM) databases were conducted for historical and recent records of freshwater mussels in the Mississippi River. Historically, 50 species of freshwater mussels occurred in the upper Mississippi River (upstream from its confluence with the Ohio River), but only 35 species have been found post-1970 (Tiemann et al. 2007). Factors responsible for these declines include impoundments, chemical pollution, siltation, and loss of fish hosts (Cummings and Mayer 1997).

## METHODS

On 15 June 2017, ESI, along with INHS personnel J.S. Tiemann, initiated the collection of freshwater mussels from the Mississippi River at Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge (**Figure 1**). Freshwater mussels were haphazardly (=randomly) collected by diving using surface supplied air to the divers (**Figure 3**). The survey area extended 100 feet in all directions from Pier 3, but given the heterogeneous substrates (= suitable mussel habitat) near the pier, the majority of search time was focused on substrates located within 10 feet of Pier 3. Beyond this area was homogeneous substrates (= not suitable mussel habitat).

All freshwater mussels were identified, measured, and enumerated. Per the signed agreement with the Illinois Department of Natural Resources (permit # S-16-034 – **Appendix 2**), all state listed mussels were affixed with passive integrated transponder (PIT) tags (**Figure 4**) and relocated to an area of suitable habitat outside of the project area (**Figure 1**). Recently, Tiemann et al. (2016) suggested short-distance relocations are a viable minimization tool for protecting freshwater mussels at bridge construction sites, and their methodology was followed for this present mussel relocation in Sylvan Slough.

Spent shell was retained as voucher specimens for deposition in the INHS Mollusk Collection, Champaign. Nomenclature discussed in this report follows Graf and Cummings (2007) with slight modifications. The current statuses of threatened and endangered species are taken from U.S. Department of Interior, Fish and Wildlife Service (USDI, FWS) (1996, 1997) and the Illinois Endangered Species Protection Board (IESPB) (2015).

## RESULTS AND DISCUSSION

The survey for freshwater mussels in the Mississippi River at the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge yielded 64 live individuals representing eight species; one species, the Fragile Papershell (*Leptodea fragilis*) was collected only as dead shell (**Table 1; Figure 4**). One individual of the state-threatened Butterfly (*Ellipsaria lineolata*) and 16 individuals of the state-listed Black Sandshell (*Ligumia recta*). One relict shell of Butterfly was collected. No other mussels collected during this present survey either live or dead are listed as threatened or endangered at the state or federal level.

The state-threatened Butterfly was historically widely distributed in large streams in gravel or firm sand (Cummings and Mayer 1992). However, it has disappeared from many areas where it

formerly occurred and now uncommon in much of the Midwest. Within Illinois, the Butterfly is found sporadically in the Mississippi River upstream of its confluence with the Missouri River, and in the Rock, Illinois, and Ohio rivers (Cummings and Mayer 1997; Tiemann et al. 2007; **Figure 5**). Live specimens of the Butterfly have been documented >10 times in the Mississippi River in Rock Island County since 2000 (data from INHS Mollusk Collection).

The state-threatened Black Sandshell was historically widely distributed in medium to large rivers in riffles or raceways in gravel or firm sand (Cummings and Mayer 1992). However, it is now uncommon in much of the upper Midwest. Within Illinois, the Black Sandshell is found sporadically in the northern half of the state as well as in the Ohio River (Cummings and Mayer 1997; Tiemann et al. 2007; **Figure 6**). Live specimens of the Black Sandshell have been documented >10 times in the Mississippi River in Rock Island County since 2000 (data from INHS Mollusk Collection).

Phylogenetically, both the Butterfly and Black Sandshell are in the Tribe Lampsilini, inclusive of species which typically have a periodic life history strategy. This strategy is characterized by a moderate to high growth rate, moderate life span, low to moderate age at maturity and fecundity, small to moderate adult size, and typically are long-term brooders. Both of these species are considered bradytictic, meaning they are gravid from autumn to the following early summer (i.e., overwinter glochidia) (Watters et al. 2009). Reported potential fish hosts for Butterfly include Freshwater Drum (*Aplodinotus grunniens*), Green Sunfish (*Lepomis cyanellus*) and Sauger (*Sander canadensis*), whereas Black Sandshell are host specialists primarily utilizing Sauger and Walleye (*Sander vitreus*), but also may infest black basses (*Micropterus* spp.), crappie (*Pomoxis* spp.), sunfishes (*Lepomis* spp.) and a few other small-bodied fishes as marginal hosts (Watters et al. 2009).

