Illinois Department of Natural Resources
CONSERVATION PLAN
(Application for an Incidental Take Authorization)
Per 520 ILCS 10/5.5 and 17 Ill. Adm. Code 1080

150-day minimum required for public review, biological and legal analysis, and permitting

PROJECT APPLICANT:	Union Pacific Railroad
PROJECT NAME:	Kankakee River Bridge and Track Improvement Project Joliet to East St. Louis High-Speed Rail
COUNTY:	Will County
AREA OF IMPACT:	UPRR bridge over the Kankakee River in the City of Wilmington

The incidental taking of endangered and threatened species shall be authorized by the Illinois Department of Natural Resources (IDNR) only if an applicant submits a conservation plan to the IDNR Incidental Take Coordinator that meets the following criteria:

1. A **description of the impact likely to result** from the proposed taking of the species that would be covered by the authorization, including but not limited to -

A) identification of the **area to be affected** by the proposed action, include a legal description and a detailed description including street address, map(s), and GIS shapefile. Include an indication of ownership or control of affected property. Attach photos of the project area.

The project is located between Joliet and East St. Louis along the Union Pacific Railroad (UPRR) tracks. The project limits include the railroad right-of-way (ROW), plus additional area adjacent to the existing right-of-way within the siding locations, grade crossings, and bridge work. One hundred twenty waterways are located within the Joliet to East St. Louis project area. However, the Kankakee River is the only waterway where both in-stream work is planned and within which state-listed mussel species are expected to occur. As such, this Incidental Take Authorization (ITA) applies only to the Kankakee River bridge improvement component of the Joliet to East St. Louis High-Speed Rail (HSR) project. Because state-listed fish species are also expected to occur in the vicinity of the proposed Kankakee River bridge improvements, and the state-listed sheepnose mussel could potentially occur in the vicinity of the proposed improvements, this ITA also addresses those species. The evaluation of the potential for involvement with state-listed mussel species in the waterbodies within the Joliet to East St. Louis HSR project is provided in Appendix A.

The UPRR bridge over the Kankakee River is located in the City of Wilmington in Will County, Illinois. The bridge is currently owned and operated by UPRR and will remain in UPRR ownership and operation after the project is completed. Figure 1 depicts the location of the Kankakee River bridge. A photograph of the river crossing is included in Figure 2. Part C of this section discussed the proposed bridge work in greater detail.

B) **biological data** on the affected species including life history needs and habitat characteristics. Attach all pre-construction biological survey reports.

State-listed Mussel Species: *A mussel survey was conducted in the Kankakee River in the vicinity of the UPRR bridge on July 21, 24, and 25, 2014. The survey results are included in Appendix B. Among the live species collected were two state-threatened species, the purple wartyback (Cyclonaias tuberculate) and the black sandshell (Ligumia recta). No live federally-listed species were collected. A fresh-dead shell of the sheepnose mussel (Plethobasus cyphyus) was collected in the Kankakee River near Wilmington, Illinois in 2013. The state-listed species are described below. This ITA presents best management practices, species surveys, and relocation of identified species in areas where construction is likely to affect listed species.*

Purple Wartyback Mussel

The purple wartyback is found in medium to large rivers with large to medium gravel or mixed sand and gravel substrates. Cobble and boulders may be present in the substrate. The purple wartyback's distinguishing features include a rounded shell with a fairly prominent wing, numerous bumps (or warts), and a purple nacre, though white nacre is present in some populations. Known fish hosts for the purple wartyback include: the black bullhead (Ameiurus melas), yellow bullhead (Ameiurus natalis), flathead catfish (Pylodictis olivaris) and the channel catfish (Ictalurus punctatus), all of which are common and widespread fish in Illinois (Cummings & Mayer 1992, Badra 2004, OSU, 2013).

The purple wartyback is commonly found throughout most of the Midwest and Eastern United States and is found as far west as Oklahoma. Within Illinois, Michigan, Wisconsin, Iowa, and Minnesota the specie's conservation status is listed as imperiled. The purple wartyback is state threatened in Illinois. (Nature Serve, 2013). The INHS database contains 259 records for purple wartyback in 20 counties and from 25 discreet streams in Illinois. Of the 25 discreet stream records, only nine records are from 2000 or later with many records of last occurrence dating to 1897-1925. The purple wartyback is in decline throughout much of its Illinois range.

Black Sandshell Mussel

The black sandshell inhabits larger streams and rivers with hard bottoms such as firm, compacted sand, sandy gravel, or gravel/cobble in fast flowing water. Despite its name the black sandshell is rarely found in readily shifting sands and is never found in silty conditions (Parmalee and Bogan, 1998, Montana, 2012). The black sandshell is a thick shelled, elongated mussel that is dark brown or black in maturity, though juvenile and young adults can show a pattern of green rays on a lighter colored shell surface. The black sandshell shows sexual dimorphism and can reach a length of approximately eight inches. (Cummings & Mayer 1992, Klocek et al. 2006).

Native freshwater mussels require a fish host to distribute their larvae (glochidia). Black sandshells are bradytictic, or long term brooders. Females brood their glochidial larvae from August through the winter to the following July before they are released (Ortmann 1919). Host fish for the glochidia of the black sandshell include the bluegill (Lepomis macrochirus), largemouth bass, sauger and white crappie (Pomoxis annularis) (Watters 1994). Additionally, yellow perch, green sunfish (Lepomis cyanellus), rock bass, and white perch (Morone americana) were identified as suitable hosts for L. recta by Steg, (1998). Saugers are considered by some to be a primary host fish for black sandshell (Khym and Layzer. 2000).

Despite the relatively large number of host fish that carry larval black sandshell, the black sandshell appears to be declining throughout its midwestern range. Although exact causes of black sandshell decline are not reported in the literature, general declines or extirpations in mussel populations are attributed to habitat changes and water quality changes that can be linked to pollution from siltation, and urban runoff. (Downing et al. 2010). Recent findings that mussel glochidia are acutely sensitive to small ammonia spikes (USEPA, 2009) indicate that ammonia

runoff from lawns, turf grass, farms and perhaps wastewater treatment plant overflows during heavy rain events may contribute to a lack of recruitment for larval mussels.

The Illinois Natural History database contains 279 records of black sandshell occurrences in Illinois, dating back to 1878. Recent populations of black sandshell were tallied from the INHS data, with records dated from the year 2000 through 2012 counted as recent populations. Recent reports of the black sandshell are from 20 discrete river/stream systems with approximately 37 populations known based on Illinois county distributions within the twenty river/stream systems.

Sheepnose Mussel

The sheepnose mussel is a thick shelled species that grows up to five inches in length. Specimens often have broad swellings to the edge of each posterior growth annuli after sexual maturity, giving the shell a somewhat knobby appearance. The sheepnose mussel is known to occur in larger streams and rivers, in moderate to swift current with sand and gravel substrates with occasional cobble, boulder and mud. The only known wild host fish for the sheepnose is the sauger (Sander canadensis). Recent laboratory studies have successfully transformed sheepnose glochidia on fathead minnow (Pimephales promelas), creek chub (Semotilus atromaculatus), central stoneroller (Campostoma anomalum) and brook stickleback (Culaea inconstans). Populations of the sheepnose were generally considered extant by the USFWS if living or fresh dead specimens have been collected since the mid-1980's (Butler 2002). Populations are known from the Kankakee River in Will County with Butler (ibid) stating that,

> *Records since 1986 place the sheepnose from the vicinity of the Iroquois River confluence (Aroma Park) downstream to Kankakee, a distance of approximately six river miles (K.S. Cummings, INHS, pers. comm., 2001).*

A recent INHS survey (Cummings and Tiemann, 2013), obtained a fresh-dead shell (tissue still attached to the shell) of the sheepnose from the Kankakee River near Wilmington, Illinois during 2013. The sheepnose was known from the Sangamon River in Sangamon County. A sheepnose was taken from Salt Creek, a medium sized stream in Logan County in 2009. The USFWS does not consider the Sangamon population of sheepnose to be extant because of few reports available on sheepnose reports and the collection of the last living specimen in 1919 (Butler, op.cit.). The sheepnose mussel was not collected during the Kankakee River mussel survey conducted for this project in 2014.

State-listed Fish Species: *A fish survey was conducted in the Kankakee River in the vicinity of the UPRR bridge on July 22, 2014. The survey results are included in Appendix B. Among the species collected were two state-threatened species, the pallid shiner (Hybopsis amnis) and river redhorse (Moxostoma carinatum). No other state- or federally-listed species were collected. The state-listed species that were collected during the 2014 survey are described below. This ITA presents best management practices and species surveys of identified species in areas where construction could affect listed species.*

River Redhorse

The river redhorse usually is found in small to medium rivers with moderate flow over rock and cobble substrates (Page and Burr, 2011). Suitable habitat for the river redhorse was identified under and immediately upstream and downstream of the bridge (INHS, 2014). This species requires clear water and is intolerant of siltation and turbid conditions (Stagliano, 2001). River redhorse most likely spawn in Illinois from early April to late May (INHS, 2014). However, as river redhorse are relatively late spawners among suckers, spawning may occur in early June in the northern part of their range (Stagliano, 2001). River redhorse have been reported to spawn in 2-4 feet of water

in moderate current over gravel and cobble substrate where redds (nests) are constructed that may be up to 4-8 feet wide (Stagliano, 2001). The species prefers clean gravel areas for spawning. Based on this, there is some spawning habitat at this crossing location, but it is limited to the nearshore areas on each side of the river, as there is exposed bedrock at the surface through a majority of the crossing location.

A recent report by Butler and Wahl (2012) identified 75 occurrances of the river redhorse in the Wilmington reach of the Kankakee River between 1975 and 2011. These occurrences were documented in various resources including the Illinois Department of Conservation Fisheries Metrics database.

Pallid Shiner

There is little life history information available for the pallid shiner, but their preferred habitat is shallow areas with moderately clear water, slow current, and a depositional substrate (Kwak, 1991). Suitable pallid shiner habitat was identified immediately upstream of the bridge (INHS, 2014). The spawning dates for pallid shiner in Illinois are unknown (INHS, 2014), but based on spawning dates of southern populations, the pallid shiner could be expected to spawn sometime after March in the Kankakee River (Kwak, 1991).

The pallid shiner is only present in the Kankakee River between the Will/Kankakee County line and its confluence with the Des Plaines River with the exception of one locality on the Mississippi River and a July 2012 discovery on the Des Plaines River at the I-55 bridge. Over 120 specimens of the pallid shiner from 10 locations within that 12-mile stretch of Kankakee River were collected between 1978 and 2005. Populations of pallid shiner exist as far south as Texas and Louisiana.

C) **description of the activities** that will result in taking of an endangered or threatened species, including practices to be used, a timeline of proposed activities, and any other permitting reviews such as a USFWS biological opinion or USACE wetland review.

The Kankakee River Bridge and Track Improvement Project will require the existing bridge be permanently replaced with a bridge that can accommodate two mainline tracks. Due to the existing movement of freight and passenger rail in the corridor, one lane of track must remain open during construction. To accomplish this, twin superstructures will be constructed. Once the first superstructure is constructed, the live track will be moved to the new superstructure, the old structure demolished, and the second new superstructure constructed. To minimize in-stream work, the new structures will share the same substructure.

Temporary bridges will be constructed on the east and west sides of the existing bridge to enable the demolition of the existing bridge and construction of the new bridge. The temporary bridge on the east side will provide a construction area from which the piers for the new bridge can be installed. The temporary bridge on the west side will provide a construction area from which the superstructure and piers from the existing bridge can be demolished, and the new superstructure can be erected. The temporary structures will be erected using pipe piles screwed directly into bedrock. Pile driving will not be required, nor will spread footing, thus eliminating vibration impacts and minimizing disturbance of the river bottom and associated sediment.

Cofferdams will be used during the construction of the piers for the new bridge. To eliminate vibration and minimize sedimentation during construction of the permanent structure, the use of inflatable bladders or sand bags are being considered. These methods would not require driving sheet piling for the cofferdams. Once the cofferdams are installed, they will be dewatered using

pumps and the footings constructed. As with the temporary structure, pile driving will not be required due to the presence of bedrock at or near the surface (depending on the location in the river).

State-listed mussels could be directly affected if they are located where the new bridge piers are to be placed or through the use of temporary bridges and cofferdams during construction. Habitat for the state-listed mussel species, though limited in the project area, may be temporarily affected during the placement of cofferdams and temporary bridge piers.

No direct effects to state-listed fish species are anticipated from these construction activities, which include noise and vibration, because they are mobile and can move away from areas of disturbance. Indirect impacts could occur if construction activities result in impairment to water quality. Water quality impacts and re-suspension of sediments could affect fish spawning if not properly mitigated/contained. The state-listed fish species may also enter workspaces during construction and have difficulty returning to the mainstream.

D) explanation of the anticipated adverse effects on listed species; how will the applicant's proposed actions impact each of the species' life cycle stages.

It is unknown at this time whether there will be adverse effects on the listed species. Potential adverse impacts to the state-listed mussel species include improper removal or relocation, sediment burial, and physical destruction. State-listed fish species could become entrapped in temporary cofferdams installed in the work area during construction.

Temporary stream impacts have the potential to occur as a result of in-stream work during construction. In-stream work would include installation of cofferdams for dewatering, removal of existing piers, and construction of new piers.

2) Measures the applicant will take to **minimize and mitigate** that impact and the **funding** that will be available to undertake those measures, including, but not limited to -

A) **plans to minimize** the area affected by the proposed action, the estimated **number of individuals** of each endangered or threatened species that will be taken, and the **amount of habitat** affected (please provide an estimate of area by habitat type for each species).

