

# **ENVIRONMENTAL ASSESSMENT**

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MOORING CELL CONSTRUCTION  
POOL 15, MISSISSIPPI RIVER MILE 491.9

SCOTT COUNTY, IOWA  
ROCK ISLAND COUNTY, ILLINOIS

DECEMBER 2000



**US Army Corps  
of Engineers**  
Rock Island District



REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING – P.O. BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004**

**CEMVR-PM-AR**

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**BACKGROUND**

The St. Louis District of the U.S. Army Corps of Engineers (Corps), in cooperation with the U.S. Fish and Wildlife Service (USFWS), the navigation industry, the U.S. Coast Guard, and the Rock Island and St. Paul Districts of the Corps, developed and revised a list of avoid/minimize (A&M) measures. Those measures dealt with methods to minimize impacts of increased navigation traffic due to completion of the second lock at Melvin Price Locks and Dam on aquatic organisms in general. Design Memorandum No. 24 (USACE 1992) lists several A&M measures that may be put into practice, one of which is to “designate locks approach waiting areas or provide special mooring sites.” Providing special mooring sites is also recognized as a measure of specific value in reducing harm to mussels, including *Lampsilis higginsi*. The Rock Island District strives to promote projects with A&M measures to minimize impacts resulting from the operation and maintenance of the 9-Foot Navigation Channel whenever and wherever practicable.

At this time, the Corps is proposing the construction of a mooring cell within an area that tows currently use to wait for upbound passage through Mississippi River Lock 14. The site under consideration is approximately one mile below Lock and Dam 14 at approximate River Mile (RM) 491.9, near the left descending bank below Illiniwek State Park and adjacent to Hampton, Illinois (plate EA-1).

A mooring cell of approximately 9.4 m (31 feet) in diameter would be constructed of steel sheetpiling and filled with concrete. The riverbed is predominantly hard substrate in this area. Therefore, the construction of a berm around the base of the cell to enhance stability is not anticipated. The short-term adverse impacts, due to construction of the mooring cell, are expected to be offset by the long-term benefits of localizing impacts to the area from upbound barges waiting to lock through Lock 14.

Early investigations for two sites under consideration (Site 1 and Site 2) indicated the presence of a nearby mussel bed along the shoreline of Illiniwek State Park. To ensure that the preferred alternative selected would not impact the nearby mussel bed, the Corps contracted with Earth Tech of Waterloo, Iowa, to perform a diving mussel survey. The area of the dive survey included the two potential construction sites of the proposed mooring cell and a distance downstream from those sites that might potentially be impacted by tows using the mooring cell. The mussel survey (Appendix C) concluded, “Compared to other areas of the Mississippi River, the study area hosts a sparse, species-

poor unionid community. However, one *L. higginsii* specimen was collected near the eastern edge of Site 1, and a relatively larger concentration of unionids in this area suggests that there is a more productive and diverse unionid bed adjacent to the eastern edge of Site 1.” In order to minimize potential impacts to the mussel bed, the Corps proposes construction of the mooring cell at Site 2.

## I. AUTHORITY AND PURPOSE

**A. Purpose and Need for Action.** The purpose of the project is to construct a mooring cell on the Mississippi River downstream of Locks and Dam 14 for tows to tie off on while awaiting passage through Lock 14. It is known that a large percentage of barge traffic currently waits in this area. Under present conditions, towboats must move in close to shore and ground their barges or maintain engine power within the area to hold position. With a mooring cell at the proposed location, towboats could tie off on the structure and minimize sediment resuspension by allowing their engines to run at idling speed. The mooring cell also would limit erosion and habitat destruction caused from towboats grounding themselves on the shoreline.

**B. Project Authority.** The proposed action is authorized under the 9-Foot Channel Navigation Project of the Rivers and Harbors Act of July 3, 1930, as amended, Senate Document 126/71/2. In accordance with the National Environmental Policy Act of 1969, this Environmental Assessment (EA) was prepared to address impacts associated with construction and project conditions affected by placing a mooring cell in Pool 15 of the Mississippi River.

## II. PROJECT LOCATION AND DESCRIPTION

A single towboat mooring cell would be constructed at Mississippi RM 491.9L in the NW  $\frac{1}{4}$ , of the SW  $\frac{1}{4}$ , of the SW  $\frac{1}{4}$ , of the SW  $\frac{1}{4}$  of Section 8, Township 18 North, Range 1 East, Rock Island County, Illinois. The cell would be constructed near the left descending bankline below Iliniwick State Park and adjacent to Hampton, Illinois (plate EA-1).

The mooring cell would be approximately 9.4 m (31 feet) in diameter and would be constructed of steel sheetpiling with concrete fill and foundation. The base of the mooring cell would be placed at a depth of approximately 4.3 m (14 feet) of water and cover an area of approximately 90 m<sup>2</sup> (963 ft<sup>2</sup>) or 0.01 ha (0.02 acre). The mooring cell would displace approximately 382 m<sup>3</sup> (500 y<sup>3</sup>) of river water. See plates EA-2 and EA-3 for mooring cell details.

### III. ALTERNATIVES

Three alternatives were considered for this project: no Federal action, construction at RM 492.5L, and construction at RM 491.9L. All alternatives were equally researched and considered in the analysis process.

**A. No Federal Action.** No mooring cell would be constructed below Lock and Dam 14. No tie-off for towboats would be available. Waiting towboats would continue to ground their barges or to run engines to maintain position, burning fuel and increasing the potential for sediment resuspension and erosion caused from prop wash.

**B. Mooring Cell Construction at RM 492.5L.** Construction of a mooring cell at RM 492.5L would require that four red channel marker buoys be relocated closer to the left descending bank, effectively widening the channel. The construction of the mooring cell at RM 492.5L would depend upon the relocation of these four red marker buoys. This location for a mooring cell also would cause potential blockages of the entrance of a newly constructed marina at Hampton, Illinois.

**C. Mooring Cell Construction at RM 491.9L.** Construction of a mooring cell at RM 491.9L is the preferred alternative. No channel marker buoys would need to be relocated. Construction of a mooring cell at this site would leave upbound tows slightly farther downstream while waiting to lock through Lock 14. This location would not adversely impact the entrance to the new Hampton marina.

### IV. AFFECTED ENVIRONMENT

The proposed mooring cell would be constructed near the left descending bankline of the main navigation channel and would occupy approximately 90 m<sup>2</sup> (963 ft<sup>2</sup>) of the Mississippi River bottom. At this location, the water depth varies from 4.3 to 4.9 m (14-16 feet) on average with a variable substratum composed of hard-packed sand and boulder, with some cobble and silt. The area is subject to flows of 45-48 cm/sec (1.5-1.6 ft/sec) and wave action. In addition, this area is currently utilized by waiting tows and is therefore subject to a number of physical changes associated with tow movement. These changes include drawdown, increased wave energies, changes in water velocities, and increased turbulence.

Recognizing that there is currently an established mussel bed along the Illinois bankline below Dam 14, the Corps was concerned that construction of the mooring cell could potentially adversely impact mussels in the vicinity. A professional dive team with a malacologist was contracted to conduct a dive survey of the project area. Their results showed that construction of a mooring cell at either site was unlikely to adversely impact mussels. Additional research and study of the project area have led the Corps to conclude that the proposed project is not likely to jeopardize the long-term existence of any species or the critical habitat of any fish, wildlife, or plant that is designated as endangered or threatened. Adverse effects due to mooring cell construction at RM 491.9 would be

temporary and are considered to be less than those of other alternatives. Therefore, construction at RM 491.9 would minimize any potential impacts to area mussels and their continued existence.

## V. ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

Effects of the preferred alternative are summarized in Table EA-1.

**A. Created Resources.** The project would benefit the conditions of created resources, as it would result in safer operating conditions in the navigation channel below Lock and Dam 14. The presence of a stable tie-off structure near the lock and dam would greatly reduce the possibility of a waiting towboat breaking loose and colliding with a passing tow. The mooring cell also would enable tows to maintain position without excessive use of engine power, thus reducing the potential for erosion by prop wash and reducing or eliminating the need for towboats to run up closer to the bank to maintain position downstream of the dam.

**B. Natural Resources.** A documented mussel bed is located along the Illinois bankline near the proposed location for the mooring cell. It is upstream and adjacent to Site 1. Because of its proximity to the proposed mooring cell sites, a mussel dive survey was performed at both proposed site locations and included an area of potential impact by a waiting tow. The survey was performed on April 26 and 27, 2000, and revealed that both sites in the study area hosted low-density, species-poor unionid populations. The survey also showed that both proposed sites were not within the current boundaries of the existing mussel bed.

The loss of approximately 90 m<sup>2</sup> (963 ft<sup>2</sup>) of river bottom habitat by the addition of a mooring cell would remove the possibility of the pre-existing mussel bed utilizing that section of the riverbed for any potential future expansion. The mooring cell also would remove that area for use by other bottom-dwelling and benthic creatures which currently use the area for feeding, reproduction, and other life requisites. The formation of new flow patterns around the structure also may impact the environment by creating altered sediment or erosion patterns in the surrounding area.

The mooring cell would replace approximately 90 m<sup>2</sup> (963 ft<sup>2</sup>) of river bottom. The mooring cell would be located in the area currently used by waiting tows and would be placed away from the shoreline in relatively deep water [approximately 3.4 m (14 feet)] within the navigation channel and on the outermost part of the existing mussel bed identified during the dive survey. As this area is currently utilized by waiting tows, it is already subject to a number of physical changes associated with tow movement. These changes include drawdown, increased wave energies, changes in water velocities, and increased turbulence. The presence of a mooring cell in an area where towboats currently wait for lockage would reduce the need for towboats to run close to shore or maintain engine power to hold position. Additionally, as towboat traffic is already using the area to wait, traffic in the area is not expected to increase as a result of this action. The project

also may result in some minor benefits to natural resources, largely through reducing or eliminating the need for towboats to run engines continuously. This would reduce the potential for sediment resuspension, fuel leakage, erosion by prop wash, or damage to trees, which might be used for tie-off under current conditions. The need for towboats running up onto shore (grounding), which can be very destructive to shoreline habitat, also would be eliminated with the addition of a mooring cell for tie-off.

**TABLE EA-1**

**Effects of the Preferred Action on Natural Resources and Historic Properties**

<b>Types of Resources</b>	<b>Authorities</b>	<b>Measurement of Effects</b>
Air quality	Clean Air Act, as amended (42 U.S.C. 165h-7, et seq.)	No significant effect
Areas of particular concern within the coastal zone	Coastal Zone Management Act of 1972, as amended	Not present in planning area
Endangered and threatened species critical habitat	Endangered Species Act of 1973, as amended (16 U.S.C. 1531, et seq.)	No significant impacts anticipated
Fish and wildlife	Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.)	No significant effect
Floodplains	Executive Order 11988, Flood Plain Management	No significant effect
Historic and cultural properties	National Historic Preservation Act of 1966, as amended (16 U.S.C. 470, et seq.)	No significant effect
Prime and unique farmland	CEQ Memorandum of August 11, 1980; Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing the National Environmental Policy Act	No significant effect
Water quality	Clean Water Act of 1977, as amended (33 U.S.C. 1251, et seq.)	No significant effect
Wetlands	Executive Order 11990, Protection of Wetlands, 24 May 1977	No significant effect
Wild and scenic rivers	Wild and Scenic Rivers Act, as amended (16 U.S.C. 1271, et seq.)	Not present in planning area

Construction-related impacts to the site would be relatively small, approximately 90 m<sup>2</sup> (963 ft<sup>2</sup>) of river bottom. Other impacts due to construction activities in the vicinity of the site also would be relatively minor and temporary. The surrounding area would be expected to recover quickly after project completion. Since tows are already waiting in the vicinity of Site 2 (RM 491.9), no new impacts are expected to be introduced as a result of constructing a mooring cell there.

**C. Endangered Species.** Three federally recognized species that are listed as endangered may be found in either Scott County, Iowa, or Rock Island County, Illinois: bald eagle (*Haliaeetus leucocephalus*), Indiana bat (*Myotis sodalis*), and Higgins' eye pearly mussel (*L. higginsii*).

The bald eagle feeds in open tailwater areas of Mississippi River dams in the winter. The mooring cell would be a little more than a mile downstream of the dam and should not disrupt eagle feeding habits. Suitable habitat for the Indiana bat (loose bark of larger trees) is not present in the project area. For these reasons, no impacts to these species are anticipated to result from this project.

The federally endangered Higgins' eye pearly mussel is known to be present in Pool 15. The mussel survey performed for the project at Site 1 did find one specimen, which was returned to the riverbed by the dive team. The mussel survey report can be found in Appendix C of this document. There were no Higgins' eye pearly mussel specimens found at Site 2. Because of the small size of the construction site and its location outside of areas of dense mussel concentrations, no significant adverse impacts to aquatic resources are anticipated.

**D. Historic Properties.** The area of potential effect (APE) is limited to the underwater location of the proposed work as shown on plate EA-1. The APE has no historic properties listed on or eligible for inclusion in the National Register of Historic Places. The APE is more than a mile downstream from the boundary of the Lock and Dam No. 14 Historic District. No underwater historic properties have been identified for the APE (Custer and Custer 1997). In addition, Benn and Anderson (1997) found no historic properties in the APE in their review entitled "Historic Properties Potential and Geomorphological Assessment at Locks and Dams 11-22, 24, and 25, Upper Mississippi River System, Illinois, Iowa, Missouri, and Wisconsin."

Based on this information, the Corps has determined that this is not the type of undertaking that has the potential to cause effects on historic properties [36 CFR 800.3(a)(1)] and that no further historic properties investigations will be required.

If this project uncovers an item or items which might be of archaeological, historical, or architectural interest, or if important data come to light in the project area, the Corps will ensure that reasonable efforts to avoid or minimize harm to the property are made until the significance of the discovery can be determined as required in 36 CFR 800.13.

**E. Air Quality.** Minor, temporary increases in noise levels and airborne particulates are anticipated to occur as a result of mobilization and use of construction equipment. However, wind would generally dispel any exhaust fumes. Disturbances to nearby residents and businesses would be minimal, and no air quality standards should be violated. Overall, air quality may show slight improvement since exhaust output by waiting tows would be reduced.