Per the signed agreement with the Illinois Department of Natural Resources (permit # S-16-034), all state listed species were PIT tagged and all mussels (including common, non-listed species) were relocated downstream to an area in Sylvan Slough near the tail of Arsenal Island. This site is the same relocation area as the site in Sylvan Slough (IDOT Sequence No. 19030; INHS Project No. FS-1032) used during a previous project in 2016 (Tiemann 2016), and is located approximately 2 miles upstream of Pier 3 (Latitude 41.51161° N, Longitude 90.53898° W). This area was chosen as the relocation area because habitat was similar, a known diverse mussel fauna was present, and it is located outside of the project area and away from possible negative influences from construction activities. Subsequent to this present translocation, all PIT tagged individuals will be monitored with an aquatic PIT tag reading system on three occasions – within two months, at one year, and at three years post-release. All data associated with this survey, PIT tagging, and results of post-translocation monitoring are stored in the INHS Mollusk PIT tag database, Champaign.

## ACKNOWLEDGMENTS

INHS personnel J.L. Jarvis prepared the map in **Figures 1** and associated shape file referenced in **Appendix 1**. K.S. Cummings and M.J. Wetzel edited the report. Ecological Specialists, Inc.

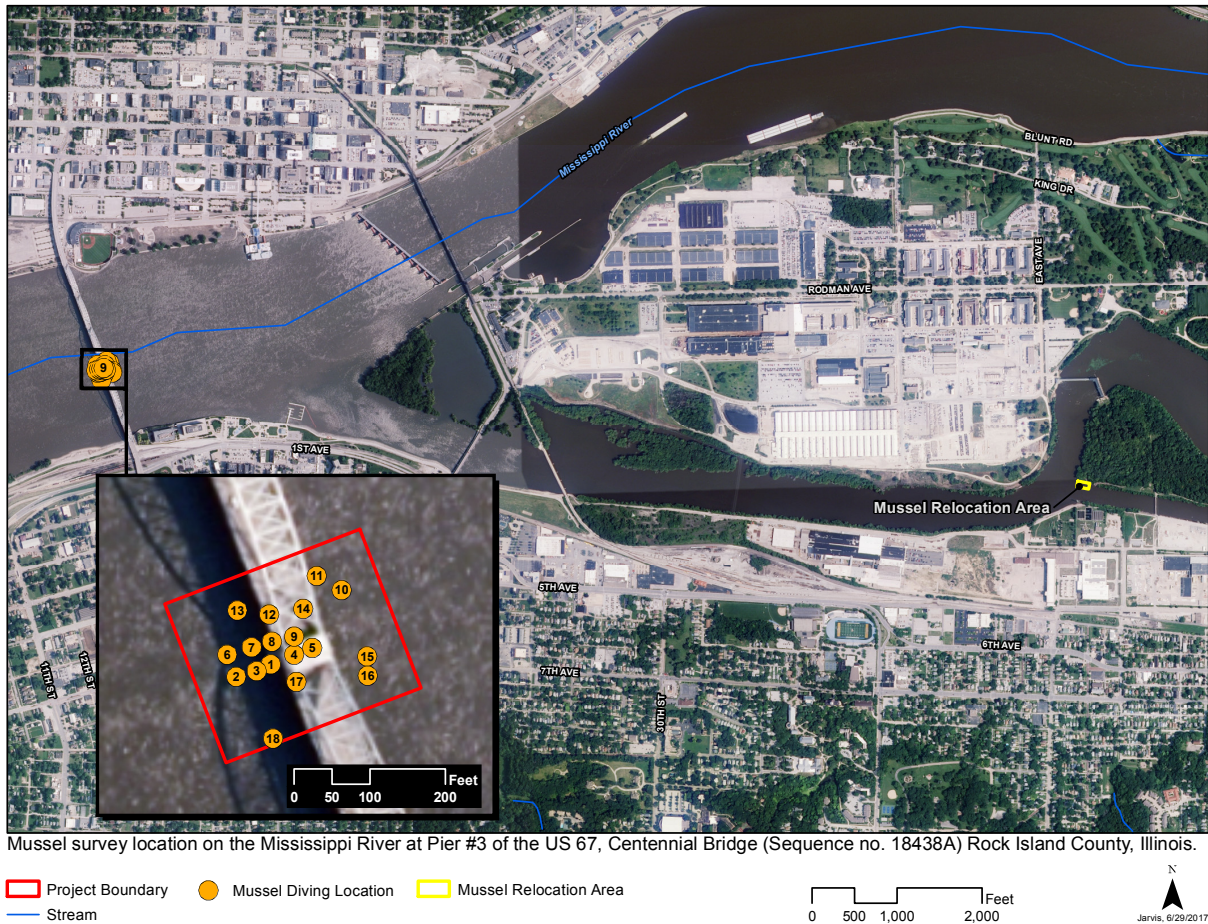
(O'Fallon, MO) staff Emily Grossman, Robert Williams, Chet Clark, Ben Dunn, and Chris Bailey served as divers and dive tenders, and handled sampling logistics.