The Kankakee River Bridge and Track Improvement Project uses the existing, previously disturbed transportation corridor. Maximizing the use of the ROW and existing corridor alignment avoids new construction on undisturbed areas, while still meeting the program objectives.

As discussed in the Record of Decision (ROD) prepared for the implementation of the high speed rail project (FRA and IDOT, 2004), to avoid and minimize impacts within the existing corridor to streams and the take of listed species, the following will occur:

1. Because avoiding impact to Kankakee River was not practicable, the area of disturbance has been minimized to the area needed for construction purposes. Erosion and sediment control measures will be implemented to avoid sediment runoff into receiving water bodies. Erosion control measures will adhere to those presented in IDOT's Bureau of Construction and Design and Environment Policy and Procedure Memorandum, dated 2011. The resident engineer will provide day-to-day enforcement of mitigation measures during construction.

2. Worker awareness training, consisting of a pre-construction briefing, will be provided by a qualified environmental professional contracted by UPRR to help minimize and avoid impacts.

3. Prior to construction or in-stream work, additional mussel surveys will be completed in the Kankakee River. All mussels collected during the survey will be relocated to suitable habitats outside of the limits of construction.

4. Additionally, the following BMPs would be employed in the Kankakee River during the fish spawning period from March 15 to July 15 to reduce the potential for impacts to state-listed fish species.

- ***Cofferdams and Silt Curtains**. Technical impact reduction techniques are structures or methods used to reduce potential impacts by reducing pressure waves or repelling fish from the area immediately before beginning work. Impermeable silt curtains and air bubble curtains will be used to mitigate vibration impacts during construction. Silt/turbidity curtains installed around areas of in-stream work would prevent re-suspended sediment from migrating downstream and potentially silting in spawning and foraging areas.*

  Cofferdams will be used during the construction of the piers for the new bridge. To eliminate vibration and minimize sedimentation during construction of the permanent structure, the use of inflatable bladders or sand bags will be considered. These methods would not require driving sheet piling for the cofferdams. Once the cofferdams are installed, they will be dewatered using pumps and the footings constructed. As with the temporary structure, pile driving will not be required due to the presence of bedrock at or near the surface (depending on the location in the river). Additionally, the dewatered area inside the cofferdams creates the same air barrier to shock wave/vibration as a bubble curtain; therefore, air bubble curtains would not be needed once cofferdams are in place.

  Should fish become entrapped in the cofferdams during dewatering, UPRR would provide a biologist to capture and relocate fish outside of the cofferdam prior to complete dewatering. Intake hoses of pumps would also be fitted with fish screens.

- ***Turbidity Monitoring.** Turbidity monitoring would demonstrate that the cofferdams and silt curtains are functioning as intended to contain re-suspended sediment and minimize downstream transport of sediment. This would entail visual observations and in-situ turbidity measurements to demonstrate that the controls are functioning as intended. The water pumped from within the cofferdams might need to be filtered or re-suspended sediment allowed to settle out of the water column prior to discharge to the river to prevent turbidity impacts to fishes and other aquatic life in the vicinity of the construction site. The need for filtration or a settling tank depends on the substrate within the work area. If little fine sediment is present, then turbidity monitoring would be sufficient.*

Specific mussel impacts are not known at this time; however, field surveys conducted in 2014 at the Kankakee River crossing location identified fewer than 30 purple wartyback (Cyclonaias tuberculata), only three black sandshell (Ligumia recta), and no sheepnose (Plethobasus cyphyus). It is estimated that the total of affected mussels will be equal to or less than those identified during the survey. As such, the number of affected purple wartyback mussels is estimated to be zero to thirty, the number of affected black sandshell mussels is estimated to be zero to three, and the number of affected sheepnose mussels is estimated to be zero or one. Due to the presence of bedrock throughout much of the corridor, less than 1/3 acre of habitat could be affected. Specifically,

approximately 0.23 acre of mussel habitat could potentially be temporarily impacted by the temporary work bridges and cofferdams, and approximately 0.03 acre of mussel habitat could potentially be permanently impacted by the permanent bridge. See Figure 2.

Specific impacts to the river redhorse will not be known until construction occurs. Because planned construction activities are known to deter fish from the work area, it is expected that the number of state-listed species to be affected by construction activities will be small. During the fish survey conducted in 2014, five pallid shiners, and three river redhorse were collected within the survey area. As such, the number of state-listed species affected by the project is expected to be equal to or smaller than these numbers, specifically zero to five pallid shiner and zero to three river redhorse.

B) **plans for management of the area affected** by the proposed action that will **enable continued use** of the area by endangered or threatened species (for example, native species planting, invasive species control, use of other best management practices, restored hydrology, etc.).

All work within the Kankakee River will be temporary. After the work is completed, the substrates in which the mussels live will restore themselves through natural geofluvial processes and the hydrology will be restored.

C) description of **all measures to be implemented to minimize and mitigate** the effects of the proposed action on endangered or threatened species, it is the **applicants responsibility to propose mitigation measures** such as habitat restoration, conservation easement, species research, etc. (proposed measures should provide conservation benefit to the State-listed species potentially impacted).

1. Implementation and maintenance of the soil, erosion, and sedimentation control plan.

2. Pre-construction surveys will be conducted by a malacologist retained by UPRR. All mussels identified during the survey will be collected. All relocated mussels will be individually planted in the proper position with siphons pointing in an appropriate direction (usually upstream but current dependent). Mussels will be hand dug into appropriate substrates similar to the substrates from which they were removed. Mussels shall be hand buried by a malacologist or by others under the supervision of one. Mussels will be located, aged, sexed, measured, and marked by GPS coordinates.

3. Should a state-listed fish species become entrapped in a temporary cofferdam during construction, a biologist will capture and relocate the fish outside of the cofferdam.

D) plans for **monitoring the effects of measures implemented to minimize or mitigate** the effects of the proposed action on endangered or threatened species, such as species and habitat monitoring pre-construction and post-construction, include a plan for follow-up reporting to IDNR.

A malacologist retained by UPRR will conduct post construction follow-up at locations adjacent to construction. A report will be prepared to summarize the condition of mussel populations adjacent to the construction limits and submitted to the IDNR by January 31 of the year following completion of project construction.

E) **adaptive management practices** that will be used to deal with changed or unforeseen circumstances that affect the effectiveness of measures instituted to minimize or mitigate the effects of the proposed action on endangered or threatened species, such management practices should include contingencies and may be triggered by monitoring results.

1. Siltation during all phases of construction will be minimized through use of erosion control devices such as silt fences to prevent runoff from entering the river and affecting threatened or endangered mussel habitat and fish species. A designated crew will inspect and maintain silt fences/erosion structures.

2. Mussels from the surveyed area will be collected from the project area and relocated to an appropriate location outside of the project area using approved methods for handling mussels with minimal stress.

3. UPRR will follow specifications on erosion control and water quality best management practices (BMPs). All runoff will be diverted prior to discharge into the river. Increasing retention time of runoff water will reduce sediment load and particulate/dissolved pollutants.

4. After construction is completed, cofferdams will be removed and the stream bottom will be restored to its approximate original condition and flow pattern, allowing for re-colonization of biota.

F) verification that **adequate funding** exists to support and implement all mitigation activities described in the conservation plan. This may be in the form of bonds, certificates of insurance, escrow accounts or other financial instruments adequate to carry out all aspects of the conservation plan.

This project is funded by the American Recovery and Reinvestment Act. There is a cooperative agreement in place between FRA, IDOT, and UPRR, as owner, to implement any mitigation required for this project. Adequate funding for mitigation and monitoring will be available to meet the goals of this conservation plan.

3) A description of **alternative actions** the applicant considered that would not result in take, and the reasons that each of those alternatives was not selected. A "no-action" alternative" shall be included in this description of alternatives.

No Build Alternative

The No Build alternative would not provide the numerous benefits of high speed rail between Chicago and East St. Louis. In addition, the no-build alternative will not provide improvements in air quality and a reduction in energy consumption that would be expected by improving train service.

Construction on New Alignment

Constructing the proposed improvements on a new alignment was also considered. However, no other available practicable sites exist that could serve as an alternative river crossing and meet the overall project purpose. The proposed location was extensively reviewed and determined to be the most practical and least disruptive location given the objectives of the overall HSR program. Because improving the railroad crossing of the Kankakee River is a component of the HSR project, alternate locations are impractical based on the need to address the track efficiencies required at the Kankakee River crossing.

The bridge design has also undergone stringent reviews and the footprint has been minimized to the extent practicable while still achieving the overall goal of safe and efficient train operations. Relocation of the Kankakee River crossing away from the existing alignment would result in far greater impacts than using an existing transportation corridor.

Benefits of the Preferred Alternative

HSR will increase rail passenger ridership based on the result of reduced rail travel times and improvements in reliability and safety of rail service. In addition, improvements in air quality and a reduction in energy consumption would be expected. HSR leads to a more balanced use of the network by diverting trips made by automobile and air while also providing benefits to the human environment.

4) Data and information to indicate that the proposed taking **will not reduce the likelihood of the survival** of the endangered or threatened species in the wild within the State of Illinois, the biotic community of which the species is a part, or the habitat essential to the species existence in Illinois.

An additional mussel survey will be conducted prior to construction starting on the Kankakee River Bridge improvements. If threatened or endangered mussels are found, they will be moved to an appropriate location outside the project area. UPRR will coordinate with IDNR on the timing and findings of the surveys and translocations, if applicable. The noise and vibration caused by construction activities are known to deter fish from work areas; therefore, it is unlikely that fish would enter the workspace. If state-listed fish species become entrapped in temporary cofferdams during construction, they will be captured and relocated outside of the cofferdam.

This action is not expected to reduce the likelihood of the survival of the species for the following reasons:

- *The mussel habitat in the corridor is limited, due to the presence of bedrock at the surface throughout much of the area in the corridor,*
- *Mussels will be relocated prior to construction by a qualified, experienced malacologist using accepted practices, and*
- *The extent of potential habitats for the mussel and fish species are much greater than the extent of the proposed project.*

5) An **implementing agreement**, which shall include, but not be limited to (on a separate piece of paper containing signatures):

A) the names and signatures of all participants in the execution of the conservation plan;

B) the obligations and responsibilities of each of the identified participants with schedules and deadlines for completion of activities included in the conservation plan and a schedule for preparation of progress reports to be provided to the IDNR;

C) certification that each participant in the execution of the conservation plan has the legal authority to carry out their respective obligations and responsibilities under the conservation plan;

D) assurance of compliance with all other federal, State and local regulations pertinent to the proposed action and to execution of the conservation plan;

E) **copies of any final federal authorizations for a taking already issued to the applicant**, if any.

Please see attached.

PLEASE SUBMIT TO: Incidental Take Authorization Coordinator, Illinois Department of Natural Resources, Division of Natural Heritage, One Natural Resources Way, Springfield, IL, 62702 OR ITACoordinator@illinois.gov November 2014

Implementing Agreement

A) Names and Signatures of all participants: UPRR is the owner of this project.

B) Obligations and Responsibilities of each participant with schedules and deadlines for completion and preparation of progress reports submitted to the department: UPRR is responsible for activities related to the Kankakee River Bridge improvements. The UPRR will oversee the activities of the excavation team.

Construction is scheduled to begin in Spring 2015 and be complete by Fall 2017.

Once the project is completed, a summary report will be submitted to the IDNR summarizing all activities that occurred prior to the commencement of monitoring.

C) Certification that each participant has the legal authority to carry out their respective obligations and responsibilities: See Final Clause of this Plan.

D) Assurance of compliance with all other federal, state, and local regulations pertinent to the proposed action and to the execution of the conservation plan: Coordination by UPRR with the U.S. Army Corps of Engineers Chicago District is ongoing. In addition, the project was discussed with resource agencies during regularly scheduled NEPA/404 Merger Meetings. Since completion of the ROD, quarterly conference call updates have been conducted to keep agencies informed of progress on the project, including the status of mussel surveys. Coordination has occurred with the following agencies:

- U.S. Army Corps of Engineers
- U.S. Fish & Wildlife Service
- U.S. Environmental Protection Agency
- Illinois Environmental Protection Agency
- Illinois Department of Natural Resources
- Illinois Historic Preservation Agency
- Illinois Department of Transportation
- Federal Railroad Administration

E) Copies of any federal authorizations of a taking already issued: Coordination with the U.S. Army Corps of Engineers, Rock Island, St. Louis, and Chicago Districts is ongoing. Copies of permits will be forwarded to the IDNR office when received.