**F. Water Quality.** Construction material would consist of physically stable and chemically non-contaminating material such as corrosion-resistant steel and concrete. A Clean Water Act Section 404(b)(1) Evaluation has been prepared to address the discharge of fill material into the Mississippi River and is attached as Appendix A.

**G. Miscellaneous Resources.** No mines or mineral resources would be impacted if the proposed project were constructed. No known hazardous or toxic waste sites are located in the vicinity of the project, nor would any be impacted if the proposed project were constructed.

## **VI. CUMULATIVE IMPACTS**

There are currently no mooring cells or tie-off facilities for towboats or recreational boats in upper Pool 15. For this reason, watercraft awaiting lockage through Lock 14 must utilize alternative methods to maintain position in the water. Towboats, for example, must either maintain engine power, tie off on trees that are growing on the shoreline, or ground the vessel onto the shore. Such actions, as seen under current conditions, contribute to the diminishing quality of the environment. Towboat traffic in Pool 15 is relatively heavy, seeing dozens of boats daily, each boat choosing different sites to wait for Lock 14 to clear. The mooring cell would direct towboats into one specific area and lessen overall adverse impacts that towboats may have on the general environment. The addition of a mooring cell in Pool 15 would provide a viable alternative for towboats and larger recreational boats to use to maintain their position in the water. The cell also would localize the towboat activity to an area that has adequate water depth. At the proposed location, water depth is great enough that erosion and habitat destruction is unlikely to occur, and sediment resuspension would be kept to a minimum. This project would help to minimize adverse impacts currently recognized as being associated with commercial navigation traffic, such as suspended sediments and erosion, and therefore help to reduce cumulative impacts that towboats pose on the environment.

## **VII. SOCIOECONOMIC IMPACTS OF THE PREFERRED ALTERNATIVE**

**A. Community and Regional Growth.** The proposed mooring cell would have no direct impact on community and regional growth. However, the existence of a cost-effective, efficient transportation system created by the locks and dams on the Upper Mississippi River has provided stimulus for growth of river communities and the entire Midwest region. Improvements to the system would help to provide for continued growth

opportunities and allow the region to remain competitive in regional, national, and international markets.

**B. Community Cohesion.** No major impacts on overall community cohesion would be expected from the construction of the proposed alternative. In conversations with local residents, no objections or concerns were expressed regarding the construction of the mooring cell at the preferred (Site 2) location.

**C. Displacement of People.** No residential relocations would be required.

**D. Property Values and Tax Revenues.** The proposed alternative would have little direct effect on property values or resulting tax revenues since it would not be a significant change from the existing condition. The mooring cell would be located in the area currently used by waiting tows and would be placed away from the shoreline.

**E. Public Facilities and Services.** The purpose of the mooring cell is to allow tows to wait closer to the locks, thereby shortening overall lockage time. This allows navigation traffic to move through the locks more quickly, and thus positively impacts this public facility.

The location of the mooring cell is approximately 0.16 km (0.1 mile) downstream from the entrance to a private marina. Access to the marina is not currently hindered or interrupted by tows moving through the area, and should remain unchanged with the preferred alternative.

The location of the mooring cell is also approximately 1.3 km (0.8 mile) downstream from the Illiniwek Forest Preserve. No significant impacts to this public recreation and camping area are anticipated.

The U.S. Environmental Protection Agency (U.S. EPA) expressed concern regarding the water intake systems for the surrounding communities and the potential for drinking water contamination. The nearest community is the village of Hampton, and it receives drinking water from the neighboring city of East Moline. The drinking water intake for East Moline is approximately 4 km (2.5 miles) downstream of the project location. Since towboats are already mooring in the area proposed for the new cell without causing water contamination, it is unlikely that the project would change this condition.

**F. Life, Health, and Safety.** The proposed project would result in safer operating conditions in the navigation channel below Lock and Dam 14. A stable tie-off near the lock and dam would greatly reduce the possibility of a waiting towboat breaking loose and colliding with a passing tow.

**G. Business and Industrial Growth.** A small increase in business and industrial activity would occur during construction of the mooring cell. No long-term impacts are anticipated in the project vicinity.

**H. Employment and Labor Force.** The proposed project would have no long-term impacts on employment or the labor force in Rock Island County.

**I. Farm Displacement.** No farmsteads would be affected by the proposed alternative.

**J. Noise Levels.** The temporary increase in noise levels created during project construction would impact the surrounding residential area. Since tows are already waiting in the vicinity of Site 2, no additional long-term impacts are expected to be introduced as a result of constructing a mooring cell. Since the mooring cell is farther out than the area where boats currently wait, the noise levels should be less.

Under the existing condition, tows waiting in this area need to keep the engines running to maintain position. Construction of the mooring cell would allow tows to reduce engine usage while waiting and thus reduce the level of noise impacts.

**K. Aesthetics.** Aesthetic impacts due to construction activities in the vicinity of the site would be temporary. The surrounding area is expected to recover quickly after project completion. Construction of the mooring cell would provide a place for tows to tie off. This would eliminate the current practice of waiting near the shoreline, which negatively impacts the aesthetics of the area by causing erosion, pollution, and habitat destruction. The aesthetic impacts of tows waiting in the viewscape of riverfront residences would essentially be unchanged from the current condition. However, the mooring cell would present an additional visual impact to the viewscape even when tows are not present. The distance from the shore should tend to make this less of an intrusion, especially since it also moves the tows farther away.

## **VIII. ENVIRONMENTAL IMPACTS OF THE NONPREFERRED ALTERNATIVES**

The No Federal Action alternative would allow for continued adverse impacts to natural resources with the existing conditions at the project site. Towboats waiting for lockage would be required to run engines continuously or to move in close to shore to hold position below the lock and dam, thereby increasing the potential for sediment resuspension and erosion by prop wash. Habitat destruction caused by towboats grounding their fleet on the shoreline would not be reduced. The effects of towboat movement on aquatic resources also would not be reduced.

Impacts of mooring cell construction at RM 492.5L (Site 1) would be similar to impacts of the preferred alternative (Site 2). As stated previously, there is a diverse and well populated mussel bed known to be located directly upstream and landward of Site 1. Construction of a mooring cell at Site 1 could potentially impact the existing mussel bed by bringing barge traffic within closer proximity to the bed. The potential for reducing adverse effects of tow traffic while protecting an established mussel bed was determined to

be greater at the downstream (Site 2) location. Therefore, the Site 1 alternative was not selected.

## **IX. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED**

The loss of 90 m<sup>2</sup> (963 ft<sup>2</sup>) of river bottom habitat by the mooring cell would be an unavoidable effect of the project. During construction, temporary turbidity and an increased amount of suspended solids would have a negative impact upon aquatic organisms in the area. With the exceptions of water current redirection and loss of 90 m<sup>2</sup> (963 ft<sup>2</sup>) of river bottom, the effects from the project are believed to be short term and not detrimental to the existence of any known organism. The benefits to the environment due to towboats having a place to tie off would be greatly offset by any adverse effects created during construction.

## **X. RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY**

Short-term use of man's environment is the addition and availability of a stable structure for towboats to tie off on while awaiting lockage through Lock 14. The addition of the mooring cell to the environment would create minimal impacts to the environment, while minimizing erosion and pollution as well as habitat destruction. The mooring cell would localize environmental impacts of towboats, while decreasing lockage times. The addition of a mooring cell would result in increased environmental and economic productivity.

## **XI. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF PROJECT IMPLEMENTATION**

The 90 m<sup>2</sup> (963 ft<sup>2</sup>) of river bottom habitat, which lies beneath the construction site, along with the time, labor, materials, and money expended on the project, should be considered irretrievable.

## **XII. RELATIONSHIP TO LAND-USE PLANS**

The mooring cell would be located in an open-water site; therefore, the proposed project should have no effect on land use in the area.

## **XIII. COMPLIANCE WITH ENVIRONMENTAL QUALITY STATUTES**

Tabular summation of compliance can be found in Table EA-2.

**TABLE EA-2**

**Relationship of Plans to Environmental Protection  
Statutes and Other Environmental Requirements**

<b>Federal Policies</b>	<b>Compliance</b>
Archaeological and Historic Preservation Act, 16 U.S.C. 469, <i>et seq.</i>	Full compliance
Analysis of Impacts on Prime and Unique Farmland (CEQ Memorandum, 11 Aug 80)	Full compliance
Clean Air Act, as amended, 42 U.S.C. 1857h-7, <i>et seq.</i>	Full compliance
Clean Water Act, 33 U.S.C. 1251, <i>et seq.</i>	Full compliance
Coastal Zone Management Act, 16 U.S.C. 1451, <i>et seq.</i>	Not applicable
Endangered Species Act, 16 U.S.C. 1531, <i>et seq.</i>	Full compliance
Environmental Effects Abroad of Major Federal Actions (Executive Order 12114)	Not applicable
Estuary Protection Act, 16 U.S.C. 1221, <i>et seq.</i>	Not applicable
Farmland Protection Policy Act, 7 U.S.C., 4201, <i>et seq.</i>	Full compliance
Federal Water Project Recreation Act, 16 U.S.C. 460-1(12), <i>et seq.</i>	Full compliance
Fish and Wildlife Coordination Act, 16 U.S.C. 601, <i>et seq.</i>	Full compliance
Flood Plain Management (Executive Order 11988)	Full compliance
Land and Water Conservation Fund Act, 16 U.S.C. 460/-460/-11, <i>et seq.</i>	Not applicable
Marine Protection Research and Sanctuary Act, 33 U.S.C. 1401, <i>et seq.</i>	Not applicable
National Economic Development (NED) Plan	Full compliance
National Environmental Policy Act, 42 U.S.C. 4321, <i>et seq.</i>	Full compliance
National Historic Preservation Act, 16 U.S.C. 470a, <i>et seq.</i>	Full compliance
Protection of Wetlands (Executive Order 11990)	Full compliance
Rivers and Harbors Act, 33 U.S.C. 403, <i>et seq.</i>	Full compliance
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, <i>et seq.</i>	Not applicable
Wild and Scenic Rivers Act, 16 U.S.C. 1271, <i>et seq.</i>	Full compliance

**NOTES:**

- a. Full compliance. Having met all requirements of the statute for the current stage of planning (either preauthorization or postauthorization).
- b. Partial compliance. Not having met some of the requirements that normally are met in the current stage of planning.
- c. Noncompliance. Violation of a requirement of the statute.
- d. Not applicable. No requirements for the statute required; compliance for the current stage of planning.

A. **Endangered Species Act of 1973, as amended.** The project is not expected to impact any endangered species.

B. **National Historic Preservation Act of 1966, as amended.** The proposed project would have no potential to affect known archeological or historical resources, since the mooring cell would be located in the main channel of the Mississippi River.

C. **Federal Water Project Recreation Act.** No recreational areas would be added as part of this project. However, a marina is located near the proposed mooring cell site and the cell would have potential for use by recreational as well as commercial traffic. While the presence of towboats moored near the marina entrance could potentially have some adverse impact on recreational traffic, the mooring cell would be located where tows are normally waiting under present conditions.

D. **Fish and Wildlife Coordination Act.** Project plans have been coordinated with the USFWS, the U.S. EPA, the U.S. Coast Guard, and the Illinois and Iowa Departments of Natural Resources by letter dated May 25, 2000. Coordination responses received can be found in Appendix B.

E. **Wild and Scenic Rivers Act of 1968, as amended.** This portion of the Mississippi River is not listed as wild or scenic.

F. **Executive Order 11988 (Flood Plain Management).** The project would not directly or indirectly induce growth in the floodplain. Therefore, the project, as proposed, is judged to be in full compliance.

G. **Executive Order 11990 (Protection of Wetlands).** The preferred alternative for this project is judged to be in full compliance, since it does not support new construction in wetlands and is deemed to be the least environmentally damaging and most practicable alternative.

H. **Clean Water Act (Sections 401 and 404), as amended.** A 404(b)(1) Evaluation is included in this document and can be found in Appendix A. Section 401 Water Quality Certification will be obtained prior to project implementation.

I. **Clean Air Act, as amended.** No aspect of the proposed project has been identified that would result in violations to air quality standards.

J. **Farmland Protection Policy Act of 1981.** No farmland would be adversely impacted by project construction. Therefore, the project is judged to be in full compliance.

K. **National Environmental Policy Act of 1970, as amended.** The completion and public coordination of this EA fulfills NEPA compliance.

L. **National Economic Development (NED) Plan.** The NED Plan is the plan which best satisfies the Federal planning objectives of increasing the Nation's output of goods

and services and produces the most improvement to the national economic efficiency. The proposed plan is considered the best to fulfill the NED objective.

#### **XIV. PUBLIC INVOLVEMENT AND COORDINATION**

Coordination for the project has been and will be maintained with the following State and Federal agencies:

- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- Illinois Environmental Protection Agency
- Illinois Department of Natural Resources
- Iowa Department of Natural Resources
- U.S. Coast Guard
- Rock Island County Park Service

All letters and comments received by the Rock Island District are contained in Appendix B. Comments and letters received from the various agencies have been incorporated into this EA.

The U.S. Environmental Protection Agency, in a letter dated June 20, 2000, expressed concerns about surrounding communities' water intake systems, and the potential for drinking water contamination. The Corps has determined that the nearest community, the Village of Hampton, receives drinking water from the neighboring city of East Moline. The drinking water intake for East Moline is a considerable distance downstream (approximately 2.5 miles at RM 489.2). Under current conditions, towboats are mooring in the area that is proposed for the mooring cell. For this reason, the project would add no new potential for spill, and subsequent drinking water contamination.

The Illinois Department of Natural Resources, in a letter dated June 28, 2000, expressed concerns about the diversity of the mussels collected during the April 2000 mussel survey. Appendix C contains a copy of the mussel survey report prepared by Ecological Specialists, Inc.

**REFERENCES:**

Benn, David W. and Jeffrey D. Anderson

1997 *Historic Properties Potential and Geomorphological Assessment at Locks and Dams 11-22, 24, and 25, Upper Mississippi River System, Illinois, Iowa, Missouri, and Wisconsin* (BCA #490). Report submitted to the U.S. Army Engineer District, Rock Island, Illinois, under Contract No. DACW25-92-D-0008, Work Order No. 26. Report submitted by Bear Creek Archeology, Inc., Cresco, Iowa.