## LITERATURE CITED

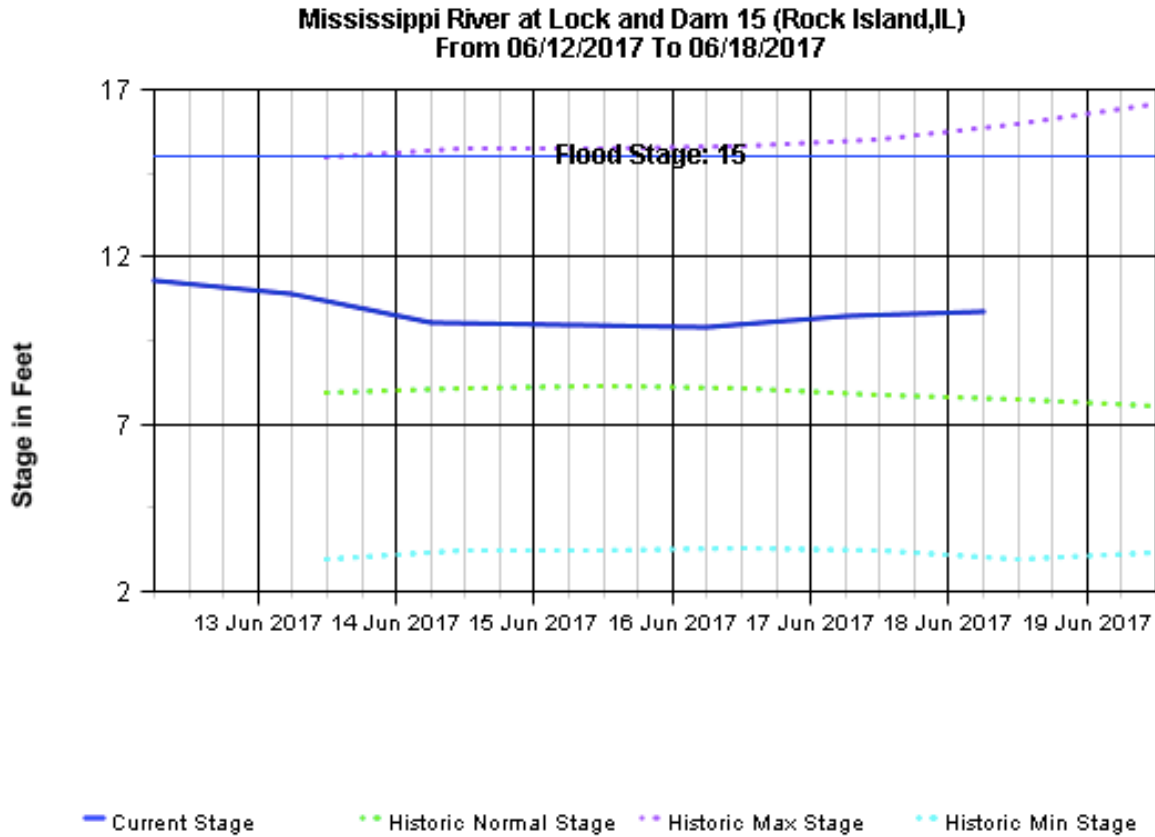
- Cummings, K.S. and C.A. Mayer. 1992. Field guide to freshwater mussels of the Midwest. Illinois Natural History Survey Manual 5. xiii +194 pp.
- Cummings, K.S. and C.A. Mayer. 1997. Distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionacea). Pp. 129-145, *in* K.S. Cummings, A.C. Buchanan, C.A. Mayer, and T.J. Naimo, eds. Conservation and Management of Freshwater Mussels II: Initiatives for the Future. Proceedings of a UMRCC Symposium, 16-18 October 1995, St. Louis, MO. Upper Mississippi River Conservation Committee, Rock Island, IL. 293 pp.
- Graf, D.L. and K.S. Cummings. 2007. Review of the systematics and global diversity of freshwater mussel species (Bivalvia: Unionoida). *Journal of Molluscan Studies* 73:291-314.
- Illinois Endangered Species Protection Board. 2015. Checklist of endangered and threatened animals and plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 18 pp. Published online at <http://www.dnr.state.il.us/espb/index.htm>.
- Stodola, A.P., S.A. Douglass, and D.K. Shasteen. 2014. Historical and current distributions of freshwater mussels in Illinois. Prepared for Illinois Department of Natural Resources, State Wildlife Grant/Project Number (T-82-R-1). 83 p.
- Tiemann, J.S. 2016. Survey for Freshwater Mussels in Sylvan Slough at the proposed pedestrian bridge to Sylvan Island, Rock Island County, Illinois (IDOT Sequence No.: 19030; Section No.: 15-000264-00-BR). INHS Job No.: FS-970. INHS/IDOT Statewide Biological Survey & Assessment Program Report 2016(174). 23 pp.
- Tiemann, J.S., K.S. Cummings, and C.A. Mayer. 2007. Updates to the distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionacea). *Transactions of the Illinois State Academy of Science* 100:107-123.
- Tiemann, J.S., M.J. Dreslik, S.J. Baker, and C.A. Phillips. 2016. Assessment of a short-distance freshwater mussel relocation as viable tool during bridge construction projects. *Freshwater Mollusk Biology and Conservation* 19:80-87.
- U.S. Department of the Interior, Fish and Wildlife Service (USDI, FWS). 1996. Endangered and threatened species, plant and animal taxa; proposed rule. Part III. 50 CFR Part 17. *Federal Register* 61(40):7596-7613. February 28.
- U.S. Department of Interior, Fish and Wildlife Service (USDI, FWS). 1997. Endangered and threatened wildlife and plants. *Federal Register*, 50 CFR Part 17.11 and 17.12. October 31, 1996. 46 pp. [This document is a compilation and special reprint, current as of October 31, 1996, that was printed by the U.S. Government Printing Office in 1997].
- Watters, G.T., M.A. Hoggarth, and D.H. Stansbery. 2009. The freshwater mussels of Ohio. Ohio State University Press, Columbus, Ohio. 421 pp.