CERTIFICATION:

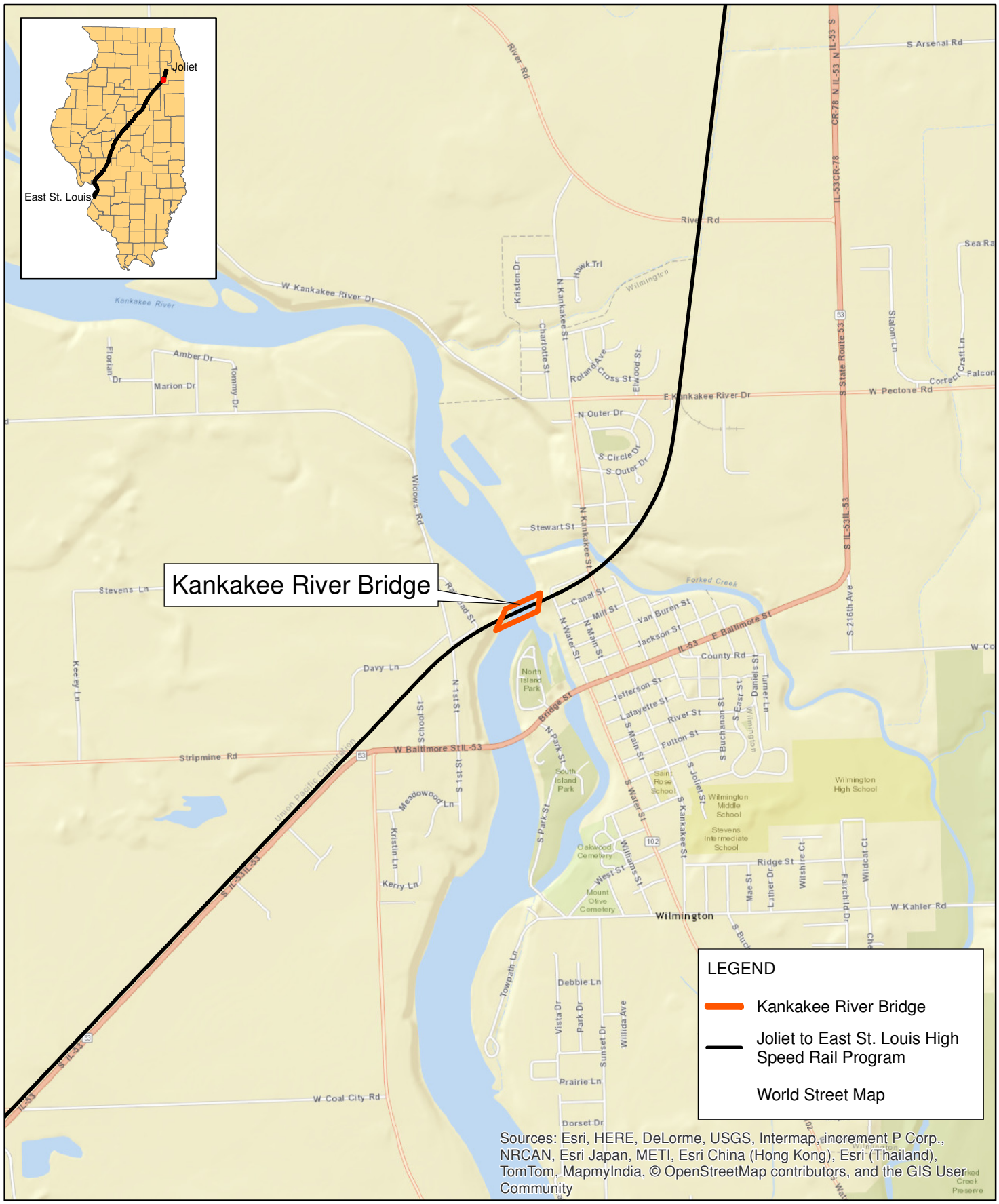
UPRR certifies that it has the authority to complete the project and to address the issues proposed in the Incidental Take Plan in the event state listed threatened or endangered species are encountered. The UPRR is in charge of construction and will assure that all applicable state laws will be adhered to during the completion of the project.

_____

Name Date:
UPRR Representative

FIGURE 1

Project Location Map

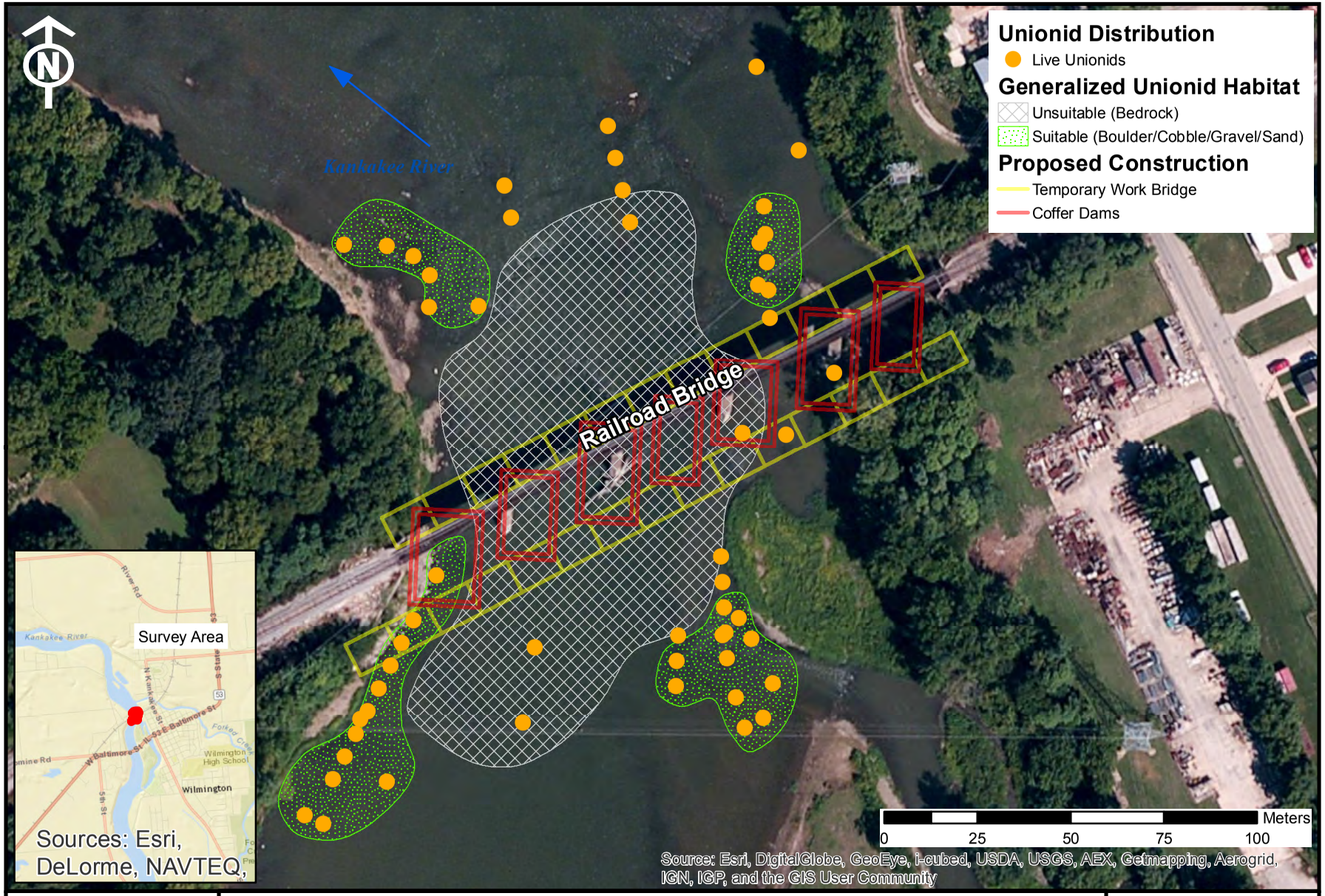


Chicago to St. Louis High Speed Rail Program
Kankakee River Bridge Project Location Map

CH2MHILL

FIGURE 2

Photograph



ECOLOGICAL SPECIALISTS, INC.

Figure 4-1. Generalized unionid distribution and suitable habitat within the study area, Kankakee River, Will County, Illinois, 2014.

ESI
ecologicalspecialists.com

APPENDIX A

Evaluation of Listed Mussels in Joliet to East St. Louis High Speed Rail Project

Appendix A

STATE-LISTED MUSSEL SPECIES REVIEW IN WATERBODIES IN THE JOLIET TO EAST ST. LOUIS HIGH SPEED RAIL PROJECT

1) INTRODUCTION

Numerous waterways are located within the Joliet to East St. Louis High Speed Rail (HSR) project. An evaluation was conducted to determine the likelihood for involvement with state-listed species in each of the waterbodies. Through coordination with the Illinois Natural History Survey, only three waterways have been identified within those limits as potential habitat for state threatened or endangered mussels: Money Creek, Mazon River, and Kankakee River. Of those three, Kankakee River is the only waterbody where both in-stream work is planned and state-listed mussel species may be present. No work is planned within Money Creek, and no state-listed mussel species were found during a 2014 mussel survey in the Mazon River, where improvements to the Union Pacific Railroad (UPRR) bridge are planned. Following are the results of the evaluation of the potential presence of state-listed species in waterbodies within the Joliet to East St. Louis HSR project.

2) MUSSEL SPECIES

A review of the Illinois Natural Heritage Database was conducted to determine the mussel species with the potential to be present in the project area. These species are discussed below. Table 1 summarizes the potentially occurring federal- and state-listed mussel species by the counties in which they could occur.

Spectaclecase Mussel

The spectaclecase mussel is an elongated, relatively thin shelled species that grows up to eight inches in length. The spectaclecase frequents medium to large rivers with swift current, with bottom substrates of boulder, cobble, sand, or gravel. The spectaclecase is frequently found in areas outside of the direct force of the current. Two fish hosts are known for the Spectaclecase: the shorthead redhorse (*Moxostoma macrolepidotum)* and the bigeye chub (*Hybopsis amblops).* The spectaclecase was known from the Des Plaines River and Kankakee River in Will County, Illinois. The spectaclecase mussel is presumed extirpated in the Illinois drainage including the Kankakee and Des Plaines Rivers, and is only found in the Mississippi River in Illinois. The 1991 record for the Kankakee River is for a relic specimen. The last live specimen for the Kankakee River in Illinois was 1906. (Butler, 2002)

> The last reported records for the spectaclecase in some streams occurred decades ago (e.g., Rock, Des Plaines, Kaskaskia, Platte, Wabash, Stones, Red, Little Rivers; River Aux Vases; Big South Fork), [Butler, 2002, Appendix II]. Parmalee (1967) considered it to be a rare and of local occurrence in Illinois in the 1960s, but that it had apparently already been extirpated from the Illinois and Kankakee Rivers.

This High Speed Rail (HSR) project terminates at East St. Louis and will not result in impacts to the Mississippi River. Potential impacts to the spectaclecase mussel are not likely.

Sheepnose Mussel

The sheepnose mussel is a federally listed, thick shelled species that grows up to five inches in length. Specimens often have broad swellings to the edge of each posterior growth annuli after sexual maturity, giving the shell a somewhat knobby appearance. The sheepnose mussel is known to occur in larger streams and rivers, in moderate to swift current with sand and gravel substrates with occasional cobble, boulder and mud. The only known wild host fish for the sheepnose is the sauger (*Sander canadensis*). Recent laboratory studies have successfully transformed sheepnose glochidia on fathead minnow (*Pimephales promelas*), creek chub (*Semotilus atromaculatus*), central stoneroller (*Campostoma anomalum*) and brook stickleback (*Culaea inconstans*). Populations of the sheepnose were generally considered extant by the USFWS if living or fresh dead specimens have been collected since the mid-1980's (Butler 2002). Populations are known from the Kankakee River in Will County with Butler (ibid) stating that,

> Records since 1986 place the sheepnose from the vicinity of the Iroquois River confluence (Aroma Park) downstream to Kankakee, a distance of approximately six river miles (K.S. Cummings, INHS, pers. comm., 2001).

A recent INHS survey (Cummings and Tiemann, 2013), obtained a fresh-dead shell (tissue still attached to the shell) of the sheepnose from the Kankakee River near Wilmington, Illinois during 2013. The sheepnose was known from the Sangamon River in Sangamon County. A sheepnose was taken from Salt Creek, a medium sized stream in Logan County in 2009. The USFWS does not consider the Sangamon population of sheepnose to be extant because of few reports available on sheepnose reports and the collection of the last living specimen in 1919 (Butler, op.cit.). The HSR will cross the Kankakee, Sangamon and Salt Creek in the mentioned counties. The sheepnose mussel was not collected during the Kankakee River mussel survey conducted for this project in 2014.

Snuffbox Mussel

The snuffbox mussel is a federally listed species with a small, moderately stout shell that grows up to 2.5 inches in length. Shells show pronounced sexual dimorphism. The snuffbox frequents small to medium sized creeks to large rivers in riffles and shoals in swift water. The snuffbox is found on substrates of gravel, sand, and gravel riffles, occasionally with cobble or boulders present. Three known snuffbox fish hosts occur in the northern two-thirds of Illinois that are: the mottled sculpin, (*Cottus bairdi*), blackside darter, (*Percina maculata*), and the logperch (*Percina caprodes*). Five other fish hosts are known for the snuffbox but are not found in the project area.

The snuffbox was known to be present in the Kankakee River, Will County, Illinois and could also be present in appropriate habitat in tributaries to the Kankakee River. However, no live specimens have ever been taken from the river and the last fresh dead shell was collected in 1991. The HSR will cross the Kankakee River and five of its tributaries. Examination of the tributary crossings with *Google Earth* ® on February 8, 2013 demonstrated no recent or historical images of the HSR crossings at the five tributary crossings that contain likely riffle habitat for the snuffbox. All recent and historical images show flat water, often ditch-like, without the development of sand/gravel bars near the HSR crossings.

Purple Wartyback Mussel

The purple wartyback is found in medium to large rivers with large to medium gravel or mixed sand and gravel substrates. Cobble and boulders may be present in the substrate. The purple wartyback's distinguishing features include a rounded shell with a fairly prominent wing, numerous bumps (or warts), and a purple nacre, though white nacre is present in some populations. Known fish hosts for the purple wartyback include: the black bullhead (*Ameiurus melas*), yellow bullhead (*Ameiurus natalis*), flathead catfish (*Pylodictis olivaris*) and the channel catfish (*Ictalurus punctatus*), all of which are common and widespread fish in Illinois (Cummings & Mayer 1992, Badra 2004, OSU, 2013).