Custer, Jack E. and Sandra M. Custer

1997 *An Investigation of Submerged Historic Properties in the Upper Mississippi River and the Illinois Waterway*. Report submitted to the U.S. Army Engineer District, Rock Island, Illinois, under Contract No. DACW25-93-D-0012, Work Order No. 37. Report prepared by Steamboat Masters & Associates, Louisville, Kentucky, as subcontractor to American Resources Group, Ltd., Carbondale, Illinois (Cultural Resources Management Report No. 306).

U.S. Army Corps of Engineers

1992 *Design Memorandum No. 24 – Avoid and Minimize Measures, Melvin Price Locks and Dam*. St. Louis District, U.S. Army Corps of Engineers, October 1992.

**FINDING OF NO SIGNIFICANT IMPACT**

**MOORING CELL CONSTRUCTION  
POOL 15, MISSISSIPPI RIVER MILE 491.9  
SCOTT COUNTY, IOWA  
ROCK ISLAND COUNTY, ILLINOIS**

Having reviewed the information provided by this Environmental Assessment, pending data obtained from cooperating Federal, State, and local agencies and from the interested public, I find that construction of a towboat mooring cell at Mississippi River Mile 491.9 near Lock and Dam 14 would not significantly affect the quality of the environment.

In addition to the "No Action" alternative, two alternatives were considered: construction at RM 492.5, and construction at RM 491.9.

Factors that were considered in making a determination of no significant impacts and that an EIS was not required are as follows:

- a. Any negative impacts which would occur have been minimized and/or are temporary in nature. Positive impacts are expected to be long-term in nature.
- b. The proposed action would have no effect on the continued survival of the endangered species Higgins' Eye pearly mussel.
- c. No significant environmental, social, economic, or historic properties impacts are anticipated as a result of constructing the mooring cell.

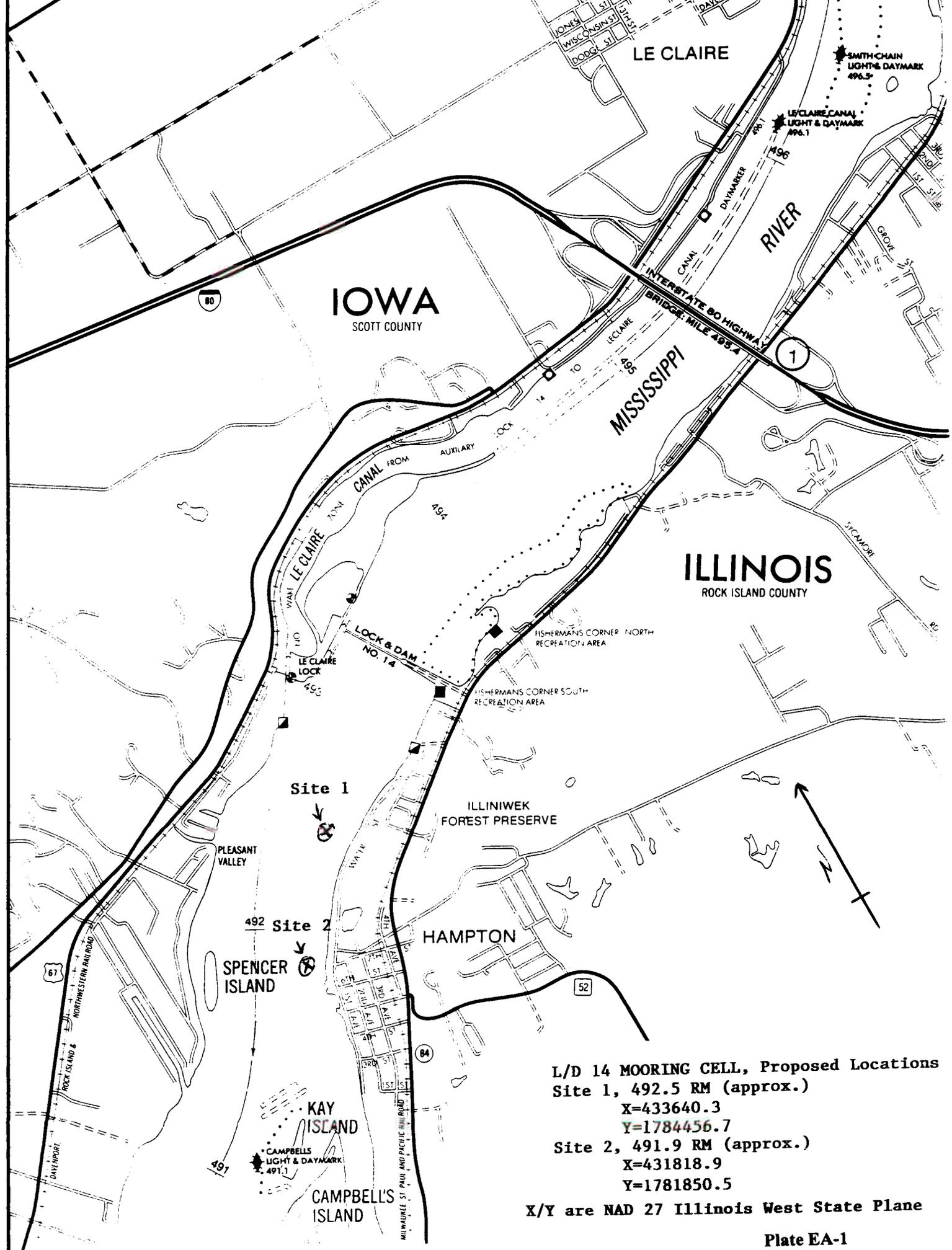
The environmental review process indicates that the proposed action does not constitute a major Federal action significantly affecting the environment. Therefore, preparation of an EIS is not required. This determination may be reevaluated if warranted by later developments.

19 June 2001  
(date)

William J. Bayles  
Colonel, U.S. Army  
District Engineer

  
LTC EW  
Acting Dist Eng

10174



**L/D 14 MOORING CELL, Proposed Locations**  
 Site 1, 492.5 RM (approx.)  
 X=433640.3  
 Y=1784456.7  
 Site 2, 491.9 RM (approx.)  
 X=431818.9  
 Y=1781850.5

**X/Y are NAD 27 Illinois West State Plane  
 Plate EA-1**





**CLEAN WATER ACT  
SECTION 404(b)(1) EVALUATION**

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REPLY TO  
ATTENTION OF

**CEMVR-PM-AR**

**DEPARTMENT OF THE ARMY  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING - P.O. BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004**

**MOORING CELL CONSTRUCTION  
POOL 15, MISSISSIPPI RIVER MILE 491.9**

**SCOTT COUNTY, IOWA  
ROCK ISLAND COUNTY, ILLINOIS**

**CLEAN WATER ACT  
SECTION 404(b)(1) EVALUATION**

**DECEMBER 2000**

**MOORING CELL CONSTRUCTION  
POOL 15, MISSISSIPPI RIVER MILE 491.9  
SCOTT COUNTY, IOWA  
ROCK ISLAND COUNTY, ILLINOIS**

**APPENDIX A  
CLEAN WATER ACT  
SECTION 404(b)(1) EVALUATION**

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**MOORING CELL CONSTRUCTION  
POOL 15, MISSISSIPPI RIVER MILE 491.9  
SCOTT COUNTY, IOWA  
ROCK ISLAND COUNTY, ILLINOIS**

**APPENDIX A  
CLEAN WATER ACT  
SECTION 404(b)(1) EVALUATION**

**SECTION 1 - PROJECT DESCRIPTION**

**LOCATION AND DESCRIPTION**

The proposed mooring cell would be located below Locks and Dam 14 at River Mile (RM) 491.9, left descending bank (L) of the Mississippi River. For a complete description, see sections in the EA (Environmental Assessment) entitled, **Background**, and **Project Location and Description**.

**AUTHORITY AND PURPOSE**

The proposed action is authorized under the 9-Foot Channel Navigation Project of the Rivers and Harbors Act of July 3, 1930, as amended, Senate Document 126/71/2.

The purpose of the evaluation portion of this document is to comply with Section 404 of the Clean Water Act pertaining to guidelines for the construction of a sheetpile and concrete structure in waters of the United States. This evaluation, in conjunction with the EA, will assist in analysis of alternatives for the proposed project, resulting in a designated Preferred Alternative. Further, this evaluation will provide information and data to the State water quality certifying agency demonstrating compliance with State water quality standards.

The purpose of the project is to provide, for navigation safety, a mooring point for towboats awaiting lockage through Lock 14 from the downstream side. The cell would also be available for use by recreational vessels.

**GENERAL DESCRIPTION OF DREDGED AND FILL MATERIAL**

The structure would be approximately 9.4 m (31 feet) in diameter and would be constructed of a steel sheetpile exterior with concrete fill. As the riverbed at the site is mainly hard substrate, the construction of a berm around the base of the cell to enhance stability is not anticipated. No other fill material is anticipated.

### **DESCRIPTION OF PROPOSED DISCHARGE SITES**

The base of the mooring cell would be placed at a depth of approximately 4.3 m (14 feet) of water and cover an area of approximately 90 m<sup>2</sup> (963 ft<sup>2</sup>) or 0.01 ha (0.02 acres). The mooring cell would displace approximately 382 m<sup>3</sup> (500 y<sup>3</sup>) of river water. The river bottom within the area of the site has a substrate composed of hard-packed sand with some cobble and silt. The area is subject to flows of 45-48 cm/sec (1.5-1.6 ft/sec) and wave action.

### **DESCRIPTION OF DISPOSAL METHOD**

The fill material would be placed at the construction site by mechanical means.

## **SECTION 2 - FACTUAL DETERMINATIONS**

### **PHYSICAL SUBSTRATE DETERMINATIONS**

The substrate at the construction site is mainly composed of hard-packed sand. It ranges from nearly horizontal to moderately sloping. Depth of the river bottom at the site is between 4.3-4.9 m (14-16 feet).

### **WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATIONS**

Water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients, and eutrophication would not be affected by the project. Salinity determinations are not applicable to the area. Circulation, flow, velocity, stratification and hydrologic regime would not be affected. Normal water fluctuations would not be altered by the project. Current patterns would be slightly altered near the structure.

### **SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS**

There would be a minor, temporary increase in suspended particles and turbidity during construction. However, strong current and wave action would quickly dilute the area to ambient levels. Light penetration and dissolved oxygen would not change. Toxic metals, organics, and pathogens should not be present in the fill material.

### **CONTAMINANT DETERMINATIONS**

The materials used for construction of the project would be chemically stable and/or inert. No contamination is anticipated from the use of the commercially manufactured materials.

### **AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS**

The effect on plankton, nekton, and benthos would be minimal since the site occupies only a small fraction of Pool 15. There are no anticipated effects on the aquatic food web. No mudflats, vegetated shallows, coral reefs, or riffle and pool complexes would be affected by the proposed action. There are three federally recognized species that are listed as endangered that may be found in either Scott County, Iowa, or Rock Island County, Illinois: bald eagle (*Haliaeetus leucocephalus*), Indiana bat (*Myotis sodalis*), and Higgins' eye pearly mussel (*Lampsilis higginsii*). Impacts to any of these species around the project area are not anticipated. See EA Section V. **Environmental Impacts of the Preferred Alternative, 3. Endangered Species**. Other fish and wildlife associated with the aquatic ecosystem are not expected to be impacted as a result of this project. Actions taken to

minimize impacts include early and open coordination with State and Federal resource agencies to identify potential impacts to aquatic, wetland, and terrestrial ecosystems.

### **PROPOSED PLACEMENT SITE DETERMINATIONS**

No excavation would be required. Implementation of the proposed project would have no effect on municipal or private water supplies; commercial or recreational fishery; parks, national and historic monuments or other similar preserves; national seashores; wilderness areas; or research sites.

### **DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM**

No adverse cumulative effects are foreseen for this action. However, the project could help to minimize adverse impacts currently recognized as being associated with commercial navigation traffic, such as suspended sediments and erosion, and therefore help to reduce cumulative impacts that towboats pose on the environment.

### **DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM**

No adverse secondary effects have been recognized or are anticipated for this project. This determination is subject to reevaluation, if warranted by Federal, State, or local agency comment, as well as input from the general public.

**SECTION 3 - FINDINGS OF COMPLIANCE OR NONCOMPLIANCE  
WITH THE RESTRICTIONS ON DISCHARGE**

A. No significant adaptations of the 404(b)(1) guidelines were made relative to this evaluation.

B. Aside from **No Federal Action**, only two alternatives were considered. These alternatives involved construction at two different locations: RM 491.9 (Site 2) and RM 492.5 (Site 1). It was determined that construction at RM 491.9 (Site 2) would be the least environmentally damaging of the three alternatives. (For evaluation of practicable alternatives, refer to the EA Sections III, VI, and V.)

C. The project is not anticipated to induce toxic substances into nearby waters or result in appreciable increases in existing levels of toxic materials. Therefore, Section 307 of the Clean Water Act will not be exceeded.

D. No significant impact to Federal or State listed endangered species would result from the proposed actions. No marine sanctuaries would be impacted.

E. No municipal or private water supplies would be affected by the proposed actions, and no degradation of waters of the United States is anticipated.

F. Construction of a mooring cell in the main channel is considered to be beneficial and has been proposed as an "avoid and minimize" measure by the U.S. Fish and Wildlife Service.

G. Potential adverse impacts on the aquatic ecosystem would be minimized by using chemically inert, uncontaminated fill material.

H. No other practical alternatives have been identified. The proposed actions are in compliance with Section 404(b)(1) of the Clean Water Act, as amended. The proposed actions would not significantly impact water quality and would improve the integrity of an authorized navigation system.

19 June 2001  
Date

William J. Bayles  
Colonel, U.S. Army  
District Engineer

  
LTC EW  
Acting Dist Eng

**PERTINENT CORRESPONDENCE**

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REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING – P.O. BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004

May 25, 2000

Planning, Programs, and  
Project Management Division (10-1-7c)

SEE DISTRIBUTION LIST

The Rock Island District of the U.S. Army Corps of Engineers (Corps) is currently proposing the construction of a mooring cell in upper Pool 15 below Lock and Dam 14 on the Mississippi River. Two alternate sites have been identified for consideration between river miles (RM) 491 and 493 (Figure 1). Each site is located along the left descending bank line.