**Table 1.** List of freshwater mussels recorded from the Mississippi River at the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge, Rock Island, Rock Island County, Illinois, by INHS and Ecological Services, Inc., personnel on 15 June 2017. Data from the survey includes the number of individuals found alive and the one species found as fresh-dead (FD). Special designation includes those species listed as state-threatened in Illinois <sup>(ST)</sup>.

Scientific name	Common name	This survey
<i>Amblema plicata</i>	Threeridge	14
<i>Quadrula (Amphinaias) pustulosa</i>	Pimpleback	19
<i>Ellipsaria lineolata</i> <sup>ST</sup>	Butterfly	1
<i>Lampsilis cardium</i>	Plain Pocketbook	6
<i>Leptodea fragilis</i>	Fragile Papershell	FD
<i>Ligumia recta</i> <sup>ST</sup>	Black Sandshell	16
<i>Megaloniaias nervosa</i>	Washboard	2
<i>Obliquaria reflexa</i>	Threehorn Wartyback	3
<i>Obovaria olivaria</i>	Hickorynut	3
<b>Total number of individuals</b>		64
<b>Total number of extant species</b>		9



**Figure 1.** Aerial image of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge over the Mississippi River in the City of Rock Island, Rock Island County, Illinois, where a freshwater mussel survey was conducted by INHS and Ecological Services, Inc., personnel on 15 June 2017. Freshwater mussels were relocated to an area (yellow box) approximately 2 miles upstream of the bridge (map created by J.L. Jarvis).



**Figure 2.** Hydrograph stage height in feet (solid blue line) from 13 - 18 June 2017 for the U.S. Army Corps of Engineers (USACE) stream gage at Mississippi River at Lock and Dam 15, Rock Island, Illinois ([USACE's RiverGages.com](http://rivergages.mvr.usace.army.mil/WaterControl/stationinfo2.cfm?sid=MI15&fid=RCKI2&dt=S&pcode=HT)<sup>2</sup>), which located near the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge.