The purple wartyback is commonly found throughout most of the Midwest and Eastern United States and is found as far west as Oklahoma. Within Illinois, Michigan, Wisconsin, Iowa, and Minnesota the specie's conservation status is listed as imperiled. The purple wartyback is state threatened in Illinois. (Nature Serve, 2013). The INHS database contains 259 records for purple wartyback in 20 counties and from 25 discreet streams in Illinois. Of the 25 discreet stream records, only nine records are from 2000 or later with many records of last occurrence dating to 1897-1925. The purple wartyback is in decline throughout much of its Illinois range.

Spike Mussel

The spike mussel is usually found in small to large rivers, but can also be found in the outlet habitats of lakes and reservoirs. The spike generally lives in sandy and muddy substrates, rarely in cobble. The spike shell's features are elongated, moderately thick, and have a brown to black coloration as its characteristics. Its shell can grow up to six inches but is more commonly four inches. This species requires a fish host to distribute their larvae and known hosts include: the gizzard shad (*Dorosoma cepedianum*), flathead catfish (*Pylodictis olivaris*), sauger, white crappie (*Pomoxis annularis*), black crappie (*P. nigromaculatus*), and the yellow perch (*Perca flavescens*) (Cummings & Mayer 1992, MDNR 2008, OSU, 2013).

The spike mussel is widespread throughout the Midwest and Eastern United States and it ranges as far west as Oklahoma, Nebraska, and South Dakota. Its population is relatively common throughout much of the Midwest but its Conservation Status is listed as imperiled in Illinois and is state threatened (IDNR, 2011, Nature Serve, 2013). The spike in Illinois has rapidly declined in small and medium sized streams where it was once abundant.

The INHS database contains 358 records for spike in Illinois waterways. The spike is known from recent records to occur in streams crossed by the HSR at Hickory Creek (2009) Will County, Kankakee River (2009) Will County, Vermillion River (2012) Livingston County (2009), Sugar Creek (2007) McLean County, and Sangamon River (1988) Sangamon County.
The spike mussel was not collected during the Kankakee River mussel survey conducted for this project in 2014.

Salamander Mussel

The salamander mussel (*Simpsonaias ambigua*) inhabits medium to large rivers and lakes. It tends to be found in silty or muddy substrates under flat slabs or stones (Cummings & Mayer

1992). Its key characteristics include a small, thin, elongated elliptical shell, poorly developed teeth, and a double looped beak structure. Salamander shells grow to be two inches in length. The salamander mussel is the only freshwater mussel that does not use a fish host for larval distribution. Instead, the salamander species uses a mudpuppy salamander (*Necturus maculosus*) (Carmen, *Simpsonaias ambigua*, 2002).

The salamander mussel is found in much of the Midwest and Eastern United States. The species can be abundant where found but is spotty in distribution throughout its range. The salamander mussel is critically imperiled and is listed as endangered in Illinois. (IDNR, 2011, Nature Serve, 2013).

The INHS database contains 20 records for salamander mussel in Illinois waterways. This species is known from several records to occur in the Kankakee River crossed by the HSR in Will County (1991), however it was not collected during the Kankakee River mussel survey conducted for this project in 2014.

Rainbow Mussel

The rainbow mussel (*Villosa iris*) is found in small to medium sized streams with sand and gravel substrates. Its distinguishing characteristics include a small, relatively thin, and elongate shell, a double looped beak structure, and with numerous broken green rays (Cummings & Mayer 1992). The rainbow grows to about two inches in length. The fish hosts for the rainbow along the HSR corridor in Illinois include: the striped shiner (*Luxilus chrysocephalus*), smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), mottled sculpin (*Cottus bairdi*), rock bass (*Ambloplites rupestris*), green sunfish (*Lepomis cyanellus*), rainbow darter (*Etheostoma caeruleum*), and yellow perch (Badra, *Villosa iris*, 2007, OSU, 2013).

The rainbow mussel's range is through much of the Midwest and Eastern states and extends as far west as Oklahoma. Although the species population's Conservation Status is listed as secure or apparently secured in many states, the rainbow mussel is listed as critically imperiled in Illinois (Nature Serve, 2013) and is listed as endangered by the state.

The INHS database contains 119 records for rainbow mussel in Illinois waterways. The rainbow mussel is known from records to occur in: the Kankakee River crossed by the HSR in Will County, (2008), Vermillion River (1991) in Livingston County, and Kickapoo Creek (2004) Logan County. The Rainbow mussel was not collected during the Kankakee River mussel survey conducted for this project in 2014.

Black Sandshell Mussel

The black sandshell inhabits larger streams and rivers with hard bottoms such as, firm, compacted sand, sandy gravel, or gravel/cobble in fast flowing water. Despite its name the black sandshell is rarely found in readily shifting sands and is never found in silty conditions (Parmalee and Bogan, 1998, Montana, 2012). The black sandshell is a thick shelled, elongated mussel that is dark brown or black in maturity, though juvenile and young adults can show a pattern of green rays on a lighter colored shell surface. The black sandshell shows sexual

dimorphism and can reach a length of approximately eight inches. (Cummings & Mayer 1992, Klocek et al. 2006).

Native freshwater mussels require a fish host to distribute their larvae (glochidia). Black sandshells are bradytictic, or long term brooders. Females brood their glochidial larvae from August through the winter to the following July before they are released (Ortmann 1919). Host fish for the glochidia of the black sandshell include the bluegill (*Lepomis macrochirus*), largemouth bass, sauger and white crappie (*Pomoxis annularis*) (Watters 1994). Additionally, yellow perch, green sunfish (*Lepomis cyanellus*), rock bass, and white perch (*Morone americana*) were identified as suitable hosts for L. recta by Steg, (1998). Saugers are considered by some to be a primary host fish for black sandshell (Khym and Layzer. 2000).

Despite the relatively large number of host fish that carry larval black sandshell, the black sandshell appears to be declining throughout its midwestern range. Although exact causes of black sandshell decline are not reported in the literature, general declines or extirpations in mussel populations are attributed to habitat changes and water quality changes that can be linked to pollution from siltation, and urban runoff. (Downing et al. 2010). Recent findings that mussel glochidia are acutely sensitive to small ammonia spikes (USEPA, 2009) indicate that ammonia runoff from lawns, turf grass, farms and perhaps wastewater treatment plant overflows during heavy rain events may contribute to a lack of recruitment for larval mussels.

The Illinois Natural History database contains 279 records of black sandshell occurrences in Illinois, dating back to 1878. Recent populations of black sandshell were tallied from the INHS data, with records dated from the year 2000 through 2012 counted as recent populations. Recent reports of the black sandshell are from 20 discrete river/stream systems with approximately 37 populations known based on Illinois county distributions within the twenty river/stream systems. Black sandshells are known from records to occur in the vicinity of the HSR corridor in the Kankakee River Will County (2012) and from a single record for the Sangamon River, Sangamon County (1988). The black sandshell mussel was collected during the Kankakee River mussel survey conducted for this project in 2014.

TABLE 1					
FEDERAL AND STATE PROTECTED MUSSELS BY COUNTY					
County	**Latin name**	**Common Name**	**State Protection**	**Federal Protection**	**Comment**
Will	*Cumberlandia monodonta*	Spectaclecase	Endangered	Endangered	Extirpated
	Alasmidonta viridis	Slippershell	Threatened	....	....
	Cyclonaias tuberculata	Purple wartyback	Threatened	....	....
	Elliptio dilatata	Spike	Threatened	....	....
	Epioblasma triquetra	Snuffbox	Endangered	Endangered	....
	Ligumia recta	Black sandshell	Threatened	....	....
	Plethobasus cyphyus	Sheepnose	Endangered	Endangered	....
	Simpsonaias ambigua	Salamander mussel	Endangered	....	....
	Villosa iris	Rainbow mussel	Endangered	....	....
Grundy*	*Alasmidonta viridis*	Slippershell	Threatened	....	....
	Elliptio dilatata	Spike	Threatened	....	Illinois River only
	Ligumia recta	Black sandshell	Threatened	....	Illinois River only
Livingston	*Alasmidonta viridis*	Slippershell	Threatened	....	....
	Elliptio dilatata	Spike	Threatened	....	....
	Villosa iris	Rainbow mussel	Endangered	....	....
McLean	*Alasmidonta viridis*	Slippershell	Threatened	....	....
	Elliptio dilatata	Spike	Threatened	....	....
Logan	*Alasmidonta viridis*	Slippershell	Threatened	....	....
	Plethobasus cyphyus	Sheepnose	Endangered	Endangered	Salt Creek
	Villosa iris	Rainbow mussel	Endangered	....	....
Sangamon	*Elliptio dilatata*	Spike	Threatened	....	....
	Plethobasus cyphyus	Sheepnose	Endangered	Endangered	Extirpated (1988)
Macoupin	No Mussels in database			....	database poor
Jersey	No Mussels in database			….	….
Madison	*Cumberlandia monodonta*	Spectaclecase	Endangered	Endangered	Mississippi River
	Ellipsaria lineolata	Butterfly	Threatened	....	Mississippi River
	Elliptio crassidens	Elephant-ear	Threatened	....	Mississippi River
	Elliptio dilatata	Spike	Threatened	....	....
	Fusconaia ebena	Ebonyshell	Threatened	....	Mississippi River
	Ligumia recta	Black sandshell	Threatened	....	Mississippi River

Source: Illinois Natural History Database accessed 02/06/13

*The Mazon drainage is considered a *Unique Aquatic Resource* by IDNR

Table 2 lists the stream locations within the project corridor and the potential for the presence of state-listed mussels based on database records or past field studies. Again, of the 120 stream locations in the project corridor, 3 are identified as streams in which mussels could occur. Of these 3 locations, sampling for mussels was recommended by INHS at potential crossings of the Kankakee and Mazon Rivers and Money Creek. As no work is proposed at Money Creek, sampling did not occur at that location. Surveys at the Kankakee and Mazon Rivers were conducted in 2014. No state listed mussels were identified at the Mazon River. Two state-listed mussel species were identified at the Kankakee River.

Table 2. Stream Locations within the Project Corridor

Site	County	Milepost	Latitude	Longitude	Stream	Protected Mussels Unlikely
1	Will	38.0	41.510133	-88.079611	Hickory Creek	X
2	Will	38.5	41.502636	-88.084731	Sugar Run	X
3	Will	39.0	41.495963	-88.088061	Intermittent tributary	X
4	Will	40.5	41.479372	-88.090336	intermittent tributary	X
5	Will	41.8	41.4603	-88.09508	Cedar Creek	X
6	Will	42.5	41.450074	-88.097632	Intermittent tributary to Cedar Creek	X
7	Will	43.0	41.444276	-88.09908	Intermittent tributary to Cedar Creek	X
8	Will	43.8	41.431971	-88.10211	Intermittent tributary to Jackson Creek	X
9	Will	44.5	41.423019	-88.104369	Jackson Creek	X
10	Will	46.5	41.391854	-88.117814	Intermittent tributary to Grant Creek	X
11	Will	47.0	41.384944	-88.12314	Grant Creek	X
12	Will	48.0	41.377466	-88.128777	Intermittent tributary	X
13	Will	49.0	41.363021	-88.134768	Intermittent tributary to Prairie Creek	X
14	Will	49.5	41.35462	-88.136154	Prairie Creek	X
15	Will	50.0	41.348969	-88.137065	Intermittent tributary to the Kankakee River	X
16	Will	50.0	41.347479	-88.137451	Intermittent drainage to marsh	X
17	Will	50.5	41.344099	-88.137962	Intermittent drainage to the Kankakee River	X
18	Will	50.5	41.343664	-88.136542	Intermittent drainage to marsh	X
19	Will	50.8	41.337625	-88.139053	Intermittent drainage to the Kankakee River	X
20	Will	51.0	41.334694	-88.139405	Drainage ditch tributary to the Kankakee River	X

Table 2. Stream Locations within the Project Corridor

Site	County	Milepost	Latitude	Longitude	Stream	Protected Mussels Unlikely
21	Will	51.5	41.325826	-88.140831	Tributary of the Kankakee River	X
22*	Will	52.5	41.313047	-88.14588	Forked Creek	X
23**	Will	52.5	41.311098	-88.150506	Kankakee River	.....
24	Will	59.5	41.240718	-88.241597	Unnamed farm drainage ditch, Godley,	X
25	Grundy	60.0	41.232638	-88.251679	Unnamed farm drainage ditch, Godley, IL	X
26	Grundy	61.0	41.225739	-88.260193	Unnamed drainage ditch, between RR and RT 53	X
27	Grundy	62.5	41.207274	-88.283717	Mazon River	X
28	Grundy	62.8	41.206611	-88.284226	Unnamed tributary ditch To the Mazon River	X
29	Grundy	64.0	41.193183	-88.30119	Unnamed tributary ditch to the Mazon River	X
30	Grundy	65.0	41.182313	-88.314921	Unnamed tributary ditch to the Mazon River	X
31	Grundy	66.0	41.171822	-88.328327	Unnamed intermittent tributary to the Mazon River	X
32	Grundy	67.0	41.160253	-88.342847	Unnamed tributary to the Mazon River	X
33	Grundy	70.0	41.129469	-88.381646	Gooseberry Creek	X
34	Grundy	71.0	41.116396	-88.397899	Tributary to Gooseberry Creek	X
35	Livingston	72.5	41.104505	-88.412907	Gooseberry Creek running along westside RR	X
36	Livingston	72.5	41.103426	-88.414183	Tributary to Gooseberry Creek	X
37	Livingston	72.8	41.101716	-88.416517	Gooseberry Creek moves out of RR ROW	X
38	Livingston	73.0	41.096653	-88.422729	Gooseberry Creek	X
39	Livingston	75.5	41.071913	-88.453431	Tributary to Gooseberry Creek/Swale	X
40	Livingston	77.5	41.050059	-88.481046	Branch of the West Fork of the Mazon River	X
41	Livingston	80.0	41.019152	-88.510055	Tributary ditch to the West Fork of the Mazon River	X
42	Livingston	80.5	41.014931	-88.51397	Intermittent tributary	X
43	Livingston	81.0	41.008575	-88.520086	Intermittent tributary/swale	X