An Environmental Assessment (EA) for this proposed action is currently in progress. The EA is expected to be distributed later this year. This letter is to provide a brief description of the proposed project and to ask for your agency's early comments within your area of expertise.

**Mooring Cell Site 1** is located at RM 492.5L on the Mississippi River. Construction of the mooring cell at Site 1 would require that four red channel marker buoys be moved toward the left descending bank, effectively widening the channel. The construction of the mooring cell at Site 1 would depend upon the relocation of these four red buoys.

**Mooring Cell Site 2** is located at RM 491.9L on the Mississippi River. Site 2 is the proposed location of the mooring cell with the current location of the channel buoys. Construction of a mooring cell at Site 2 would leave upbound tows farther downstream while waiting to lock through Lock 14, but still within an area where they currently fleet.

Corps staff researched current literature and made preliminary on-site investigations. The information search revealed a mussel bed located adjacent to the left descending bank of Illiniwek Park, Rock Island County, Illinois. This mussel bed is near proposed Site 1. The Corps conducted a diving mussel survey on April 25 and 26, 2000, to determine potential impacts, if any, to endangered mussel species at Sites 1 and 2. The diving survey covered an area approximately 100 m wide by 1700 m long (Figure 2). The average depth within the area surveyed was approximately 5.5 m (18 ft). Twelve 100-m transects at approximate 150- to 160-m intervals within the survey area were run, and all mussel specimens collected were recorded. The mid-point of transect 1 (the farthest upstream transect) is the location of proposed mooring cell Site 1. Dives along the first six transects resulted in the collection of 34 live

specimens. One of the specimens collected was an endangered Higgins' eye (*Lampsilis higginsii*). This specimen was a non-gravid female and was returned to the riverbed by the diver. The mid-point of transect 7 is the location of proposed mooring cell Site 2. The survey along this transect and the remaining downstream transects resulted in the collection of 22 live mussels. No endangered species were found at or below Site 2.

Recognizing that there could potentially be some impact to mussels in the vicinity, it is unlikely that construction of a mooring cell at either site would jeopardize the continued existence of any species or the critical habitat of any fish, wildlife, or plant that is designated as endangered or threatened. However, a mooring cell constructed at Site 2 would minimize any potential impacts to area mussels and will be addressed as the preferred alternative in the EA. Any impacts on the site of actual construction would be relatively small, approximately 66 m<sup>2</sup> (700 ft<sup>2</sup>) of river bottom, and other impacts due to construction activities in the vicinity of the site would be temporary with the surrounding area expected to recover quickly after project completion. Since tows are already fleeing in the vicinity of Site 2, no new impacts are expected to be introduced as a result of constructing a mooring cell there.

The information provided should allow you to make preliminary comments on the proposed project. A timely review of this information and a written response for inclusion into the EA would be greatly appreciated. Please provide your written recommendations, comments, and concerns relative to resources in your area of expertise no later than 30 days from the date of this letter.

In addition, we request that you provide us with any potential environmental restoration concepts that may fall under Section 1135 or Section 204 program authorities. These programs are authorized by the Water Resources Development Act (as amended) and require a non-Federal sponsor to cost share a percentage of project costs (details of the cost share vary between these programs). The Section 1135 program focuses on environmental quality improvement at water resources projects constructed by the Corps of Engineers, which are feasible and consistent with authorized project purposes. The Section 204 program authorizes the protection, restoration, and creation of aquatic and ecologically related habitats, including wetlands, in connection with dredging activities at an authorized Federal navigation project. We are interested in pursuing restoration ideas relative to these programs as we execute our channel maintenance responsibilities. Your ideas are appreciated.

If you have any questions, please call Mr. Kraig McPeck of our Environmental Analysis Branch, telephone 309/794-5547, or write to our address above, ATTN: Planning, Programs, and Project Management Division (Kraig McPeck).

Sincerely,

**ORIGINAL SIGNED BY**

Kenneth A. Barr  
Chief, Economic and Environmental  
Analysis Branch

**Enclosures**

## DISTRIBUTION LIST

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U.S. Fish and Wildlife Service  
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Aledo, IL 61231

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Natural Heritage Division  
Illinois Department of Natural Resources  
524 South 2nd Street  
Springfield, IL 62701-1787

Mr. Bruce Yurdin  
Illinois Environmental Protection Agency  
1021 North Grand Avenue East  
Springfield, IL 62794

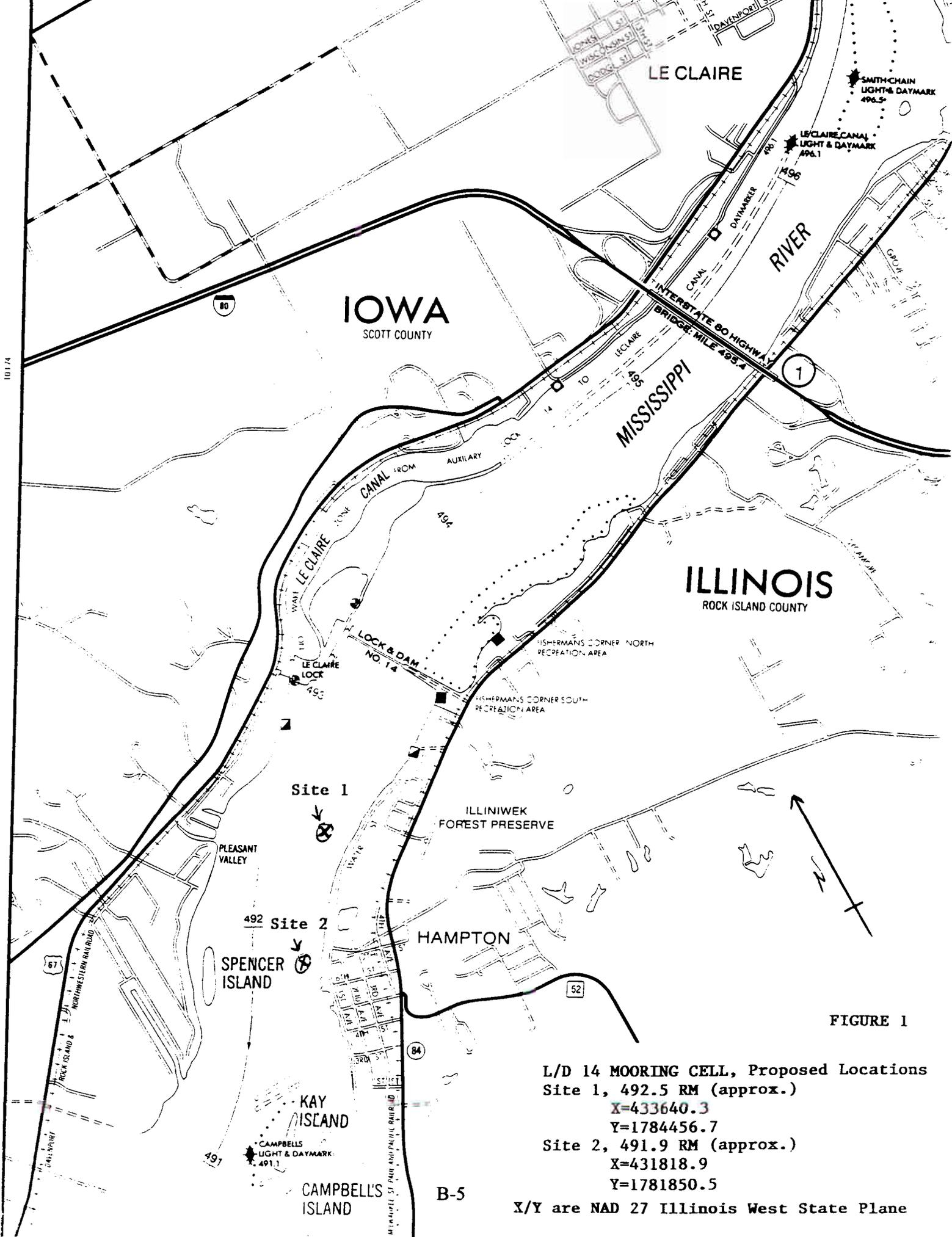
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900 East Grand  
Des Moines, IA 50319-0034

Mr. Bob Sheets  
Iowa Department of Natural Resources  
201 West Platt  
Maquoketa, IA 52060

Bellevue Fish Management  
Iowa Department of Natural Resources  
R.R. 3, Box 1  
Bellevue, IA 52031

Fairport Fish Hatchery  
Iowa Department of Natural Resources  
3390 Highway 22  
Muscatine, IA 52761

Mr. James Welling  
Director  
Rock Island County Parks  
1504 - 3rd Avenue  
Rock Island, IL 61201



**FIGURE 1**

**L/D 14 MOORING CELL, Proposed Locations**  
 Site 1, 492.5 RM (approx.)  
 X=433640.3  
 Y=1784456.7  
 Site 2, 491.9 RM (approx.)  
 X=431818.9  
 Y=1781850.5  
 X/Y are NAD 27 Illinois West State Plane

10174

B-5





UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII  
901 NORTH 5TH STREET  
KANSAS CITY, KANSAS 66101

**JUN 20 2000**

U.S. Army Corps of Engineers  
Rock Island District  
Clock Tower Building  
P.O. Box 2004  
Rock Island, Illinois 61204-2004  
ATTN: Planning, Programs, and Project Management Division  
(Kraig McPeek)

Dear Mr. McPeek;

Thank you for the opportunity to provide preliminary comments on the proposed Mooring Sites in Upper Pool 15 on the Mississippi River. USEPA Region 7 offers the following comments:

1. Drinking water supply intakes for Hampton, Illinois and other downriver communities are not identified. Extended mooring/fleeting at the proposed sites should be evaluated for typical cargoes, hull integrity (double, single...), and spill event history to assess the potential for drinking water intake contamination.
2. EPA would appreciate receiving details on the mooring cell design, and most specifically, the anchoring system for these cells.

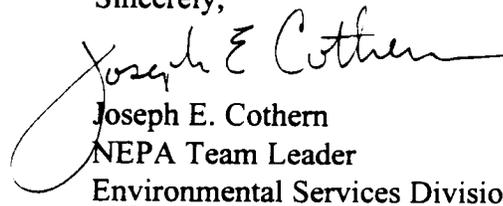
For expedited service on future requests for comments, please utilize the following address:

USEPA Region 7  
NEPA Team/Environmental Services Division  
901 N. 5<sup>th</sup> Street  
Kansas City, Kansas 66101

The NEPA program can be contacted via a website at <http://www.epa.gov/region07/programs/ensv/nepapage.htm> New requests for review or comment should be sent to Ms. Diane LeDesma, while ongoing work may be sent directly to the staff person assigned to a specific project.

Again, thank you for the opportunity to review your proposed action.

Sincerely,



Joseph E. Cothern  
NEPA Team Leader  
Environmental Services Division

cc: Michael MacMullen, R-5  
Thomas Taylor, WWPD/GPCB



# Illinois Department of Natural Resources

<http://dnr.state.il.us>

524 South Second Street • Springfield, Illinois 62701-1787

George H. Ryan, Governor • Brent Manning, Director

June 28, 2000

Mr. Kenneth A. Barr  
Chief, Economic and Environmental Analysis Branch  
Department of the Army  
Rock Island District, Corps of Engineers  
Clock Tower Building, P.O. Box 2004  
Rock Island, Illinois 61204-2004

ATTN: Kraig McPeck

Dear Mr. Barr:

Reference is made to your letter of May 25, 2000 concerning the Rock Island District's proposed construction of a mooring cell in upper Pool 15 below Lock and Dam 14 on the Mississippi River. Two potential construction sites have been identified, Site 1 at river mile 492.5 and Site 2 at mile 491.9, both along the left descending bank near Hampton, in Rock Island County, Illinois.

We have consulted the Illinois Natural Heritage Database and find that both alternative construction sites lie within the Mississippi River – Moline Illinois Natural Areas Inventory (INAI) site, and near a winter roost for the bald eagle (*Haliaeetus leucocephalus*). We are also aware of a significant mussel bed located a short distance downstream from Lock and Dam 14 near Illiniwek Park. According to your May 25 letter, a diving survey conducted by your agency on April 25 and 26 resulted in the collection of 56 live mussels including one Higgin's-eye (*Lampsilis higginsii*), a federally endangered species. Unfortunately, no listing was provided of the species and comparative numbers of the remaining 55 mussels, some of which may well be considered endangered or threatened in the State of Illinois.

Direct impacts to the mussel bed may occur as a result of excavation and filling for the mooring cell, as well as downstream deposition of sediment disturbed and re-suspended by construction activities. Depending on water depths and other factors, additional secondary impacts may be associated with propellor wash, wake-induced erosion of the adjacent riverbank, oil and fuel spills, and other disturbances.

The Department looks forward to reviewing the Environmental Assessment for the proposed action, which your letter indicates will be distributed later this year. If we can provide additional information or be of any other assistance in the interim, please contact me at 217-785-4863.