<sup>2</sup> The U.S. Army Corps of Engineers RiverGages.com gauge for the Mississippi River at Lock and Dam 15 (Rock Island, IL) was used to determine height = <http://rivergages.mvr.usace.army.mil/WaterControl/stationinfo2.cfm?sid=MI15&fid=RCKI2&dt=S&pcode=HT>



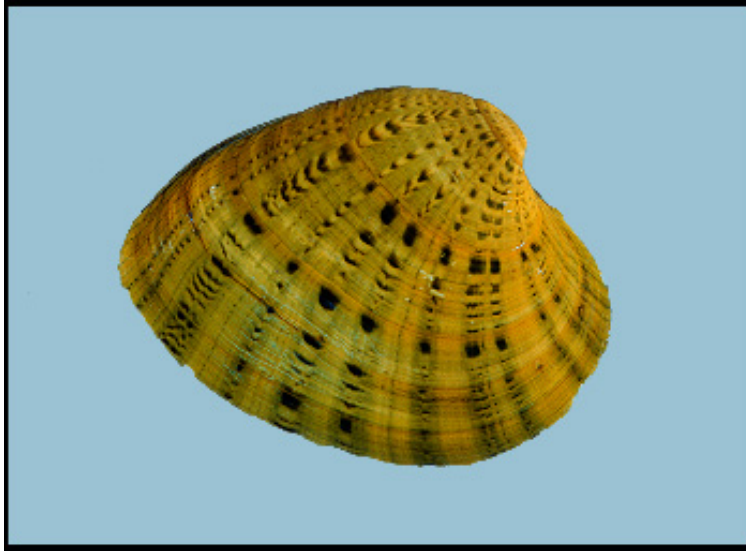


**Figure 3.** Ecological Services, Inc., diver collecting freshwater mussels within the project corridor on 15 June 2017. Pictured is Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge crossing the Mississippi River in the City of Rock Island, Rock Island County, Illinois on 15 June 2017 (J.S. Tiemann photo).

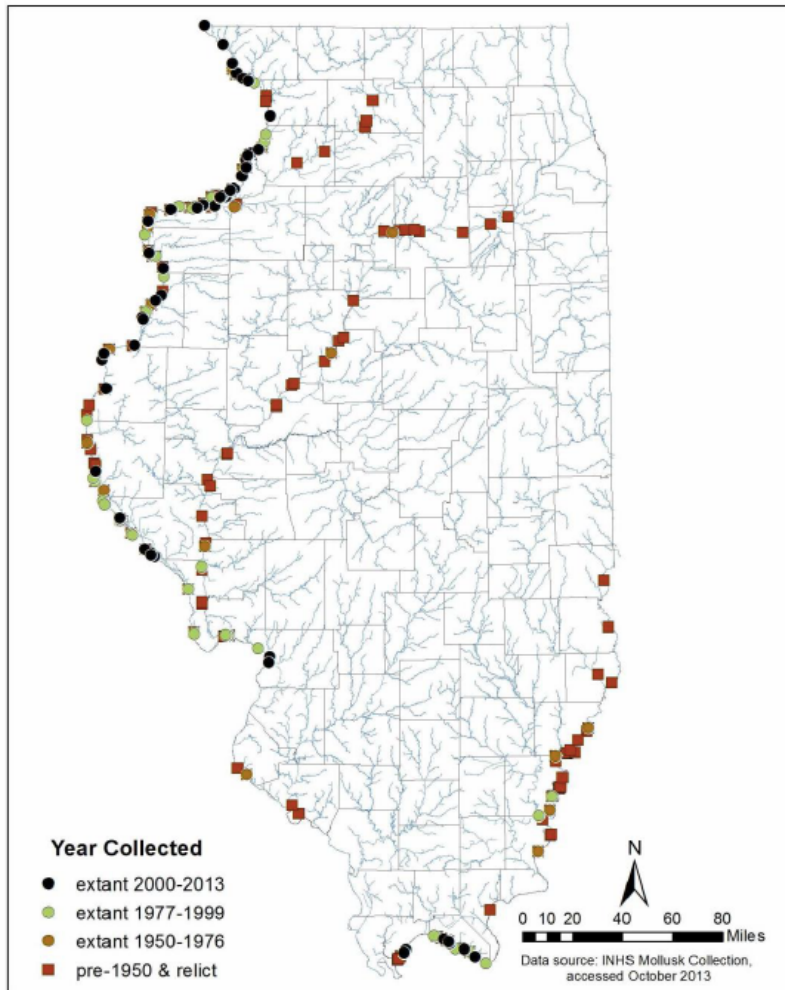


**Figure 4.** State-threatened Black Sandshell (*Ligumia recta*) after having PIT tags glued to their shells. Specimens were collected from Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge (S/N 081-9905) by ESI, Inc. and INHS personnel on 15 June 2017 (J.S. Tiemann photo).