Table 2. Stream Locations within the Project Corridor

Site	County	Milepost	Latitude	Longitude	Stream	Protected Mussels Unlikely
44	Livingston	83.0	40.984132	-88.542441	Intermittent tributary to the west fork of the Mazon River	X
45	Livingston	84.0	40.967389	-88.558962	Wolf Creek	X
46	Livingston	85.5	40.955531	-88.570564	Intermittent tributary to Wolf Creek	X
47	Livingston	88.0	40.921596	-88.601297	Intermittent tributary to North Creek	X
48	Livingston	90.0	40.906792	-88.614755	North Creek	X
49	Livingston	91.0	40.893633	-88.626915	North Creek	X
50*	Livingston	92.0	40.878089	-88.637924	Vermilion River	X
51	Livingston	93.8	40.855959	-88.651589	Turtle Creek	X
52*	Livingston	97.0	40.814448	-88.677613	Rooks Creek	X
53	Livingston	99.0	40.788456	-88.69364	Lakes surrounding RR and connected to Rooks Creek	X
54	Livingston	100.0	40.772531	-88.703652	Tributary to Turkey Creek	X
55	McLean	103.0	40.734522	-88.727179	Intermittent tributary/swale that runs along east side RR	X
56*	McLean	108.0	40.663921	-88.77094	Turkey Creek	X
57	McLean	109.0	40.65592	-88.775611	Intermittent tributary to Turkey Creek	X
58*	McLean	111.0	40.631925	-88.798985	Mackinaw River	X
59a*	McLean	112.0	40.621639	-88.814358	Tributary to Mackinaw River	X
59b	McLean	113.8	40.606101°	-88.836010°	Intermittent tributary to Rook's Creek	X
60	McLean	114.5	40.599283	-88.845828	Intermittent Tributary to Mackinaw River	X
61**	McLean	117.0	40.57263	-88.884927	Money Creek	.....
62	McLean	120.0	40.546793	-88.924964	Intermittent tributary to Sixmile Creek	X
63a*	McLean	125.0	40.499204	-88.99641	Sugar Creek	X
63b	McLean	127.5	40.466418°	-89.015443°	Urban tributary to Sugar Creek	X
64	McLean	130.0	40.433972	-89.034681	Intermittent tributary of Sugar Creek	X
65	McLean	134.0	40.3893	-89.082672	Intermittent tributary to Timber Creek	X

Table 2. Stream Locations within the Project Corridor						
Site	**County**	**Milepost**	**Latitude**	**Longitude**	**Stream**	**Protected Mussels Unlikely**
66	McLean	135.0	40.37484	-89.09891	Intermittent tributary to Timber Creek	X
67*	McLean	136.5	40.362058	-89.114411	Timber Creek	X
68	McLean	137.5	40.349265	-89.1291	Intermittent tributary to Timber Creek	X
69	McLean	138.8	40.337893	-89.142522	Intermittent tributary to Timber Creek	X
70	McLean	141.5	40.309255	-89.175846	Branch of unnamed intermittent tributary	X
71*	Logan	144.0	40.280595	-89.209473	Clear Creek	X
72	Logan	147.0	40.249866	-89.252131	Intermittent tributary of Kickapoo Creek	X
73	Logan	147.5	40.245364	-89.256464	Intermittent tributary of Kickapoo Creek	X
74	Logan	148.5	40.232185	-89.266099	Tributary of Kickapoo Creek	X
75	Logan	149.5	40.222257	-89.277383	Kickapoo Creek	X
76	Logan	152.5	40.187393	-89.317862	Tributary ditch to Kickapoo Creek	X
77	Logan	154.0	40.172591	-89.335092	Intermittent tributary of Kickapoo Creek	X
78	Logan	155.0	40.163809	-89.345303	Intermittent tributary of Kickapoo Creek	X
79	Logan	157.5	40.135661	-89.378451	Tributary to Salt Creek	X
80	Logan	158.0	40.130102	-89.388331	Salt Creek	X
81	Logan	159.8	40.112223	-89.405443	Tributary to Lake Fork	X
82	Logan	162.5	40.076267	-89.435722	Headwaters tributary to Lake Fork	X
83	Logan	164.0	40.059235	-89.450501	Tributary to Lake Fork	X
84	Logan	165.0	40.044883	-89.462457	Tributary to Elkhart Slough	X
85	Logan	168.0	40.011689	-89.492574	Tributary ditch to Elkhart Slough	X
86	Logan	170.5	39.983924	-89.519878	North branch of Wolf Creek	X
87	Logan	171.0	39.976538	-89.527251	Headwaters Wolf Creek	X
88	Sangamon	174.0	39.942224	-89.560838	Intermittent tributary to Fancy Creek	X
89	Sangamon	176.0	39.916994	-89.582114	Fancy Creek	X
90	Sangamon	180.0	39.866406	-89.609494	Sangamon River	X
91	Sangamon	192.0	39.705064	-89.687714	Lake Springfield crossing	X

Table 2. Stream Locations within the Project Corridor

Site	County	Milepost	Latitude	Longitude	Stream	Protected Mussels Unlikely
92	Sangamon	196.5	39.644646	-89.717735	Intermittent tributary of Panther Creek	X
93	Sangamon	196.8	39.642048	-89.718969	Intermittent tributary of Panther Creek	X
94	Sangamon	197.0	39.6361	-89.72194	Intermittent tributary of Panther Creek or farm swale	X
95	Sangamon	197.5	39.630469	-89.724546	Panther Creek	X
96	Sangamon	200.0	39.598164	-89.740292	Tributary of Sugar Creek	X
97	Sangamon	201.5	39.576886	-89.747516	Pond crossing/Intermittent Tributary of Sugar Creek	X
98	Sangamon	203.0	39.556179	-89.752129	Sugar Creek	X
99	Macoupin	207.5	39.488251	-89.767153	West fork of Otter Creek	X
100	Macoupin	208.0	39.483946	-89.768248	West fork of Otter Creek	X
101	Macoupin	208.8	39.474689	-89.770275	East fork of Otter Creek and large pond adjacent to RR	X
102	Macoupin	209.8	39.460726	-89.773588	Intermittent tributary of the east fork of Otter creek	X
103	Macoupin	211.8	39.43257	-89.784297	Intermittent tributary to Searle's Branch	X
104	Macoupin	214.0	39.404877	-89.803172	Headwaters West fork ditch of Searle's Creek	X
105	Macoupin	216.5	39.37206	-89.825688	Intermittent tributary ditch to Anderson Branch	X
106	Macoupin	218.3	39.351249	-89.840165	Headwaters tributary to Anderson Branch	X
107	Macoupin	230.0	39.210577	-89.95888	Intermittent tributary to Hurricane Creek	X
108	Macoupin	230.5	39.199582	-89.963208	Macoupin Creek	X
109	Macoupin	231.5	39.189105	-89.965339	May Branch	X
110	Macoupin	232.5	39.178119	-89.971989	Intermittent tributary of May Branch	X
111	Macoupin	232.5	39.176933	-89.972398	Intermittent tributary of May Branch	X
112	Macoupin	236.0	39.144984	-90.02237	Coop Branch	X
113	Macoupin	239.3	39.106366	-90.059351	Intermittent tributary of	X

Table 2. Stream Locations within the Project Corridor

Site	County	Milepost	Latitude	Longitude	Stream	Protected Mussels Unlikely
					Coop Branch	
114	Macoupin	240.0	39.098674	-90.06972	Intermittent tributary of Coop Branch	X
115	Macoupin	240.5	39.095465	-90.073947	Intermittent tributary of Coop Branch	X
116	Macoupin	240.8	39.092793	-90.077726	Intermittent tributary of Coop Branch	X
117	Macoupin	244.5	39.053727	-90.125121	Intermittent tributary from Little Piasa Creek	X
118	Madison	254.3	38.929901	-90.165083	Tributary to Coal Branch	X
119	Madison	258.0	38.889153	-90.118422	Wood River	X
120	Madison	266.8	38.805333	-90.086269	Cahokia Creek	X

** Sampling occurred and threatened or endangered species were not found.*
*** Sampling occurred and threatened or endangered species were identified.*
Shaded – sampling is recommended.

APPENDIX B

Survey Reports

Unionid Survey for Proposed Construction at an Existing Railroad Bridge in the Kankakee River near Wilmington, Illinois

Prepared for:

CH2M HILL

Englewood, Colorado

Under contract to:

Union Pacific Railroad

Omaha, Nebraska

Prepared by:

Ecological Specialists, Inc.

O'Fallon, Missouri

October 2014

(ESI Project 14-013)

Acknowledgments

Union Pacific Railroad funded this project through CH2M HILL. Mr. Jeff Frantz managed the project for CH2M HILL. Mr. Eric Belt of Ecological Specialists, Inc. (ESI) was the project manager, field team leader, and primary report author. Mr. Robert Williams, Mr. Andrew Velez, Mr. Matt Schaefer, and Ms. Emily Grossman assisted with fieldwork for ESI. Ms. Heidi Dunn was co-author.

Executive Summary

Union Pacific Railroad has proposed bridge construction at an existing railroad bridge across the Kankakee at Wilmington, Illinois. The purpose of this construction is to create two lanes for the future high-speed rail. It is our understanding that construction will involve placing two temporary work bridges upstream and downstream of the current bridge for constructing seven new piers within the river. A mussel survey in the area is needed to understand if federal or state protected species may be present within the project area.

Semi-quantitative and quantitative methods were used to meet the study objectives. Four (4) 200 m transect lines were established parallel with the current. Lines were positioned approximately 100 m upstream to 100 m downstream of the railroad bridge. At least 3 min. of search time was spent within areas of suitable substrate. Thirty-four (34) quantitative samples were collected within the areas where unionids were most abundant. Depth and substrate constituents (Wentworth scale) were recorded at each sample. Sampling was conducted July 21, 24, and 25, 2014.

A total of 437 live individuals representing 17 species of the 35 taxa historically known from the Kankakee River, including two Illinois threatened species (*Cyclonaias tuberculata* and *Ligumia recta*), were collected within the survey area. Unionids were most abundant within 10 m of the bank where habitat was more suitable (cobble, gravel, and sand). Habitat throughout the majority of the study area was bedrock, and therefore unsuitable for unionids. Most unionids were within 50-100 m upstream within 10 m the left descending bank.

No federally endangered species were collected in this study, but federally endangered and other Illinois protected species have recently been collected within 6.5 km of the existing bridge, and additional species are expected to occur in the study area based on a species accumulation curve.

Table of Contents

List of Figures

List of Tables

1.0 Introduction

Union Pacific Railroad has proposed bridge construction at an existing railroad bridge across the Kankakee at Wilmington, Illinois. The purpose of this construction is to create two lanes for the future high-speed rail. It is our understanding that construction will involve placing two temporary work bridges upstream and downstream of the current bridge for constructing seven new piers within the river. A mussel survey in the area is needed to understand if federal or state protected (threatened and endangered; T&E) species may be present within the project area.

In-stream construction can harm freshwater mussels (unionids; Order Unionoida) directly by crushing them, disturbing the substrate during construction, or re-suspending sediment that can clog unionid gills and filtration systems causing nutritive stress and reduced growth, oxygen consumption, and nitrogen excretion (Aldridge et al., 1987). Sedimentation is extremely detrimental to unionids and is implicated in the decline and extinction of numerous species (Box and Mossa, 1999). Indirect effects can include changes in substrate that alter unionid habitat or changes in river bottom topography that influence host fish behavior.

The Kankakee harbors one of Illinois' most diverse and abundant mussel communities and is regarded as a Biologically Significant Stream in Illinois (Page et al., 1992). It is an important river in Illinois for species diversity and known populations of rare species (Cummings and Mayer, 1997). At least 35 unionid species have been recorded in the Kankakee River since 1906 (Table 1-1). Of these 35, *Lampsilis higginsii*, *Cumberlandia monodonta*, *Plethobasus cyphyus*, and *Epioblasma triquetra* are federally endangered, *Simpsonaias ambigua* and *Villosa iris* are listed as endangered in Illinois, *Alasmidonta viridis, Cyclonaias tuberculata*, *Elliptio dilatata*, and *Ligumia recta* are listed as threatened in Illinois, and *Venustaconcha ellipsiformis* is listed as a species of special concern in Illinois (IESPB, 2010).

Because construction activities may harm unionid resources in the Kankakee River, and Illinois Department of Natural Resources (IDNR) and the U.S. Fish & Wildlife Service (USFWS) require surveys before construction, Ecological Specialists, Inc. (ESI) was contracted to conduct a unionid survey near the Wilmington railroad bridge. The objective of this study was to map unionid distribution and collect species composition information (specifically T&E species) within the project area. Fieldwork was conducted July 21, 24, and 25, 2014.