Sincerely,

Robert W. Schanzle  
Permit Program Manager  
Office of Realty and Environmental Planning

RWS:rs

cc: IDNR/OWR (Diedrichsen), IEPA (Yurdin), USFWS (Clevenstine), USEPA (Pierard)



THOMAS J. VILSACK, GOVERNOR  
SALLY J. PEDERSON, LT. GOVERNOR

LYLE W. ASELL, INTERIM DIRECTOR

*July 18, 2000*

***Kenneth A. Barr  
Department of the Army  
Rock Island District, Corps of Engineers  
Clock Tower Building, P.O. Box 2004  
Rock Island, IL 61204-2004***

***RE: Construct a Mooring Cell in the upper Pool 15 below Lock & Dam 14,  
Mississippi River, across from Scott County***

***Dear Mr. Barr:***

***Thank you for inviting our comments on the impact of the above referenced project on protected species and rare natural communities.***

***The Department is very interested in reviewing the results of your diving mussel survey of April 25, 2000. Field staff have commented that the two proposed mooring sites are in the vicinity of some of the best historic fish and mussel habitat in Pool 15. Although the sites on the Illinois side of the border, we would recommend that alternative sites be pursued for a mooring cell.***

***This letter is a record of review for protected species and rare natural communities in the project area. It does not constitute a permit and before proceeding with the project, you may need to obtain permits from the DNR or other state and federal agencies.***

***If you have any questions about this letter or if you require further information, please contact Keith Dohrmann at (515) 281-8967.***

***Sincerely,***

**STEVE PENNINGTON  
IOWA DEPARTMENT OF NATURAL RESOURCES**

**SP:kd**

00-362L.doc

**MUSSEL SURVEY**

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# **Evaluation of Unionid Mussels, Lock and Dam 14 Lower Proposed Mooring Cell Sites, Mississippi River, RM 492**

**Prepared for:**

**Earth Tech**  
Waterloo, Iowa

**Under contract to:**

**U.S. Army Corps of Engineers**  
Rock Island, Illinois  
Contract No. DACW25-95-0006  
Delivery Order No. 0014

**Prepared by:**

**Ecological Specialists, Inc.**  
St. Peters, Missouri

**September 2000**  
(ESI Project 2k-008)

# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE 14 September 2000	3. REPORT TYPE AND DATES COVERED Final	
4. TITLE AND SUBTITLE Evaluation of Unionid Mussels, Lock and Dam 14 Lower Proposed Mooring Cell Sites, Mississippi River, RM 492			5. FUNDING NUMBERS DACW25-95-0006	
6. AUTHOR(S) Paul J. Marangelo and Heidi L. Dunn				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Ecological Specialists, Inc. 114 Algana Ct. St. Peters, MO 63376			8. PERFORMING ORGANIZATION REPORT NUMBER 29651.10.141	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers Clock Tower Building P.O. Box 2004 Rock Island, IL 61204-2004			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The Army Corps of Engineers has proposed two locations for constructing a barge mooring cell below Lock and Dam 14 between MRM 491.5 and 492.9 east of the navigation channel in Rock Island County, IL. The purpose of this study was to determine if unionid beds occurred within the proposed sites. Unionids were semi-quantitatively sampled along six 100m transects within each site. Divers searched 10m intervals along each transect for 2 to 5 minutes collecting all unionids encountered. Both sites hosted low-density, species-poor unionid populations. However, one <i>Lampsilis higginsii</i> was found. Both sites appeared to be on the edge of unionid beds, as most unionids at Site 2 were at the downstream end, and most unionids were found along the shoreward edge of Site 1. Either site would be suitable for a mooring cell.				
14. SUBJECT TERMS Unionidae, Lampsilis higginsii, Mooring cells, Mississippi River, Pool 15			15. NUMBER OF PAGES 12pp. and appendices	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT	

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Appendix A. Database from Sites 1 and 2, Mississippi River, Pool 15, April 2000.

Appendix B. Scope of Work

## 1.0 Introduction

The Army Corps of Engineers (USACE) has proposed two locations for constructing a barge mooring cell below Lock and Dam 14 between MRM 491.5 and 492.9 east of the navigation channel in Rock Island County, IL. Both locations are near known unionid beds. Ecological Specialists, Inc. was contracted by USACE to evaluate the unionid communities in these locations.

Installation of a mooring cell could potentially have direct or indirect effects on unionids. Unionids living directly in the cell placement area may be crushed or dislodged during cell construction.

Construction activities (such as staging equipment near banks and in the water, barge spudding, etc.) could also disturb substrate and streambanks resulting in resuspension of sediment, which can interfere with unionid respiration and feeding.

Also, turbulence from tows waiting in one area could dislodge unionids, alter currents, and re-suspend sediment (Miller *et al.*, 1989). Additionally, increased suspended solids within the waiting area and subsequent silt deposition downstream of waiting tows could smother unionids, clog gills, alter food availability, and disrupt host fish activity (USACE, 1996).

## 2.0 Methods

### 2.1 Field

Field sampling was conducted on 26 and 27, April 2000. Unionids were sampled by a diver along 12-100m transects (six transects per site) established perpendicular to the flow at RM 491.9-492.5.

Transects endpoints were located using pre-determined GPS coordinates. Actual transect beginning and endpoints were recorded with GPS (Figure 2-1).

Five minute timed searches were conducted at 10m intervals in each transect. A diver collected unionids within 1m of the transect by visually searching the substrate and by disturbing the substrate by hand. Unionids collected from each 10m interval were placed in individual bags, identified, measured lengthwise, and sexed (if possible). Fresh-dead, weathered dead, and sub-fossil shells were recorded, but the latter two were only noted once per species, and subsequent weathered and sub-fossil shells were not enumerated. Also, the percentage of each shell surface infested with zebra mussels (*Dreissena polymorpha*) was visually estimated.

Substrate composition was visually classified into predominant and subdominant particle size categories using the Wentworth scale. Also, depth was measured at each 10m segment, and turbidity (Secchi depth), velocity (surface and bottom), and dissolved oxygen (DO) (surface and bottom) was measured once per site per sampling day. The number of unionids collected per transect segment was divided by the search time to obtain a measure of Catch Per Unit Effort (CPUE), which is expressed as the number of unionids collected in 10min of search effort per person.

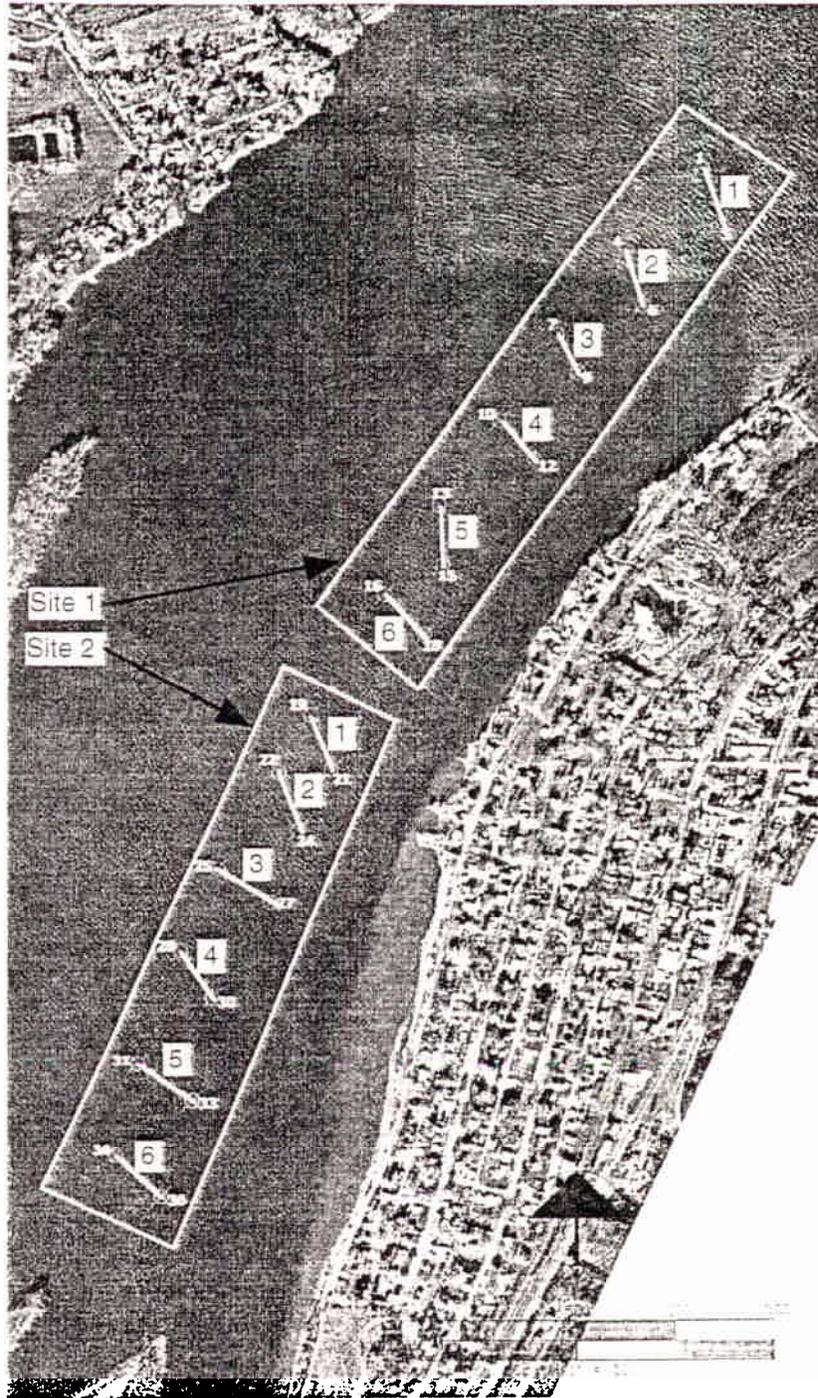
### 2.2 Data Analysis

In order evaluate diversity, Simpson's diversity index ( $D_s$ ) was calculated.  $D_s$  is widely known and is mostly sensitive to the relative abundance of each species. It is computed with the formula:

$$l = (\sum n_i(n_i - 1)) / (N(N - 1))$$

where  $n_i$  is the number of unionids in the  $i$ th species,  $N$  is the total number of individuals, and  $l$  is a measure of species dominance.  $D_s$  is calculated by subtracting  $l$  from 1.

Species evenness was evaluated by comparing the least-squares slope of plots of the natural log of the relative abundance of each species vs. species abundance rank for each transect. A slope of zero represents a completely equitable distribution of species abundance, and larger slopes are indicative of communities dominated by a small number of (or single) species. Additionally, a size frequency histogram was plotted to evaluate the demographic structure of the unionid community in the study area.



Numbers near transect midpoints denote transect numbers.

### 3.0 Results and Discussion

#### 3.1 Habitat

Current velocity in Site 1 was 60cm/sec and 55cm/sec at the bottom and surface of the river, respectively. Dissolved oxygen was 11.0mg/l (surface) and 11.8mg/l (bottom), water temperature was 13°C, and visibility was 350mm (Secchi). Substrate in Site 1 ranged from predominantly sand in Transects 1-3 with some bedrock and boulder, to a mixture of sand, cobble, and boulder in Transects 4-6. Some of the segments in Transects 1-3 hosted piles of unconsolidated sand. Depth was fairly uniform, ranging from 4.9-6.4m.

In Site 2, flow was 45cm/sec (bottom) and 48cm/sec (surface). Dissolved oxygen was 11.8 mg/l (bottom) and 11.0mg/l (surface), and transparency was 350mm (Secchi). Substrate was variable. Transects 1 and 2 consisted mostly of hard-packed sand and boulder, with some cobble and silt. Transect 3 was mostly sand and clay, Transect 4 was a mixture of sand, cobble, and boulder, and Transects 5 and 6 were mostly sand with some gravel and silt. Depth varied more than Site 1; Transects 1-3 ranged from 4.3-4.9m, and Transects 4-6 ranged from 2.4-4.0m.

#### 3.2 Unionid community

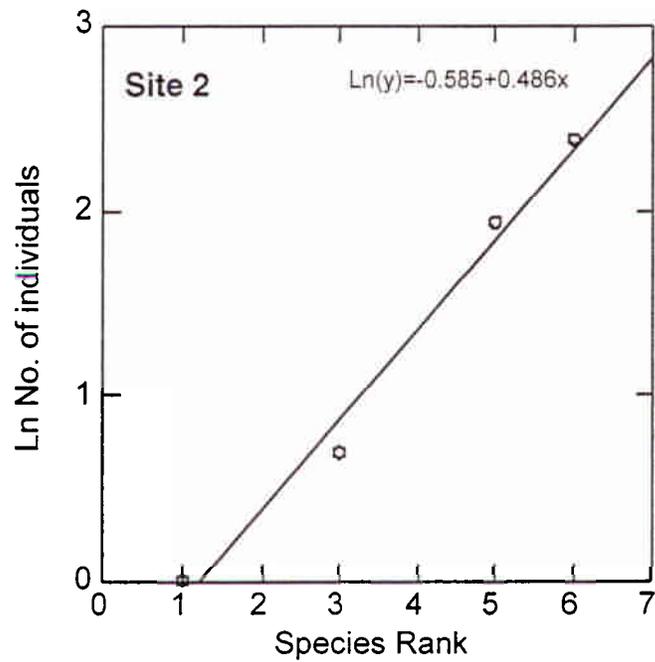
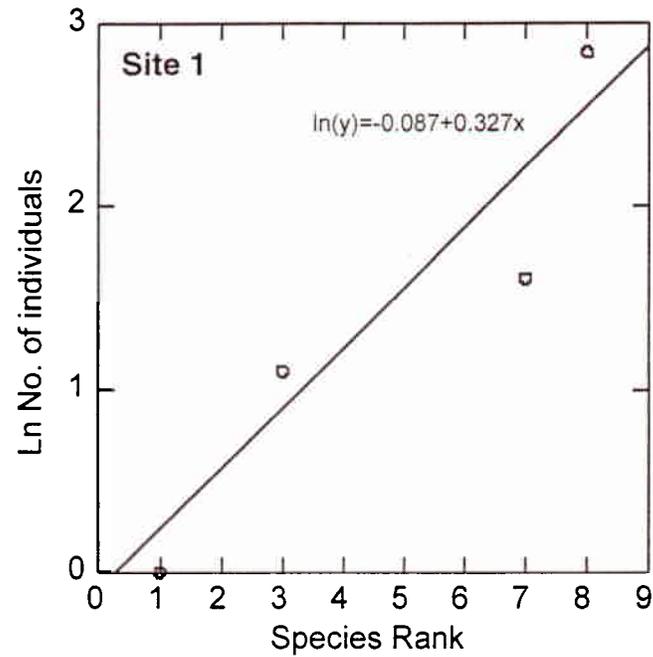
Both sites in the study area hosted low-density, species-poor unionid populations. At Site 1, 35 unionids of seven species were collected (Table 3-1), including one individual of the federally endangered *Lampsilis higginsii*, while Site 2 yielded 22 unionids of seven species (see Table 3-1). Overall, a total of nine species of live unionids were found in the study area. *Quadrula p. pustulosa* (49%) and *Amblema p. plicata* (21%), were the most abundant species in the study area, while *Obliquaria reflexa* (9%), *Obovaria olivaria* (5%), *Ligumia recta* (5%), and *Lampsilis cardium* were moderately abundant. *Lampsilis higginsii*, *Quadrula quadrula*, and *Leptodea fragilis* were rare (<2%). Unionid density was similar between the two sites: Site 1 averaged 0.58 unionids/transect segment (10m<sup>2</sup>) (CPUE =1.2/10 min), while Site 2 averaged 0.36 unionids/transect segment (CPUE=0.7/10min). Simpson's D<sub>s</sub> for Sites 1 and 2 were 0.28 and 0.24, respectively (see Table 3-1), while species evenness slopes were 0.33 and 0.49, respectively (Figure 3-1). It should be noted that Simpson's D<sub>s</sub> tends to display high variance for low density populations (ESI, 2000) such as found in Sites 1 and 2, thus diminishing the usefulness of this index for comparisons to other areas.