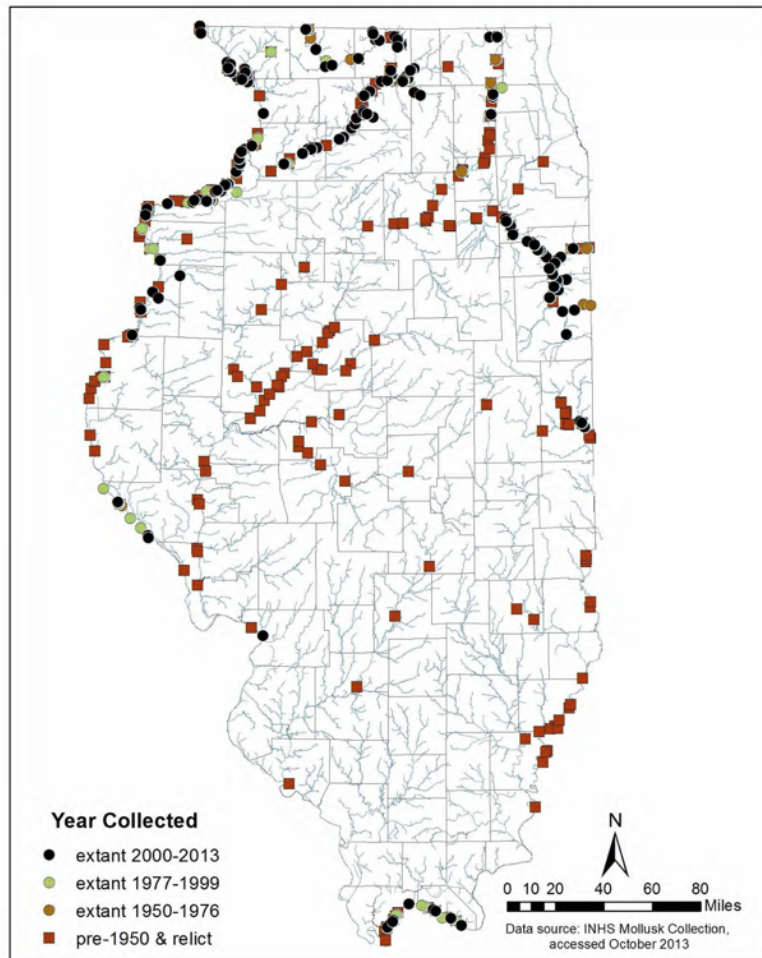
**Butterfly (*Ellipsaria lineolata*)**



**Figure 5.** The state-threatened Butterfly (*Ellipsaria lineolata*) and its distribution in Illinois (K.S. Cummings photo; map from Stodola et al. 2014).



**Black sandshell (*Ligumia recta*)**



**Figure 6.** The state-threatened Black Sandshell (*Ligumia recta*) and its distribution in Illinois (K.S. Cummings photo; map from Stodola et al. 2014).

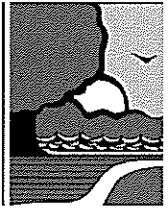
## Appendix 1

This appendix cover page references < **18438A\_Mussel\_Survey\_GIS.zip** > containing an ArcGIS shapefile with sampling point information for the site discussed in this report. Specifically, this shapefile includes site information for Pier 3 of the U.S. Highway 67 / Centennial / IDOT FAP 308 Bridge over the Mississippi River in the City of Rock Island, Rock Island County, Illinois, where a survey for freshwater mussels was conducted by Ecological Specialists, Inc., and INHS personnel on 15 June 2017.

The ArcGIS shapefile and this report were both submitted to IDOT via the IDOT Site Assessment Tracking System extranet website (Frostycap) on 18 August 2017.

## **Appendix 2**

Permit # S-16-034 from Illinois Department of Natural Resources to the Illinois Natural History Survey granting the Survey permission to collect, tag, and relocate freshwater mussels at bridge construction projects sponsored by the Illinois Department of Transportation.