2.0 Methods

Semi-quantitative and quantitative methods were used to meet the study objectives. Four (4) 200 m transect lines were established parallel with the current (Figure 2-1). Lines were positioned approximately 100 m upstream to 100 m downstream of the railroad bridge. Current velocity was high toward the middle and substrate was often bedrock, so maintaining transect lines in place proved difficult. Therefore, some transects were not quite 100 m upstream and extended further downstream. Lines were marked at 10 m intervals. A diver (or snorkeler in shallow areas) crawled along the transect lines, collecting encountered unionids within 1 m on one side of each line. Each 10 m interval was a separate sample. At each 10 m mark, the collected unionids were retrieved by the surface crew and processed. At least 3 min. of search time was spent within areas of suitable substrate. Depth and substrate constituents (Wentworth scale) were recorded at each 10 m mark.

To estimate unionid density and detect juveniles and smaller species, 34 quantitative samples were collected within the areas where unionids were most abundant (Figure 2-1). Quantitative sampling consisted of excavating all substrate within a 0.25 m^2 quadrat to a depth of 15 cm or bedrock. Excavated material was pushed into an attached mesh bag (6 mm mesh). The sample was then be retrieved and processed. Substrate and depth were recorded for all samples. Much of the substrate where unionids were found was cobble, which makes it difficult to find smaller species during qualitative sampling. Since the purpose of qualitative sampling is to find additional species, in lieu of qualitative sampling (which is biased toward larger individuals), additional quantitative samples were collected.

For each sample, unionids were brought to the surface and identified to species. Live unionids (up to 30 per species) were counted, measured (length in mm), and aged (external annuli count). Freshly dead unionids (with or without meat, nacre lustrous, valves still intact, periostracum present; animal likely dead less than one year) were counted and noted as adults or juveniles. Weathered (no meat, nacre chalky, valves may or may not be intact, periostracum present; animal probably dead more than one year) or subfossil shells (entire shell chalky, valves not intact, no periostracum; animal dead from several years to centuries) were noted as present. Live unionids of listed species were hand placed in the substrate at the point of collection. Most species (except three common: *Truncilla donaciformis*, *Potamilus alatus*, and *Lasmigona costata* were inadvertently omitted) were photographed (see Appendix A). However, weathered dead specimens of *P. alatus* and *L. costata* were retained. Table 2-1 shows total sampling effort throughout the site.

3.0 Results

Habitat throughout the study area was largely a relatively shallow run, with most of the substrate being bedrock (Table 3-1; Figure 3-1). Bedrock extended approximately 50 m upstream and downstream of the bridge along the river's width, excluding within about 10 m of each bank. In addition, current velocity appeared to increase significantly beyond 10 m from the banks. Upstream on the left descending bank (LDB) along Transect 1 (T1), substrate was a mix of boulder, cobble, gravel, and sand with patches of bedrock. Bedrock extended downstream for 50 m, beyond which boulder, cobble, and gravel became more common. Substrate along T2 and T3 was mostly bedrock, with some boulder, gravel, and sand encountered 50 m upstream and downstream of the bridge (Table 3-1; Figure 3-1). Boulder, cobble, and gravel were present upstream along the right descending bank (RDB) within 50-100 m upstream then transitioned to bedrock 0-50 m upstream. Boulder, cobble, and gravel were present just downstream along T4, and then substrate transitioned back to bedrock. Depths ranged from 0.3-1.2 m along transects; shallower areas (0.15 m) were present downstream along the LDB were quantitative samples were collected (Figure 3-1).

Although habitat throughout the majority of the study area was bedrock, and therefore unsuitable for unionids, abundant unionids were observed in areas within 10 m of the bank, and a few other locations where habitat was more suitable. Most unionids were along T1 within 50-100 m upstream near the LDB where substrate was generally an even mix of boulder, cobble, gravel, and sand (Table 3-1; Figure 3-1; Figure 3-2). Relatively few were collected along T2 and T3, and where present, were associated with substrates of boulder, cobble, gravel, and sand rather than bedrock (Table 3-1). Relative density (no. live / 10 m^2) in semi-quantitative samples averaged 14.9 (LDB) and 2.7 / 10 m^2 section (RDB), but only 0.9/ 10 m^2 mid-channel (Table 3-2). Species richness was also higher along the banks, with 14 and 8 species along the LDB and RDB, respectively and only 5 species mid-channel (Table 3-2).

A total of 437 live individuals of 17 species, including two Illinois threatened species, were collected throughout the survey area. The majority (71.6%) of unionids were the common *Actinonaias ligamentina*. The next most abundant species was *Cyclonaias tuberculata* (Illinois threatened) and *Potamilus alatus*, which each represented 5.9% (Table 3-3). *Quadrula p. pustulosa* (3.0%), *Amblema plicata* (2.7%), and *Lasmigona costata* (1.8%) were also relatively common. *Quadrula metanevra*, *Lampsilis cardium*, and *Leptodea fragilis* were each at 1.1% relative abundance. *Fusconaia flava*, *Pleurobema sintoxia*, *Megalonaias nervosa*, *Strophitus undulatus*, *Ligumia recta* (Illinois threatened), *Obliquaria reflexa*, and *Truncilla donaciformis* were all relatively rare at less than 1% each (Table 3-3). No freshly dead shells were observed, nor were weathered dead shells of species not collected live. Only one juvenile (0.3%) was collected in semi-quantitative sampling. In contrast, 16 juveniles (32.0%) were collected in quantitative samples, as this method is less biased towards larger individuals. *Truncilla donaciformis*, which is the smallest species as an adult found in this study, was only collected in quantitative samples. In addition, over half (58.3%) of the unionids collected in quantitative samples along the LDB were juveniles (Table 3-2). Juveniles (annuli count ≤ 5) of 7 species were observed (Table 3-4), which suggests a reproducing unionid community.

4.0 Discussion

The purpose of this project was to estimate abundance and distribution of unionids (especially T&E species) within a defined area at the proposed river crossing in the Kankakee River. Temporary work bridges, cofferdams, and new piers may impact unionids within the project area both directly and indirectly. Unionids may be crushed or buried under fill material during installation of piers and cofferdams. In addition, altered flow patterns may indirectly affect resident unionids. Unionid distribution is likely related to complex hydraulic variables, which measure substrate and flow stability (ESI, 2014). Overall stability (during both low and high flows) appears to be most significant factor in preserving unionid habitat (Haag, 2012). Unionids require substrate that is soft enough for burrowing but is stable in both low and high flow (remains in place during high water, no major scouring or deposition; Strayer, 2008). They also need relatively consistent flow, some current velocity during low discharge, but current velocity not high enough during high discharge to dislodge unionids (flow refugia). Construction of bridge piers and cofferdams affect patterns of sediment scouring and deposition, which is particularly important in this reach of the Kankakee where the river narrows and flow is concentrated in the center of the channel. In addition, changes in flow patterns around structures may impact unionid abundance and distribution, especially along the banks. Habitat within approximately 10 m from the banks appeared most stable. Substrate riverward was bedrock, suggesting that higher current velocities mid channel prevent formation of stable sand, cobble, gravel, and boulder substrate conditions. During high discharge events, the banks provide flow refugia, as flow is concentrated through the center of the river. Altering current conditions may greatly impact the delicate balance of habitat conditions on which the resident unionids rely for survival. Figure 4-1 presents generalized unionid habitat and distribution.

Although the unionid diversity appears relatively low, being dominated by one common species (*A. ligamentina*), rare species were collected; further sampling may prove additional species presence within the impact area. The species accumulation curve and observed unionid densities suggest more species are present within the study area (Figure 4-1). Fifteen (15) species were collected along transects. Two (2) new species (*Fusconaia flava* and *Truncilla donaciformis*) were recovered in the 34 quantitative samples (Table 3-3). Regression analysis based on cumulative species and the log of cumulative individuals (R^2= 0.94) predicts another species at 700 individuals and 3 more (for a total of 20 species) at 1000 (Figure 4-1). Assuming at a minimum that the area within 50 m upstream and 10 m riverward along the LDB will be impacted (500 m^2), and based on density estimates throughout the site (8.3/m^2±3.2), the estimated number within that area is 2550-5750 live individuals.

Since several T&E species are known to occur near the project site and additional species are likely present at the site, T&E species may occur within the bridge construction area. Between 2008 and 2010, 28 species have been collected alive near the study area (Table 1-1). Fifteen (15) of these and 2 additional species (*Obliquaria reflexa* and *Truncilla donaciformis*) were collected in this survey, and at least 3 additional species are expected within the study area. Species not found in this survey, but collected nearby since 2000 include *Elliptio dilatata* (Illinois threatened species), *Quadrula quadrula*, *Alasmidonta marginata*, *Anodonta suborbiculata*, *Lasmigona c. complanata*, Pyganodon grandis, *Utterbackia imbecillis*, *Lampsilis siliquoidea*, *Potamilus ohiensis*, and *Venustaconcha ellipsiformis* (Illinois special concern species)

(Table 1-1). Additionally, ESI collected one live *P. cyphyus* and a freshly dead *Simpsonaias ambigua* shell (Illinois endangered) just 1.5 km downstream during July 2014 (ESI, unpublished) and another was recorded approximately 650 m upstream at the Route 53 Bridge in 1984 (Kasprowicz et al., 1985). In 2008 and 2010, a freshly dead *P. cyphyus* shell, and live *V. ellipsiformis* and *E. dilatata* were collected in the Kankakee in Will County 6.5 km upstream (HDR, 2008; ESI, 2010).

5.0 Literature Cited

Aldridge, D. W., B. S. Payne, and A. C. Miller. 1987. The effects of intermittent exposure to suspended solids and turbulence on three species of freshwater mussels. Environmental Pollution 45:17-28.

Box, J. M., and J. Mossa. 1999. Sediment, land use, and freshwater mussels: prospects and problems. Journal of the North American Benthological Society 18:99-117.

Cummings, K. S., and C. A. Mayer. 1997. Distributional Checklist and Status of Illinois Freshwater Mussels (Molluscas: Unionacea). Pages 129-145 in K.S. Cummings, A.C. Buchanan, C.A. Mayer and T.J. Naimo, editors. Conservation and Management of Freshwater Mussels II: Initiatives for the Future. Proceedings of a UMRCC Symposium, 16-18 October 1995, St. Louis Missouri. Upper Mississippi River Conservation Committee, Rock Island, Illinois. 293pp.

Ecological Specialists, Inc. (ESI). 2003a. Unionid Mussel Survey of the Kankakee River at Two Proposed Water Intake Sites for the City of Joliet, Illinois. Prepared for EA Engineering, Science, and Technology. 19pp.

Ecological Specialists, Inc. (ESI). 2003b. Qualitative surveys of unionids and associated habitats within the Rock, Illinois, and Kankakee Rivers, Illinois to identify potential relocation areas for the federally endangered Higgins' eye pearly mussel (*Lampsilis higginsii*). Report prepared for MACTEC, Inc., Maryland Heights, MO under contract with U.S. Army Corps of Engineers, Rock Island District, Rock Island, IL. 42pp.

Ecological Specialists, Inc. (ESI). 2008. Characterization of Unionid Communities near the Braidwood Nuclear Station Kankakee River Discharge Location. Prepared for Exelon Nuclear. 14pp.

Ecological Specialists, Inc. (ESI). 2009. Characterization and Relocation of Unionid Communities Within Proposed Dredge Site, Kankakee River, Will County, Illinois. Prepared for Exelon Nuclear, Braidwood, Illinois. 8pp.

Ecological Specialists, Inc. (ESI). 2010. Unionid Relocation near the Braidwood Nuclear Station Kankakee River Discharge Location. Prepared for Exelon Nuclear, Braidwood, Illinois. 15pp.

Ecological Specialists, Inc. (ESI). 2014. Final report: unionid mussel habitat construction/creation summary. Prepared for U.S. Army Corps of Engineers, St. Louis District. 64pp + appendices.

Haag, W. R. 2012. North American Freshwater Mussels. Natural History, Ecology, and Conservation. Cambridge University Press. New York, New York. 505pp.

HDR Engineering, Inc. (HDR). 2008. Investigations to Determine Presence of State-Listed Species of Fish and Freshwater Mussels in the Kankakee River Near the Braidwood Nuclear Station Warmwater Discharge Channel. Prepared for Exelon Nuclear. 21pp.

Illinois Endangered Species Protection Board (IESPB). 2010. Checklist of Endangered and Threatened Animals and Plants of Illinois. 18pp.

Illinois Natural History Survey (INHS) Database. 2014. http://ellipse.inhs.uiuc.edu:591/INHSCollections/mollsearch.html

Kasprowicz, J. M., M. J. Wetzel, K. S. Cummings, and W. U. Brigham. 1985. Survey of Kankakee River fishes and mussels at Illinois Rout 53 Bridge in Wilmington, Will County, Illinois. 25pp.

Page, L. M., K. S. Cummings, C. A. Mayer, S. L. Post, and M. E. Retzer. 1992. Biologically significant Illinois streams: an evaluation of the streams of Illinois based on aquatic biodiversity. Illinois Natural History Survey. Tech. Rept. 1992.

Strayer, D. L. 2008. Freshwater mussel ecology, a multifactor approach to distribution and abundance. University of California Press. 204pp.