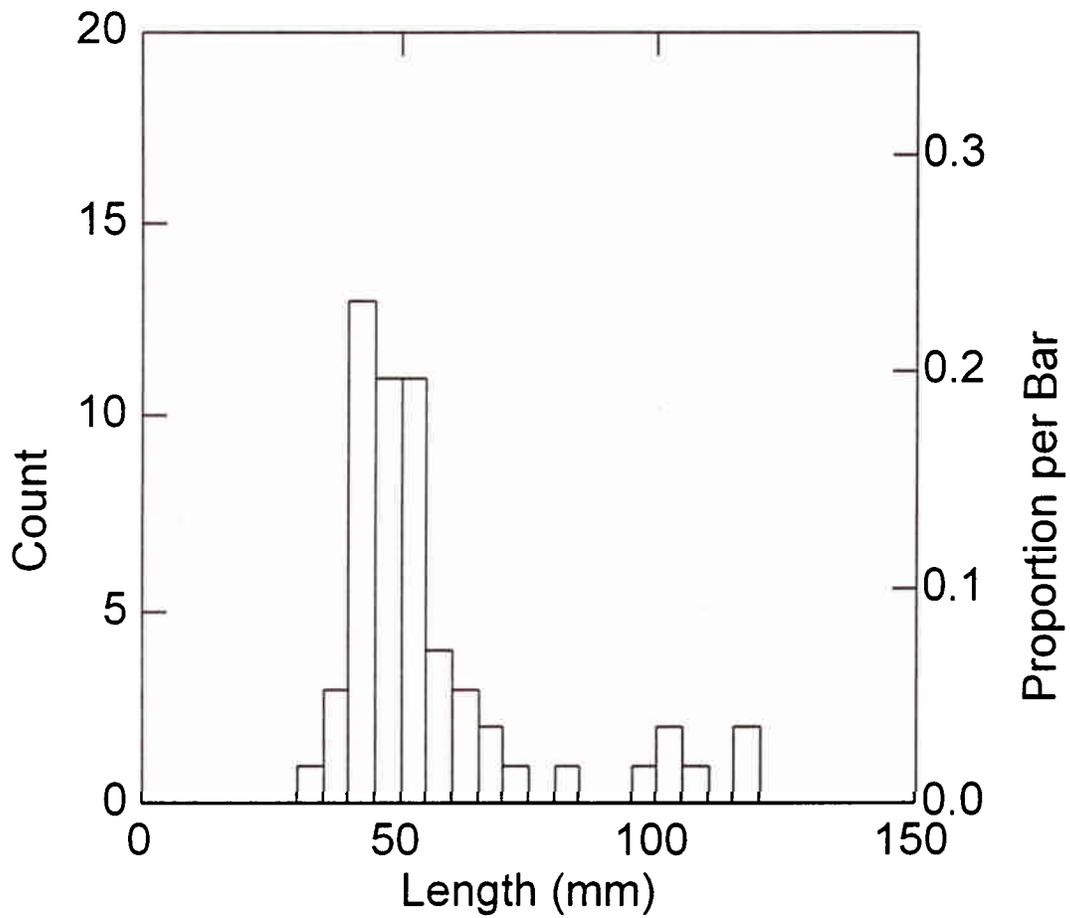
A small percentage of the population (7%) were juveniles (<40mm), though too few unionids were collected to derive strong conclusions about reproductive activity in the study area (Figure 3-2). Moreover, all four individuals classified as juveniles by our length criteria were of common species whose adults are relatively small in terms of length (*O. reflexa* and *Q. p. pustulosa*). It is likely that some juveniles were not collected by our sampling methods, as visual and tactile searches are typically biased against smaller size class unionids (Miller and Payne, 1988; Vaughn *et al.*, 1997; Hornbach and Deneka,

Table 3-1. Number and species of unionids collected in Pool 15, April 2000.

Species	Site 1	Site 2	Total	Relative abundance (%)
<i>Actinonaias ligamentina</i>		WD	WD	
<i>Amblema p. plicata</i>	5	7	12	21.1
<i>Arcidens confragosus</i>		WD	WD	
<i>Cyclonaias tuberculata</i>		SF	SF	
<i>Ellipsaria lineolata</i>	FD	FD	FD	
<i>Fusconaia ebena</i>		SF	SF	
<i>Lampsilis cardium</i>	3	FD	3	5.3
<i>Lampsilis higginsi</i>	1		1	1.8
<i>Leptodea fragilis</i>	FD	1	1	1.8
<i>Ligumia recta</i>	3	WD	3	5.3
<i>Megalonaias nervosa</i>		FD	FD	
<i>Obliquaria reflexa</i>	3	2	5	8.8
<i>Obovaria olivaria</i>	3		3	5.3
<i>Potamilus alatus</i>		WD	WD	
<i>Potamilus ohioensis</i>		WD	WD	
<i>Pyganodon grandis</i>	FD	WD	FD	
<i>Quadrula metanevra</i>		SF	SF	
<i>Quadrula nodulata</i>		WD	WD	
<i>Quadrula p. pustulosa</i>	17	11	28	49.1
<i>Quadrula quadrula</i>	FD	1	1	1.8
<i>Truncilla truncata</i>		WD	WD	
Total	35	22	57	
CPUE	1.2	0.7	0.9	
No./10m <sup>2</sup> segment	0.58	0.36	0.47	
Species Richness	7	5	9	
Simpson's D <sub>s</sub>	0.28	0.24	0.29	

FD=fresh dead, WD=weathered dead, SF=sub-fossil





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Figure 3-2. Length frequency histogram of unionids collected in Pool 15, April 2000.

**ESI**

1996). Nevertheless, the overall scarcity of unionids probably renders such bias unimportant, as the number of overlooked individuals would likely not be sufficient to upgrade the evaluation of the unionid population in the study area.

### 3.3 Distribution

Unionids were sparsely distributed throughout Sites 1 and 2 (Table 3-2). In Site 2, the downstream most transect (Transect 6) might be on the edge of a unionid bed, as unionids were more abundant here than in the five transects immediately upstream (see Table 3-2). Site 1 also appears to be located on the edge of a unionid bed, as 23 of the 35 unionids collected at this site were found on transects between 0 and 10m on the eastern boundary of Site 1. This is consistent with the *L. higginsii* collection location (see Table 3-2), as *L. higginsii* is typically found in unionid beds with a much higher diversity and abundance than we found Site 1 (Hornbach, 1998; Wilcox *et al.*, 1993).

Unionid distribution did not appear to be related to substrate in either of Sites 1 or 2. Indeed, the prevalence of large particle sizes and hard-packed sand in some areas of the study area appear that it could support more unionids than were collected. Unionids are typically found in areas with clean, stable substrate consisting of cobble, gravel, and sand, whereas they are rarely found in unstable substrate (Cvancara, 1970; Strayer and Ralley, 1991) because they are unable to maintain their natural position, and may be buried or displaced during fluvial events. Unionids are typically found in areas with sufficient flow to prevent sedimentation, but without enough flow to render the substrate unstable (Vaughn, 1997). This general description of habitat criteria for unionids appears to fit much of the study area, except Transects 5 and 6 in Site 2, which were mostly sand.

### 3.4 Zebra mussel infestation

Unionids were moderately fouled in the study area. Eighty six (86)% of the unionids collected were infested with at least one zebra mussel, and the percentage of shell surface of zebra mussels covered by zebra mussels averaged 28.3%. While it is not clear whether this level of infestation poses an acute threat to unionids in the study area, future increases in infestation will probably lead to unionid mortality.

Table 3-2. Distribution of unionids in Sites 1 and 2, Pool 15, April 2000.

Site 1	Dist. on transect <sup>1</sup>	Transect						Total
		1	2	3	4	5	6	
	0m		9	4	2	2	6	23
	10m				1		6	7
	20m							0
	30m							0
	40m							0
	50m							0
	60m							0
	70m							0
	80m			5				5
	90m							0
Total		0	9	9	3	2	12	35

---

Site 2	Dist. on transect <sup>1</sup>	Transect						Total
		1	2	3	4	5	6	
	0m	2		2		1		5
	10m				2		2	4
	20m						2	2
	30m	1				2	2	5
	40m							0
	50m							0
	60m						3	3
	70m		1					1
	80m							0
	90m		2					2
Total		3	3	2	2	3	9	22

shaded table cell denotes *L. higginsi* collection location  
<sup>1</sup>distance on transect from east boundary of study area.

#### **4.0 Conclusions**

Compared to other areas of the Mississippi River, the study area hosts a sparse, species-poor unionid community. However, one *L. higginsi* specimen was collected near the eastern edge of Site 1, and a relatively larger concentration of unionids in this area (see Table 3-2) suggests that there is a more productive and diverse unionid bed adjacent to the eastern edge of Site 1. Otherwise, there was little difference between Sites 1 and 2 in terms of unionid abundance and diversity.

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Appendix A. Database from Sites 1 and 2, Mississippi River, Pool 15, April 2000.

Study ID	ESI project	mon th	year	State	Bank	min dist bank (m)	max dist bank (m)	coll method	area (m <sup>2</sup> )	time (min)	Depth (ft)	Species	Site	Trans #	#F	#WD	#S	Age (years)	Length (mm)	Weight (g)	reproductive condition	comments	zobras per unionid
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quant	10	16	<i>Leptodea fragilis</i>	2	T1	0	0	0	1			cobble with sand		
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quant	10	16	<i>Fusconia ebena</i>	2	T1	0	0	0	1			cobble with silt		
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	16	<i>Quadrula p. pustulosa</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	16	<i>Leptodea fragilis</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	16	<i>Lamprolaima carolinum</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	16	<i>Truncilla truncata</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quant	10	16	<i>Quadrula quadrata</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quant	10	16	<i>Potamilius alatus</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quant	10	16	<i>Quadrula p. pustulosa</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	50	60	semi-quant	10	16	<i>Quadrula p. pustulosa</i>	2	T1	0	1	0	0					
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quant	10	16	<i>Elipsaria lineolata</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quant	10	16	<i>Quadrula melanevra</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quant	10	16	<i>Quadrula p. pustulosa</i>	2	T1	1	0	0	0		43			80
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quant	10	16	<i>Truncilla truncata</i>	2	T1	0	0	0	0					
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quant	10	16	<i>Megalomans nervosa</i>	2	T1	0	1	0	0					
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quant	10	16	<i>Obliquaria reflexa</i>	2	T1	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quant	10	16	<i>Fusconia ebena</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quant	10	16	<i>Arcidensis confragosus</i>	2	T1	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quant	10	16	<i>Pygmaeodon granulatis</i>	2	T1	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quant	10	16	<i>Amblema p. plicata</i>	2	T1	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quant	10	16	<i>Quadrula quadrata</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quant	10	16	<i>Cyclomans tuberculata</i>	2	T1	0	0	0	1					
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quant	10	16	<i>Obliquaria reflexa</i>	2	T1	0	1	0	0					
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quant	10	16	<i>Potamilius alatus</i>	2	T1	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quant	10	16	<i>Quadrula nodulata</i>	2	T1	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quant	10	16	<i>Amblema p. plicata</i>	2	T1	1	0	0	0		69			2
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quant	10	16	<i>Amblema p. plicata</i>	2	T1	1	0	0	0		82			5
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quant	10	16	<i>Obliquaria reflexa</i>	2	T2	1	0	0	0		38			20
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quant	10	16	<i>Quadrula p. pustulosa</i>	2	T2	1	0	0	0		35			0
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	16	<i>Ligumia recta</i>	2	T2	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	16	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quant	10	15	<i>Amblema p. plicata</i>	2	T2	1	0	0	0		51			30
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quant	10	15	<i>Lamprolaima carolinum</i>	2	T2	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quant	10	15	<i>Leptodea fragilis</i>	2	T2	0	0	1	0					
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quant	10	15	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	50	60	semi-quant	10	16	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quant	10	16	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quant	10	16	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quant	10	15	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quant	10	15	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quant	10	15	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quant	10	15	none	2	T2									
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quant	10	15	<i>Amblema p. plicata</i>	2	T2	0	1	0	0					
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quant	10	2	none	2	T3									
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quant	10	2	none	2	T3									
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quant	10	2	none	2	T3									
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quant	10	2	none	2	T3									
2k-008	2k-008	4	26	2000	Iowa	left	50	60	semi-quant	10	2	none	2	T3									