**Illinois**  
Department of  
**Natural Resources**

One Natural Resources Way • Springfield, Illinois 62702-1271

www.dnr.illinois.gov

**PERMIT FOR POSSESSION OF  
ENDANGERED OR THREATENED SPECIES**

Permit type: S Permit No. 16-034 is issued to: Jeremy Tiemann, Illinois Natural History Survey, 1816 South Oak Street, Champaign, IL. 61820 to allow netting, brailing, hand capture, tagging/marking, data collection, photograph, immediate relocation and release in the same stream system only, and follow-up monitoring only of the following animals or animal products of endangered or threatened species or federal endangered plants:

SPECIES	ITEM	QUANTITY
1. <u>All State Listed Mussel Species</u>	<u>Live Animal</u>	<u>As Encountered</u>

Permit version: Original      Renewal X Amended   

**Special conditions:** This permit allows the capture and marking of state listed mussels at bridge construction projects sponsored by the Illinois DOT. These mussels shall be relocated to an area of suitable habitat in the same stream from which they were collected. Relocated animals shall be monitored at 2 months, 1 year, and 3 years post-relocation. This permit is valid in all of Illinois' 102 counties. Subpermittees include: Kevin S. Cummings and Alison P. Stodola


**Standard conditions:**

- **Reporting-** Annual reports must be submitted by January 31 of each year. Changes in inventory of specimens must be reported within 5 days. Changes in personal information or affiliation must be reported within 10 days.
- **Propagation-** Propagation requires a permit for such a purpose, only available under Scientific and Zoological/Botanical permits.
- **Disposal or Transfer-** Applicants must obtain a permit prior to transfer or disposal of specimens.

- **Facilities:** Holding facilities must meet the standards set forth by the Federal Animal Welfare Act.
- **Temporary holding:** Specimens allowed under limited permits may be held temporarily (up to 90 days) by other persons only after written consent of the director.
- **Revocation:** Permits may be revoked if false information was used to obtain permit, reports were not submitted, facility standards were not met, or applicant violates state or federal laws.

**THIS PERMIT IS VOID IF IT CONTAINS ANY STRIKE-OUTS, OVERWRITES OR OTHER ALTERATIONS AND IS NON-TRANSFERABLE**

ITEMS LISTED ON THIS PERMIT MAY BE SOLD, GIVEN AWAY OR OTHERWISE DISPOSED OF ONLY WITH PERMISSION OF THE ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Signed:   
 Chris Young  
 Office Director  
 IDNR Office of Resource Conservation

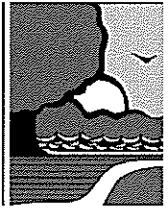
Date issued: 3/17/17

Expiration Date: December 31, 2017

\*This permit is issued pursuant to the Illinois Endangered Species Protection Act and authorizes only those activities listed above. This permit does NOT exempt the permittee from compliance with any other federal, state, or local law, statute, ordinance, or regulation. As a permit holder, the individual/agency acknowledges that all collections of Federal and State listed species be reported to the Endangered Species Program Manager (IL. DNR-Division of Natural Heritage) within 10 days of collection.

## **Appendix B**

Permit # S-16-034 from Illinois Department of Natural Resources to the Illinois Natural History Survey granting the Survey permission to collect, tag, and relocate freshwater mussels at bridge construction projects sponsored by the Illinois Department of Transportation.



**Illinois**  
Department of  
**Natural Resources**

One Natural Resources Way • Springfield, Illinois 62702-1271

www.dnr.illinois.gov

**PERMIT FOR POSSESSION OF  
ENDANGERED OR THREATENED SPECIES**

Permit type: S Permit No. 16-034 is issued to: Jeremy Tiemann, Illinois Natural History Survey, 1816 South Oak Street, Champaign, IL. 61820 to allow netting, brailing, hand capture, tagging/marking, data collection, photograph, immediate relocation and release in the same stream system only, and follow-up monitoring only of the following animals or animal products of endangered or threatened species or federal endangered plants:

SPECIES	ITEM	QUANTITY
1. <u>All State Listed Mussel Species</u>	<u>Live Animal</u>	<u>As Encountered</u>

Permit version: Original        Renewal X Amended   

**Special conditions:** This permit allows the capture and marking of state listed mussels at bridge construction projects sponsored by the Illinois DOT. These mussels shall be relocated to an area of suitable habitat in the same stream from which they were collected. Relocated animals shall be monitored at 2 months, 1 year, and 3 years post-relocation. This permit is valid in all of Illinois' 102 counties. Subpermittees include: Kevin S. Cummings and Alison P. Stodola

**Standard conditions:**


- **Reporting-** Annual reports must be submitted by January 31 of each year. Changes in inventory of specimens must be reported within 5 days. Changes in personal information or affiliation must be reported within 10 days.
- **Propagation-** Propagation requires a permit for such a purpose, only available under Scientific and Zoological/Botanical permits.
- **Disposal or Transfer-** Applicants must obtain a permit prior to transfer or disposal of specimens.