Turgeon, D. D., J. F. Quinn, Jr., A. E. Bogan, E. V. Coan, F. G. Hochberg, W. G. Lyons, P. M. Mikkelsen, R. J. Neves, C. F. E. Roper, G. Rosenberg, B. Roth, A. Scheltema, F. G. Thompson, M. Vecchione and J. D. Williams. 1998. Common and scientific names of aquatic invertebrates from the United States and Canada: Mollusks, 2nd Edition. American Fisheries Society Special Publication 26, Bethesda Maryland. 526pp.

U. S. Fish and Wildlife Service (USFWS). 2014. http://www.fws.gov/Endangered/wildlife.html

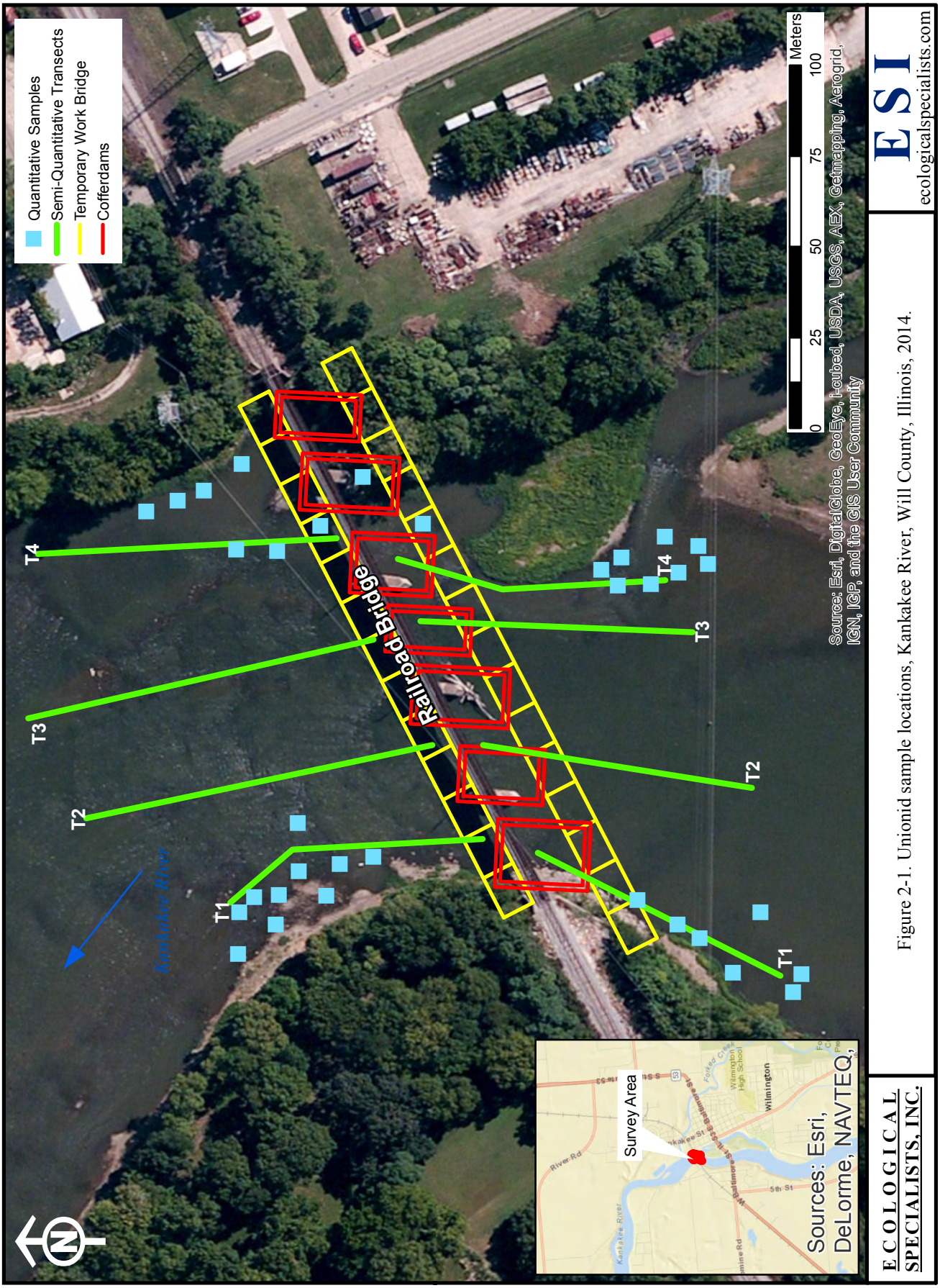


Figure 2-1. Unionid sample locations, Kankakee River, Will County, Illinois, 2014.

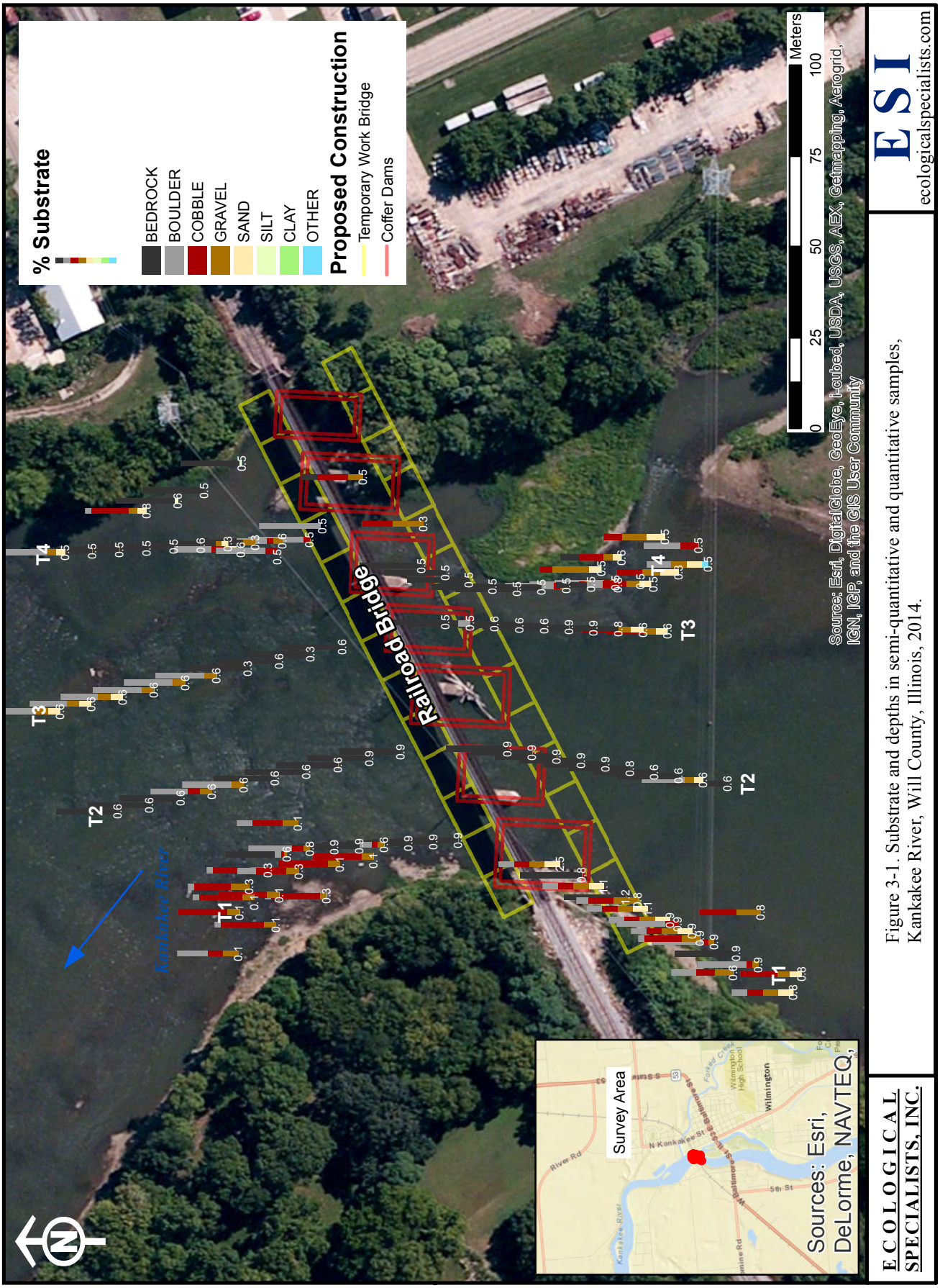
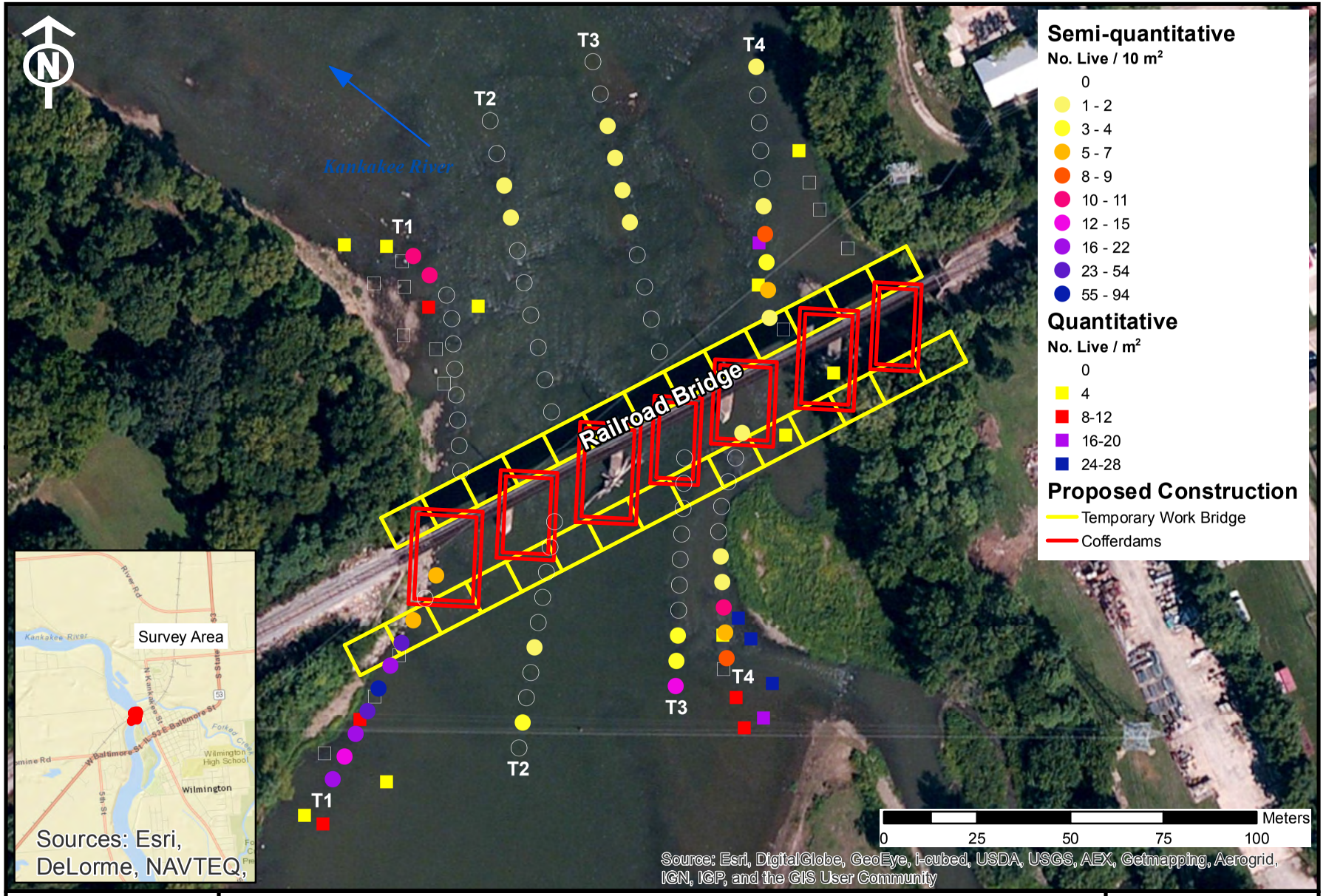