Study ID	Est. protect.	mon	th	day	year	State	Bank	min dist. bank (m)	max dist. bank (m)	sample time		Depth (ft)	Species	Site	Trans. #	Li. #	#S	Age (years)	Length (mm)	Weight (g)	reproductive condition	comments	zebra mussels per umidion			
										area (m <sup>2</sup> )	time (min)															
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quan	10	2	15	none	2	T3							sand and clay				
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	15	none	2	T3								sand/cobble/twilder			
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	14	none	2	T3								sand			
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quan	10	2	14	none	2	T3								sand and cobble	95		
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	14	Quadrula p. pustulosa	2	T3	1	0	0	0	43			sand/cobble/twilder	50		
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	14	Quadrula p. pustulosa	2	T3	1	0	0	0	43						
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	13	Actinodonta ligamentum	2	T3	0	0	1	0							
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quan	10	2	11	none	2	T4								boulder/sand			
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quan	10	2	13	none	2	T4								boulder/sand			
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quan	10	2	13	none	2	T4								cobble/sand			
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	13	none	2	T4								cobble/sand			
2k-008	2k-008	4	26	2000	Iowa	left	50	60	semi-quan	10	2	13	none	2	T4								boulder/sand			
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quan	10	2	13	none	2	T4								cobble/sand to sand			
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	13	none	2	T4								sand			
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	13	none	2	T4	1	0	0	0	43			sand	50		
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quan	10	2	13	Quadrula p. pustulosa	2	T4	1	0	0	0	48				sand	50	
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quan	10	2	13	Ellipsaria lineolata	2	T4	0	1	0	0							
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	13	none	2	T4									sand		
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quan	10	2	11	none	2	T5									sand		
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quan	10	2	11	none	2	T5									sand		
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quan	10	2	11	none	2	T5									sand		
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	11	none	2	T5									sand		
2k-008	2k-008	4	26	2000	Iowa	left	50	60	semi-quan	10	2	11	none	2	T5									sand		
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quan	10	2	10	none	2	T5	1	0	0	0	54				sand	50	
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	11	Amblyema p. plicata	2	T5	1	0	0	0	48				sand	50	
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	11	Quadrula p. pustulosa	2	T5	1	0	0	0							
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	11	Lampsilis cardium	2	T5	0	1	0	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	10	none	2	T5									sand		
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quan	10	2	11	Quadrula quadrata	2	T5	1	0	0	0	51					sand	50
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	9	none	2	T6									sand		
2k-008	2k-008	4	26	2000	Iowa	left	90	100	semi-quan	10	2	9	none	2	T6									sand		
2k-008	2k-008	4	26	2000	Iowa	left	80	90	semi-quan	10	2	9	none	2	T6									sand		
2k-008	2k-008	4	26	2000	Iowa	left	70	80	semi-quan	10	2	9	none	2	T6									sand		
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	7	Quadrula neolata	2	T6	0	0	1	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	7	Quadrula p. pustulosa	2	T6	0	1	0	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	7	Truncella truncata	2	T6	0	0	1	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	7	Leptodea fragilis	2	T6	0	0	1	0	62					sand	10
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	7	Amblyema p. plicata	2	T6	1	0	0	0	54					sand	20
2k-008	2k-008	4	26	2000	Iowa	left	60	70	semi-quan	10	2	7	Amblyema p. plicata	2	T6	1	0	0	0	53					sand	80
2k-008	2k-008	4	26	2000	Iowa	left	50	60	semi-quan	10	2	8	none	2	T6									sand with 1" of silt		
2k-008	2k-008	4	26	2000	Iowa	left	40	50	semi-quan	10	2	8	none	2	T6									sand with 1" of silt		
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	9	Obliquaria reflexa	2	T6	1	0	0	0	36					sand	75
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	9	Obliquaria reflexa	2	T6	1	0	0	0	44					sand	10
2k-008	2k-008	4	26	2000	Iowa	left	30	40	semi-quan	10	2	9	Quadrula p. pustulosa	2	T6	0	0	1	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	8	Potamilus ohioensis	2	T6	0	0	1	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	8	Amblyema p. plicata	2	T6	1	0	0	0	64					sand	20
2k-008	2k-008	4	26	2000	Iowa	left	20	30	semi-quan	10	2	8	Amblyema p. plicata	2	T6	1	0	0	0	44					sand	50
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quan	10	2	8	Quadrula p. pustulosa	2	T6	1	0	0	0	48					sand	40
2k-008	2k-008	4	26	2000	Iowa	left	10	20	semi-quan	10	2	8	Quadrula p. pustulosa	2	T6	1	0	0	0	52					sand	50
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	9	none	2	T6									sand		
2k-008	2k-008	4	26	2000	Iowa	left	10	100	semi-quan	90	18	17	Amblyema p. plicata	1	T6	0	1	0	0	43				sand/cobble	50	
2k-008	2k-008	4	26	2000	Iowa	left	10	100	semi-quan	90	18	17	Obliquaria reflexa	1	T6	1	0	0	0	48					sand	20
2k-008	2k-008	4	26	2000	Iowa	left	10	100	semi-quan	90	18	17	Quadrula p. pustulosa	1	T6	1	0	0	0	55					sand	25
2k-008	2k-008	4	26	2000	Iowa	left	10	100	semi-quan	90	18	17	Quadrula p. pustulosa	1	T6	1	0	0	0	44					sand	75
2k-008	2k-008	4	26	2000	Iowa	left	10	100	semi-quan	90	18	17	Quadrula p. pustulosa	1	T6	1	0	0	0	100					sand	0
2k-008	2k-008	4	26	2000	Iowa	left	10	100	semi-quan	90	18	17	Lampsilis cardium	1	T6	1	0	0	0	102					sand/cobble and some boulders	5
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	16	Ellipsaria lineolata	1	T6	0	1	0	0						sand	
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	16	Lampsilis hugginsi	1	T6	1	0	0	0	72					sand	50
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	16	Quadrula p. pustulosa	1	T6	1	0	0	0						sand	10

Study ID	ESI project	mon th	day	year	State	Bank	min dist bank (m)	max dist bank (m)	Coll method	area (m <sup>2</sup> )	sample time (min)	Depth (ft)	Species	Site	Trans #I, #F	#S	Age (years)	Length (mm)	Weight (g)	reproductive live condition	comments	zabras per ummid	
2k-008	2k-008	4	26	2000	Iowa	left	0	10	semi-quan	10	2	16	<i>Amblyema p. plicata</i>	1	T6	1	0	0	0	56			70
							0	10	semi-quan	10	2	16	<i>Amblyema p. plicata</i>	1	T6	1	0	0	0	61			50
							0	10	semi-quan	10	2	16	<i>Ligumia recta</i>	1	T6	1	0	0	0	118	female		60
							0	10	semi-quan	10	2	16	<i>Ligumia recta</i>	1	T6	1	0	0	0	115	male		50
							0	100	semi-quan	100	20	19	<i>Ligumia recta</i>	1	T5	1	0	0	0	106	female	lots of byssals	5
							0	100	semi-quan	100	20	19	<i>Quadrula p. pustulosa</i>	1	T5	0	1	0	0	43			2
							0	100	semi-quan	100	20	19	<i>Pygmodon grandis</i>	1	T5	0	1	0	0				
							0	100	semi-quan	100	20	19	<i>Ligumia recta</i>	1	T5	0	1	0	0				
							0	90	semi-quan	10	2	21	none	1	T4								
							0	90	semi-quan	10	2	21	none	1	T4								
							0	70	semi-quan	10	2	20	none	1	T4								
							0	70	semi-quan	10	2	20	none	1	T4								
							0	50	semi-quan	10	2	19	none	1	T4								
							0	50	semi-quan	10	2	19	none	1	T4								
							0	40	semi-quan	10	2	19	none	1	T4								
							0	30	semi-quan	10	2	19	none	1	T4								
							0	20	semi-quan	10	2	19	none	1	T4								
							0	20	semi-quan	10	2	19	<i>Obovaria olivaria</i>	1	T4	1	0	0	0	47			0
							0	10	semi-quan	10	5	20	<i>Quadrula p. pustulosa</i>	1	T4	1	0	0	0	51			60
							0	10	semi-quan	10	5	20	<i>Quadrula p. pustulosa</i>	1	T4	1	0	0	0	43			40
							90	100	semi-quan	10	2	21	none	1	T3								
							80	90	semi-quan	10	5	21	<i>Lampisilis cardium</i>	1	T3	1	0	0	0	98	female	sand/boulder/debris	10
							80	90	semi-quan	10	5	21	<i>Obovaria olivaria</i>	1	T3	1	0	0	0	40			40
							80	90	semi-quan	10	5	21	<i>Amblyema p. plicata</i>	1	T3	1	0	0	0	59			0
							80	90	semi-quan	10	5	21	<i>Quadrula p. pustulosa</i>	1	T3	1	0	0	0	42			0
							80	90	semi-quan	10	5	21	<i>Quadrula p. pustulosa</i>	1	T3	1	0	0	0	52			40
							70	80	semi-quan	10	2	21	none	1	T3								
							60	70	semi-quan	10	2	21	none	1	T3								
							60	60	semi-quan	10	2	21	none	1	T3								
							50	50	semi-quan	10	2	21	none	1	T3								
							40	50	semi-quan	10	2	21	none	1	T3								
							40	40	semi-quan	10	2	21	none	1	T3								
							30	40	semi-quan	10	2	21	none	1	T3								
							30	30	semi-quan	10	2	21	none	1	T3								
							20	30	semi-quan	10	2	19	none	1	T3								
							10	20	semi-quan	10	2	19	none	1	T3								
							0	10	semi-quan	10	2	19	<i>Obovaria olivaria</i>	1	T3	1	0	0	0	54			10
							0	10	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T3	1	0	0	0	46			0
							0	10	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T3	1	0	0	0	46			20
							0	10	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T3	1	0	0	0	46			10
							0	100	semi-quan	20	4	18	<i>Obovaria olivaria</i>	1	T2	1	0	0	0	42			5
							80	100	semi-quan	20	4	18	<i>Obovaria olivaria</i>	1	T2	1	0	0	0	53			0
							80	100	semi-quan	20	4	18	<i>Amblyema p. plicata</i>	1	T2	1	0	0	0	68			2
							80	100	semi-quan	20	4	18	<i>Quadrula p. pustulosa</i>	1	T2	1	0	0	0	48			5
							80	100	semi-quan	20	4	18	<i>Quadrula p. pustulosa</i>	1	T2	1	0	0	0	49			2
							80	100	semi-quan	20	4	18	<i>Quadrula p. pustulosa</i>	1	T2	1	0	0	0	54			5
							60	70	semi-quan	10	2	19	<i>Lampisilis cardium</i>	1	T2	0	1	0	0				
							60	70	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T2	0	1	0	0				
							60	70	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T2	0	1	0	0				
							60	70	semi-quan	10	2	19	<i>Ellipsaria lineolata</i>	1	T2	0	1	0	0				
							60	70	semi-quan	10	2	19	<i>Obovaria olivaria</i>	1	T2	0	1	0	0				
							60	70	semi-quan	10	2	19	<i>Amblyema p. plicata</i>	1	T2	0	1	0	0				
							60	70	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T2	0	1	0	0	30			0
							60	70	semi-quan	10	2	19	<i>Quadrula p. pustulosa</i>	1	T2	1	0	0	0	46			2
							60	70	semi-quan	10	2	19	<i>Amblyema p. plicata</i>	1	T2	1	0	0	0	55			5
							60	80	semi-quan	10	2	19	none	1	T2	1	0	0	0				
							50	60	semi-quan	10	2	18	none	1	T2								
							40	50	semi-quan	10	2	16	none	1	T2								
							30	40	semi-quan	10	2	16	none	1	T2								
							30	30	semi-quan	10	2	17	none	1	T2								
							20	30	semi-quan	10	2	19	none	1	T2								
							10	20	semi-quan	10	2	19	none	1	T2								
							0	10	semi-quan	10	2	19	none	1	T2								
							0	100	semi-quan	100	20	19	<i>Leptodea fragilis</i>	1	T1	0	1	0	0				
							0	100	semi-quan	100	20	19	<i>Amblyema p. plicata</i>	1	T1	0	1	0	0				
							0	100	semi-quan	100	20	19	<i>Ellipsaria lineolata</i>	1	T1	0	1	0	0				
							0	100	semi-quan	100	20	19	<i>Quadrula quadrata</i>	1	T1	0	1	0	0				

28.333333

Appendix B. Scope of Work

## SCOPE-OF-WORK

### EVALUATION OF UNIONID MUSSELS, L/D 14 LOWER PROPOSED MOORING CELL SITES 1 & 2, UPPER POOL 15, MISSISSIPPI RIVER, ROCK ISLAND COUNTY, ILLINOIS

Prepared by Randy J. Kraciun, CEMVR-PM-R, X5174  
14 March 2000

#### I. CONTRACT PROVISIONS IN FORCE

1.1 Provisions of the Scope-of-work (SOW) in the main contract shall apply to this Work Order as required to fulfill the requirements of the main contract and to accomplish the work set out in the Specifications, below, and are not repeated here.

#### II. PROJECT OBJECTIVE, LOCATION AND COORDINATION WITH OTHER FIELD WORK

2.1 The Rock Island District U.S. Army Corps of Engineers (Corps) is examining the potential for placement of a new mooring cell below L/D (Lock and Dam) 14 on the Upper Mississippi River. Two potential sites for the mooring cell have been identified between river miles (RM) 491.5-493.0 (Fig. 1). A known mussel bed, used commercially in the past, is located on the left descending bank, at RM 492.4L adjacent to Illiniwek State Park in Illinois. The purpose of this effort is to determine the extent of impacts to mussels at either site, if selected. Primary tasks to be performed include: (1) perform a series of diver transects at each site to evaluate unionid species abundance and composition and (2) prepare a short technical report describing results of the survey.

2.2 Field work for this Delivery Order is to be accomplished in conjunction with the field work for survey of unionid mussels at Bellevue, Iowa, County Highway 52, Section 14 Streambank Stabilization, Pool 13, Mississippi River, Jackson County, Iowa.

#### III. REGULATORY REQUIREMENTS AND AUTHORITIES

3.1 The Contractor will be responsible for securing all applicable sampling permits from the State and Federal Governments.

#### IV. BACKGROUND

4.1 The project proposes plans and specifications for the installation of a new mooring cell below Lock & Dam 14 on the Mississippi River. Currently during upbound lockage exchanges, tows must wait several miles downstream until the downbound tow exits the lock. The construction of a mooring cell just downstream of the lock would enable upbound tows to wait closer to the lock, increasing transit efficiency. Unfortunately, there is a known mussel bed within the vicinity on the proposed mooring cell sites. The mussel bed is located along the left descending bankline, adjacent to Illiniwek State Park in Illinois. The problem then is to try to locate mooring facilities that are close to the lock, yet have a minimum impact to area mussels.

4.2 Review of depth surveys, conducted by CEMVR in 1996 reveals two potential locations for mooring facilities to be located in upper Pool 15.

1). Site 1 is located at approximately RM 492.5L.

2). Site 2 is located at approximately RM 491.9L

4.3 Both sites are located close enough to a known mussel bed to raise concerns for potential impacts to area mussels. The best situation would be to find an area with no mussels and construct the mooring cell there. A potential alternative would be to find an area of low mussel density for the project.