- **Facilities:** Holding facilities must meet the standards set forth by the Federal Animal Welfare Act.
- **Temporary holding:** Specimens allowed under limited permits may be held temporarily (up to 90 days) by other persons only after written consent of the director.
- **Revocation:** Permits may be revoked if false information was used to obtain permit, reports were not submitted, facility standards were not met, or applicant violates state or federal laws.

**THIS PERMIT IS VOID IF IT CONTAINS ANY STRIKE-OUTS, OVERWRITES OR OTHER ALTERATIONS AND IS NON-TRANSFERABLE**

ITEMS LISTED ON THIS PERMIT MAY BE SOLD, GIVEN AWAY OR OTHERWISE DISPOSED OF ONLY WITH PERMISSION OF THE ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Signed:   
 Chris Young  
 Office Director  
 IDNR Office of Resource Conservation

Date issued: 3/17/17

Expiration Date: December 31, 2017

\*This permit is issued pursuant to the Illinois Endangered Species Protection Act and authorizes only those activities listed above. This permit does NOT exempt the permittee from compliance with any other federal, state, or local law, statute, ordinance, or regulation. As a permit holder, the individual/agency acknowledges that all collections of Federal and State listed species be reported to the Endangered Species Program Manager (IL. DNR-Division of Natural Heritage) within 10 days of collection.

## **Appendix C**

### **SPECIAL PROVISIONS**

## Appendix C

### SPECIAL PROVISIONS

1. Construction activity will not impact river traffic in the channel. The navigation channel must be maintained and remain open to river traffic during all construction activities.
2. All work will take place from a barge which will be anchored within 100 feet of Pier #3.
3. After the proposed dredging and filling is completed, the top riprap layer will be flush with the channel. The streambed will be restored back to its pre-construction elevations.
4. All construction activities will take place underwater within 100 feet in all directions from the edge of Pier #3. No activities shall take place beyond these construction limits.
5. The excavated material will be discharged to an approved upland waste site. Dredged material will not be placed back into the river. The location of this site will be determined by the contractor and approved by IDOT. The perimeter of the upland site shall be protected with silt fence until vegetated.
6. The Department's erosion and sediment control policy will be followed and will be in compliance with the U.S. Army Corps of Engineers Sections 401, 404, and 408 permits, the water quality certification policies of IEPA, and requirements within the NPDES construction permit.
7. Barges and water craft used for construction activities shall be inspected for the presence of zebra mussels prior to placing the barges into the Mississippi River and shall be completely out of water for 10 days to ensure properly drying and reduce potential infestation by zebra mussels. If the barge is obtained from a local source, USFWS and IDNR staff must still be contacted to discuss previous locations at which the barge has been used.
8. The contractor will be responsible for implementing measures to prevent debris from falling in the river. Debris will not be allowed to collect at the bottom of the river. The contractor will remove any debris from the water or river bed as soon as practicable during the same work day in order to prevent the accumulation of potentially polluted materials. Construction inspectors will be present during construction activities to ensure compliance with IDOT Special Provisions.
9. Spill protection material (i.e. spill kit) shall be readily available at the project site, and on work barges, to contain and absorb accidental spills of fluids from construction equipment. Personnel trained in the implementation of the spill kit shall be readily available onsite to respond to accidental spills.

10. If during the course of construction, any discoveries of protected plants or animals are made in the project area, the contractor will notify the Engineer immediately.
11. All PIT tagged individuals will be monitored with an aquatic PIT tag reading system on two occasions – at one year, and at three years post-release. All data associated with this survey, PIT tagging, and results of post-translocation monitoring are stored in the INHS Mollusk PIT tag database, Champaign.
12. Mitigation to the maximum extent practicable is required by the Act. As mitigation for the potential taking of black sandshell and the butterfly mussels, the IDOT shall provide compensatory mitigation to bring conservation benefit to the species potentially impacted by the project in the amount of \$16,742. Compensatory mitigation shall be directed to the Illinois Wildlife Preservation Fund to support mussel propagation research.