4.4 The navigation industry's current preferred location is Site 2, based on existing red buoy locations.

4.5 The Corps is proposing Site 1 as a more desirable location. However, this location is subject to the relocation of four red channel marker buoys.

V. SPECIFICATIONS.

- 5.1 Study sites: Two survey areas will be evaluated as potential sites for mooring cell placement. Proposed Site 1 is located on the left descending bank at RM 492.5 (NAD 27 Illinois West, State Plane: x=433640.3, y=1784465.7). The area for survey will be 100 m (meters) wide and extend downstream for a length of 1000 m. Proposed Site 2 is located on the left descending bank at RM 491.9 (NAD 27 Illinois West, State Plane: x=431818.9, y=178150.5). The area for survey will be 100 m (meters) wide and will extend downstream for a length of 1000 m. It is anticipated that the substrate for this area is rock cobble to bedrock.
- 5.2 Sampling technique: Divers will conduct semi-quantitative sampling using 5-min searches spaced at 10-m intervals along a 100-m transect line (divers transect). At each 10-m interval the diver will collect all mussels within 1 meter of the transect line. A series of diver transects will be conducted at 200-m intervals within each of the two sites (Table 1). Two weeks prior to initiation of fieldwork, the District will provide the contractor with detailed maps showing Global Positioning System (GPS) coordinates for the beginning and end points of each dive transect. In addition, the District Biologist will reserve the option to select up to three additional transects at each site during the field operation. These optional transects will be used to further define areas identified to have low mussel density. The following specifications for diver transects shall apply:
- a. Each diver transect will be assigned an alpha-numeric designation based on the study site (numeric) and transect (alpha).
  - b. Each transect will be 100 m in length running perpendicular to the shoreline.
  - c. The location of each diver transect will be identified with a Global Positioning System (GPS) coordinates. The District will provide the contractor with detailed maps and GPS coordinates for each site. The contractor will record actual GPS coordinates for each transect.
  - d. The range and average depth encountered during the diver search shall be recorded.
  - e. Substrate types encountered along the entire length of the diver transects shall be recorded.
  - f. A dive log will be maintained to record the following information for each diver transect: diver(s) completing the transect, GPS coordinates, duration (start/end), depth range, average depth, substrate type(s), and number/species of mussels collected.
- 5.3 Sampling effort: The contractor will perform diver transects at each of the sites shown in Tables 1 as stipulated under item 5.2:

Table 1. Potential sites for mooring cell placement in Pool 15 of the Upper Mississippi River along with the number of pre-selected (PST) and optional (OPT) transects to be completed at each.

	Site	Pool	Rivermile	PST	OPT
1.)	SITE 1	15	492.5L	6	3
2.)	SITE 2	15	491.9L	6	3

- 5.4 Water quality: will be measured daily at each study site immediately prior to sampling. Measurements will include temperature (surface/bottom), dissolved oxygen (surface/bottom), current velocity (surface/bottom), and transparency (surface). River stage (feet above flat pool) and discharge information (cfs) should also be recorded for each location.
- 5.5 Descriptive parameters: Individual mussels collected during each diver search will be identified to species and measured (calipers) to the nearest millimeter for shell length. Zebra mussel infestation will be noted by recording an "I" - Infested or "C" - Clear. For infested mussels, a percent value will be recorded to reflect the portion of the unionids' shell surface area that is covered by zebra mussels (i.e. I-30% or I-90%).

- 5.6 Data analysis: shall include measures of unionid species abundance and composition at each study site using the following format or methodologies:
- (A) Abundance
    - (1) *Relative species abundance* - total number of individuals of a species expressed as a percentage of the total number of individuals of all species.
    - (2) *Index of species density* - Catch-per-unit-effort (CPUE) expressed as the number of individuals of each species collected at each sample site (i.e. 10-m intervals).
  - (B) Composition (compared by diver transect)
    - (1) *Richness* - Rarefaction method [ $E(S_n)$ ].
    - (2) *Evenness* - Abundance plots [species rank (X) -vs- relative abundance (Y)].
    - (3) *Diversity Indices* - Simpson's ( $D_s$ )
    - (4) *Size frequency distributions* - percentage of population within 5-mm shell length intervals.
- 5.7 Threatened/Endangered: Should individuals of any federally threatened or endangered species be captured at any time during fieldwork, the contractor shall, as soon as it is convenient, but not to exceed the following day, notify the Districts' Project Biologist. Any federally protected mussels will be sexed, aged, measured, photographed, and hand placed back into the river at their recovery point. Measurements of federally protected mussels will include shell length, width, and height.

## VI. SPECIAL CONDITIONS

- 6.1 The Contractor shall carry a marine band radio and cell phone while conducting fieldwork, to facilitate communication with the Lockmasters and approaching towboats. The marine band radio shall, at a minimum, be equipped with "safety and calling" channel 16 (frequency 156.8 mhz), operating channel 14 (frequency 156.7 mhz) and bridge to bridge" channel 13 (frequency 156.65 mhz). When not being used to receive or transmit a message, the radio shall simultaneously monitor channels 13 and 16.

## VII. DIVING SPECIFICATIONS

- 7.1 Divers will be working in an area subject to fast currents (up to 1 to 3 feet/sec.), deep water (12-40 feet at flat pool), variable bottom conditions, and intermittent commercial barge traffic. Adequate safety precautions should be taken to minimize the risk of bodily injury or damage to equipment. Sufficient time should be allowed in the contractor's proposal to account for standby time when tow traffic is present.
- 7.2 Diving operations shall adhere to pertinent provisions of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, dated 3 September 1996 (and all subsequent revisions).
- 7.3 Diving operations will be monitored and/or inspected by a District employee who is certified as a COE diver, a diving supervisor, or a diving inspector. The contractor shall make provisions to allow a District diver to accompany them during all diving activities. The contractor shall contact CEMVR Diving Point-of-Contact (POC) to schedule field-work.
- 7.4 The contractor shall develop and maintain a Safe Practices Manual (SPM) which details the contractor's entire diving program. Information requirements of the SPM are detailed in the Safety and Health Requirements Manual. The contractor's SPM must be submitted to the Districts' Diving POC for review (with one copy to the contracting Officer's Representative) at least fifteen days prior to the commencement of dive operations.

VIII. REPORT

- 8.1 Within 10 days of completion of field sampling the contractor shall provide to CEMVR a preliminary letter report (based on field observations) listing locations within the sample areas in which mussel densities appear to be low. This letter report will not be used to make final site recommendations for a mooring buoy, but will be used to narrow the focus to a potentially viable mooring site.
- 8.2 The Contractor shall prepare a technical report describing the survey methodology and results of the investigation outlined in Section V above. The report will include copies (hardcopy and electronic) of all field data sheets, and maps and other illustrations will be reproducible in black and white format.
- 8.3 Three (3) copies of the draft report shall be provided to the Contracting Officer's Representative. The Contractor will be responsible for any revisions to the draft report required by the Contracting Officer's Representative. Fifteen (15) copies of the final report will be furnished to the Contracting Officer's Representative no later than 30 days from the Contractor's receipt of comments on the draft. One copy of original field collection data/notes (hard copy and electronic), photo logs, photographs, and negatives shall be provided along with the final report.
- 8.4 The District will provide the contractor with finished copies of maps showing the sampling locations (with GPS coordinates) prior to submission of Draft report (see 9.1).
- 8.5 This scope-of-work shall be included as an appendix of the final report.

IX. SCHEDULE

9.1 Project Schedule: The Contractor may begin work immediately upon award of the work order. The following Project Schedule shall apply:

<u>Tasks</u>	<u>Date</u>
Date of Award	0
Corps to provide site maps	15
Field Work Completed	30
Corps to provide finished copies of maps	45
Draft Report Due	70
Draft Review Period	71-115
Final Report Due	30 days
	after receipt of comments from CEMVR
Final Report Acceptance by Corps	30 days
	after receipt of Final Report

9.2 Fieldwork: The District anticipates data acquisition to require 1 Malacologist, 2 divers and 1 diver assistant. Actual fieldwork should require approximately 2 working days. Travel Costs for this project will be covered by a previous contract, which already has the contractor near the study area.

9.3 Payment schedule: The payment schedule shall be as follows:

<u>PAYMENT SCHEDULE</u>	
<u>Tasks</u>	<u>Percent of Contract Amount</u>
1) 100% field work completion	90
2) final report acceptance	10

X. COORDINATION

10.1 Randy Kraciun is the Project Biologist for this work. He may be reached by phone: 309/794-5174, FAX: 309/794-5157, or E-mail: randall.j.kraciun@usace.army.mil.

- 10.2 Ron Fulcher is the Contracting Officers Representative (COR) for this work. He may be reached by phone: 309/794-5384 or FAX: 309/794-5157.
- 10.3 James Aidala is the Districts' Point of Contact (POC) for Contract Diving Operations. He may be reached by phone: 309/794-5455 or FAX: 309/794-5180. He shall be contacted to arrange for the Districts' Dive Inspector's presence at all dive operations. Dive and dive safety related questions should be addressed to him (See Section VII, above)
- 10.4 Lockmaster at Lock and Dam 14 will be notified (309/794-4357) by the contractor at least 24 hours prior to the commencement of fieldwork. The Lockmaster will also be contacted the day(s) of the survey to assure that they know the location of the survey team while on site.
- 10.5 The Contractor shall make provisions to allow District personnel to accompany them on one or more days of fieldwork.
- 10.6 It is the Contractor's responsibility to contact the Project Biologist or other District personnel to determine current field conditions regarding water levels and other conditions that might affect initiation or completion of the survey.

## XI. LIST OF EXHIBITS

11.1 Schedule and Provision of Exhibits: Should the Government fail to provide any of these materials at the time(s) set out herein, the Project Schedule shall be extended 1 calendar day for each calendar day of delay in providing these materials - the extension ending only when the final item is provided or when the contract is modified to remove the item from this Scope of Work. Exceptions, if any, to this provision are stated under the individual exhibit number, below.

Exhibit 1. Figure 1. I./D 14 MOORING CENE, Proposed Locations, Site 1 & 2, Pool 15, Mississippi River, -1 sheet, attached.

Exhibit 2. Site Maps to be provided per the Project Schedule.

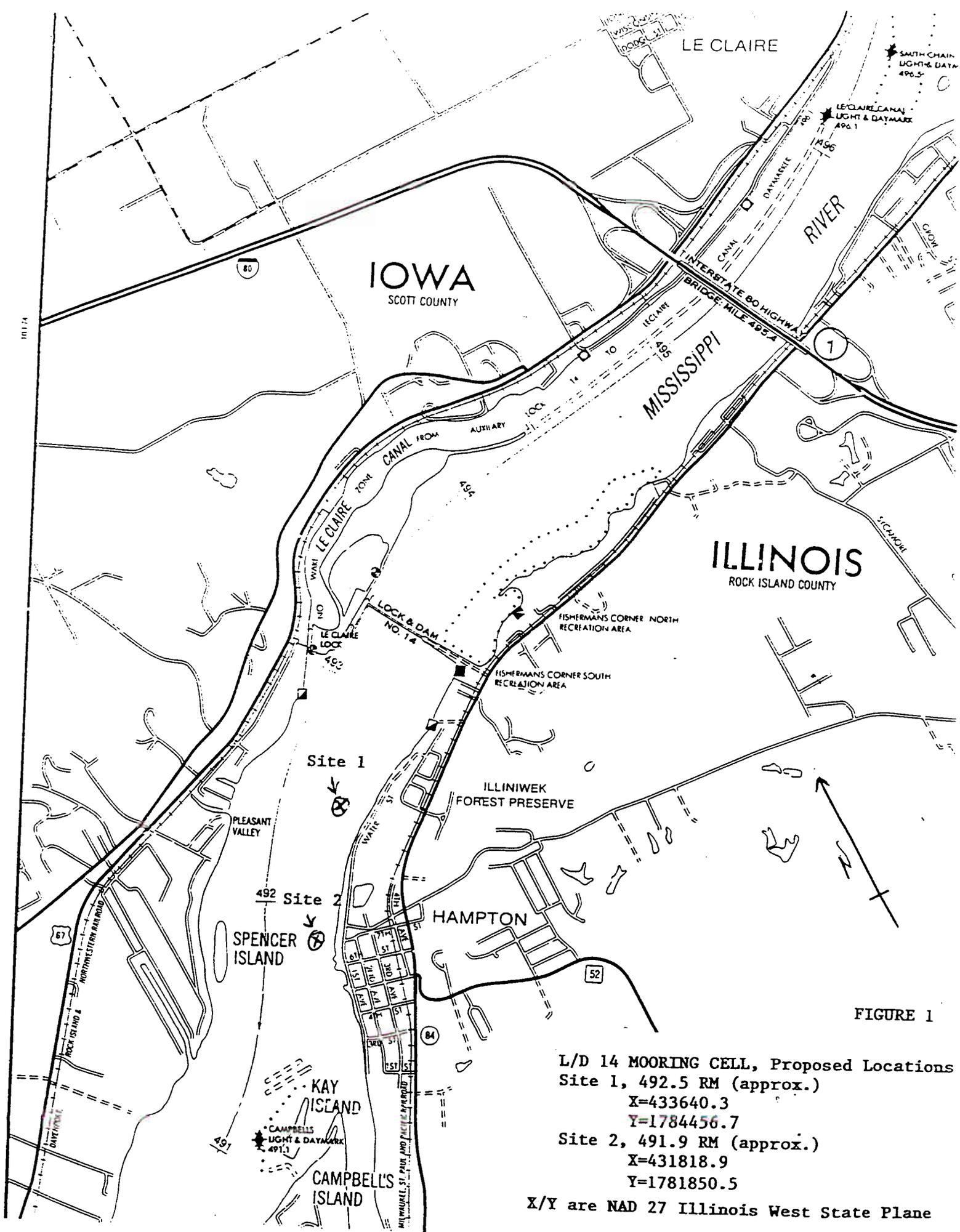


FIGURE 1

L/D 14 MOORING CELL, Proposed Locations  
 Site 1, 492.5 RM (approx.)  
 X=433640.3  
 Y=1784456.7  
 Site 2, 491.9 RM (approx.)  
 X=431818.9  
 Y=1781850.5

X/Y are NAD 27 Illinois West State Plane

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