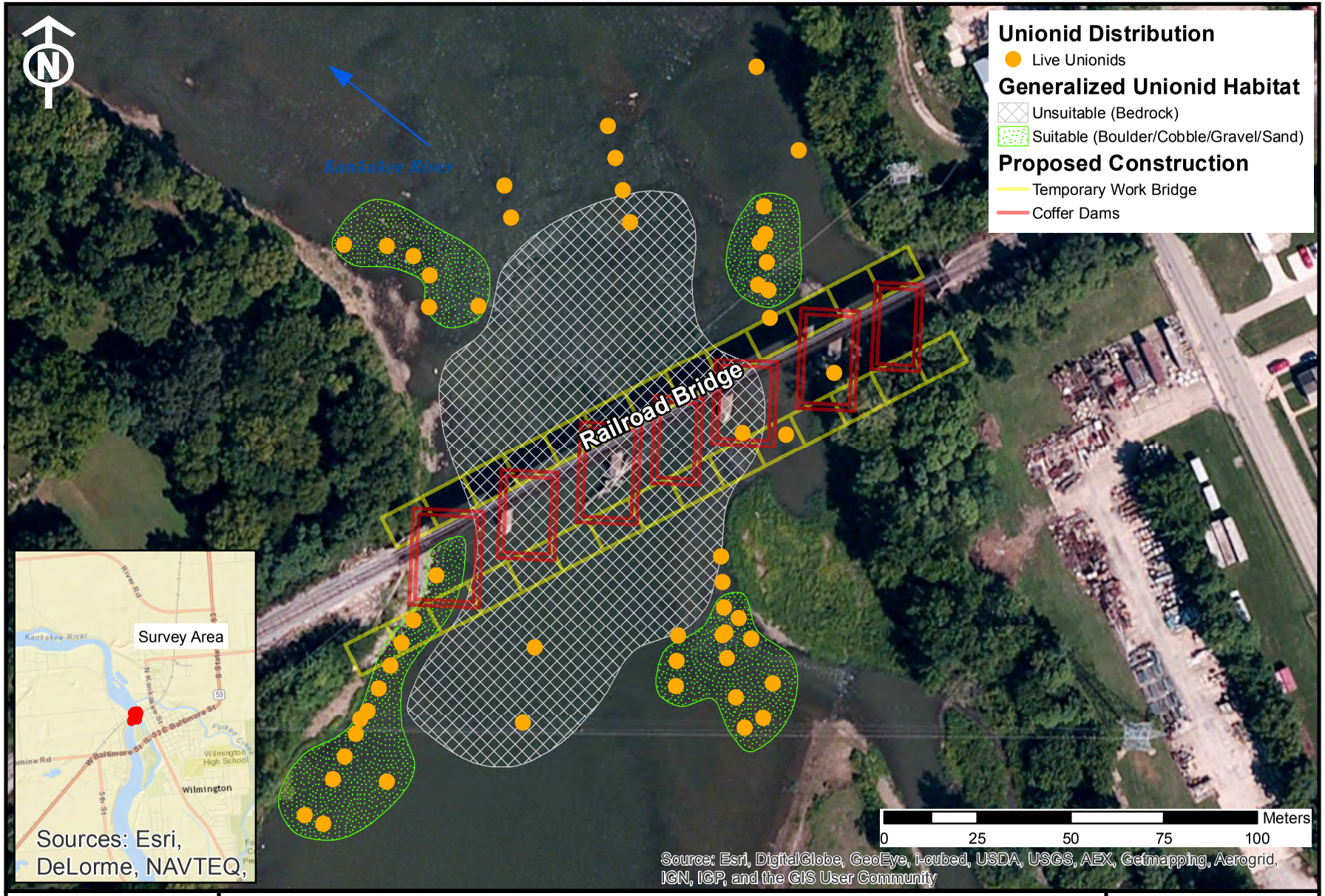
Figure 3-1. Substrate and depths in semi-quantitative and quantitative samples, Kankakee River, Will County, Illinois, 2014.



ECOLOGICAL SPECIALISTS, INC.

Figure 3-2. Live unionids collected in semi-quantitative and quantitative samples, Kankakee River, Will County, Illinois, 2014.

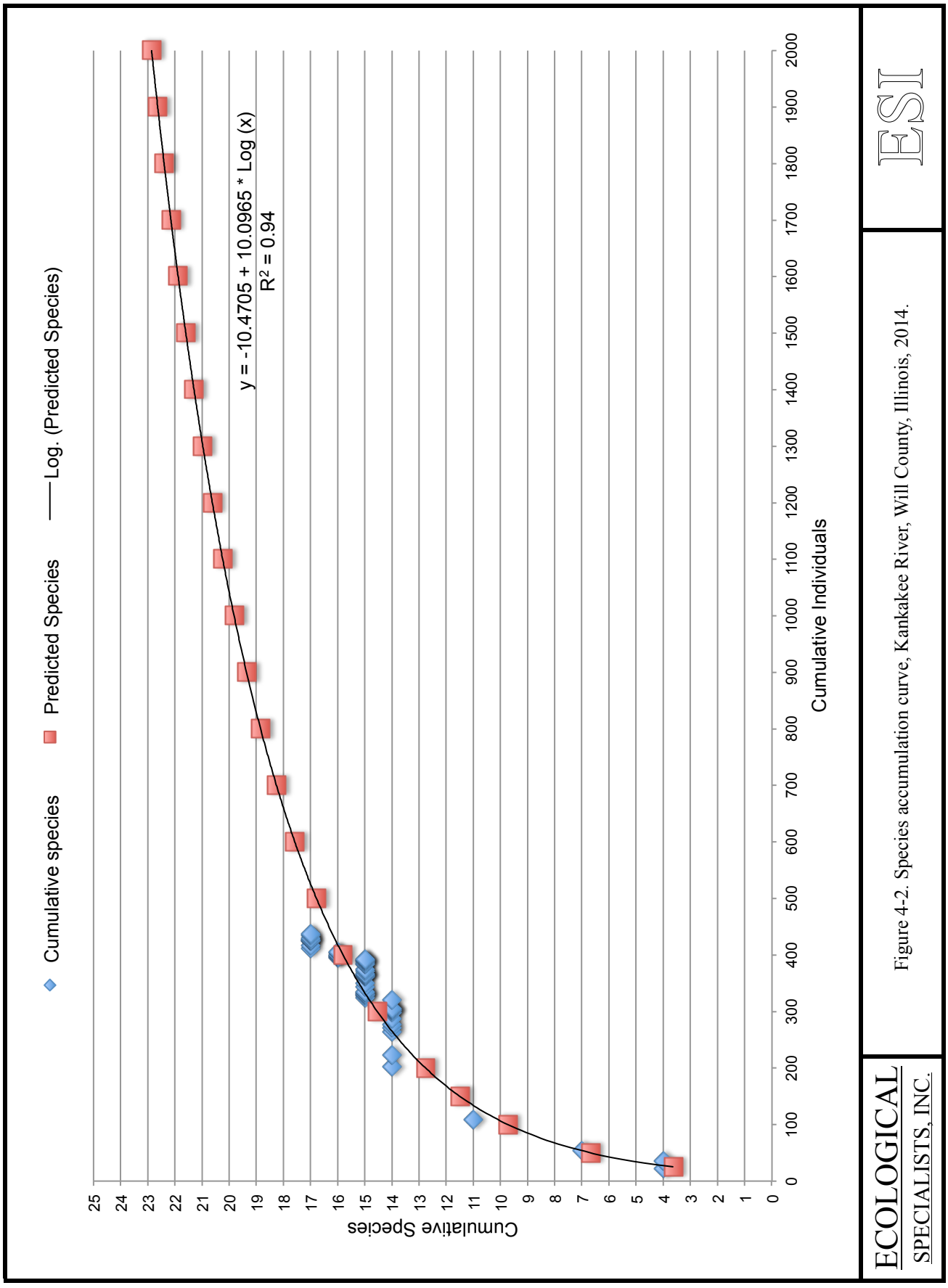
ESI
ecologicalspecialists.com



ECOLOGICAL SPECIALISTS, INC.

Figure 4-1. Generalized unionid distribution and suitable habitat within the study area, Kankakee River, Will County, Illinois, 2014.

ESI
ecologicalspecialists.com



ECOLOGICAL SPECIALISTS, INC.

Figure 4-2. Species accumulation curve, Kankakee River, Will County, Illinois, 2014.

ESI

Table 1-1. Unionid species collected in the Kankakee River in Illinois and near the study area from 2008 to 2010.

Tribe	Species[1]	Common Name	Illinois Status[2]	Federal Status[3]	Status[4,5]
Margaritiferidae					
	Cumberlandia monodonta	spectaclecase	E	E	SF, 1991
Amblemini					
	Amblema plicata	threeridge			L, 2010
Pleurobemini					
	Cyclonaias tuberculata	purple wartyback	T		L, 2010
	Elliptio dilatata	spike	T		L, 2008
	Fusconaia flava	wabash pigtoe			L, 2010
	Plethobasus cyphyus	sheepnose	E	E	L, 1986
	Pleurobema sintoxia	round pigtoe			L, 2010
Quadrulini					
	Megalonaias nervosa	washboard			L, 2008
	Quadrula metanevra	monkeyface			L, 2010
	Quadrula nodulata	wartyback			WD, 2002
	Quadrula p. pustulosa	pimpleback			L, 2008
	Quadrula quadrula	mapleleaf			L, 2003
Anodontini					
	Alasmidonta marginata	elktoe			L, 2003
	Alasmidonta viridis	slippershell mussel	T		WD, 2002
	Anodonta suborbiculata	flat floater			L, 2003
	Anodontoides ferussacianus	cylindrical papershell			WD, 2002
	Lasmigona c. complanata	white heelsplitter			L, 2010
	Lasmigona costata	fluted-shell			L, 2010
	Pyganodon grandis	giant floater			L, 2010
	Simpsonaias ambigua	salamander mussel	E	SC	FD, 1991
	Strophitus undulatus	squawfoot			L, 2010
	Utterbackia imbecillis	paper pondshell			L, 2008
Lampsilini					
	Actinonaias ligamentina	mucket			L, 2010
	Epioblasma triquetra	snuffbox	E	E	FD, 1988
	Lampsilis cardium	plain pocketbook			L, 2010
	Lampsilis higginsii	higgins eye		E	L, 1906
	Lampsilis siliquoidea	fatmucket			L, 2010
	Leptodea fragilis	fragile papershell			L, 2010
	Ligumia recta	black sandshell	T		L, 2010
	Potamilus alatus	pink heelsplitter			L, 2010
	Potamilus ohiensis	pink papershell			L, 2003
	Toxolasma parvus	lilliput			L, 1986
	Truncilla truncata	deertoe			L, 2003
	Venustaconcha ellipsiformis	ellipse	SC		L, 2010
	Villosa iris	rainbow	E		WD, 2002
Total Number of Live Species					28
Total Number of Species					35

[1]Turgeon et al. (1998)

[2]T=Illinois state-threatened; E=Illinois state-endangered; SC=Illinois Special Concern species (IESPB, 2010)

[2]E = Federally listed endangered species, SC= Species of Concern (USFWS, 2014)

[4]Last collection of best condition: L = live; FD = freshly dead shell; WD = weathered dead shell

[5]Sources: INHS database, ESI (2003a, 2003b, 2008, 2009, 2010); HDR (2008)

Table 2-1. Unionid sample effort by method and location, Kankakee River, Will County, Illinois, 2014.

	Left Descending Bank	Middle	Right Descending Bank	Total
Semi-Quantitative ($10\ m^2$ sections)	20	40	20	80
Quantitative ($0.25\ m^2$ quadrats)	17	0	17	34

Table 3-1 (1 of 2). Depth and substrate along transects, Kankakee River, Will County, Illinois, 2014.

	Distance Along Transect (m)	No. Live Unionids	Depth (m)	Substrate (%)							
				Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Other
T1	10	22	0.9	0	80	10	10	0	0	0	0
	20	14	0.9	100	0	0	0	0	0	0	0
	30	18	0.9	0	80	10	10	0	0	0	0
	40	54	0.9	0	25	25	25	25	0	0	0
	50	94	0.9	0	25	25	25	25	0	0	0
	60	21	1.1	0	25	25	25	25	0	0	0
	70	41	1.2	100	0	0	0	0	0	0	0
	80	7	1.1	0	25	25	25	25	0	0	0
	90	0	0.8	100	0	0	0	0	0	0	0
	100	6	2.5	0	25	25	25	25	0	0	0
	110	0	0.9	100	0	0	0	0	0	0	0
	120	0	0.9	100	0	0	0	0	0	0	0
	130	0	0.9	100	0	0	0	0	0	0	0
	140	0	0.6	60	20	10	10	0	0	0	0
	150	0	0.9	100	0	0	0	0	0	0	0
	160	0	0.9	100	0	0	0	0	0	0	0
	170	0	0.8	0	70	20	10	0	0	0	0
	180	0	0.6	80	10	5	5	0	0	0	0
	190	10	0.3	0	10	60	30	0	0	0	0
	200	11	0.3	0	10	60	30	0	0	0	0
T2	10	0	0.6	100	0	0	0	0	0	0	0
	20	3	0.6	0	70	0	15	15	0	0	0
	30	0	0.6	100	0	0	0	0	0	0	0
	40	0	0.6	100	0	0	0	0	0	0	0
	50	1	0.8	100	0	0	0	0	0	0	0
	60	0	0.9	100	0	0	0	0	0	0	0
	70	0	0.9	100	0	0	0	0	0	0	0
	80	0	0.9	100	0	0	0	0	0	0	0
	90	0	0.9	100	0	0	0	0	0	0	0
	100	0	0.9	100	0	0	0	0	0	0	0
	110	0	0.9	100	0	0	0	0	0	0	0
	120	0	0.9	100	0	0	0	0	0	0	0
	130	0	0.6	100	0	0	0	0	0	0	0
	140	0	0.6	100	0	0	0	0	0	0	0
	150	0	0.6	100	0	0	0	0	0	0	0
	160	0	0.6	0	80	0	20	0	0	0	0
	170	2	0.6	0	60	20	20	0	0	0	0
	180	1	0.6	100	0	0	0	0	0	0	0
	190	0	0.6	100	0	0	0	0	0	0	0
	200	0	0.6	100	0	0	0	0	0	0	0

Table 3-1 (2 of 2). Depth and substrate along transects, Kankakee River, Will County, Illinois, 2014.

	Distance Along Transect (m)	No. Live Unionids	Depth (m)	Substrate (%)							
				Bedrock	Boulder	Cobble	Gravel	Sand	Silt	Clay	Other
T3	10	15	0.6	0	0	60	20	20	0	0	0
	20	4	0.6	0	0	60	20	20	0	0	0
	30	4	0.8	100	0	0	0	0	0	0	0
	40	0	0.9	100	0	0	0	0	0	0	0
	50	0	0.9	100	0	0	0	0	0	0	0
	60	0	0.6	100	0	0	0	0	0	0	0
	70	0	0.6	100	0	0	0	0	0	0	0
	80	0	0.6	100	0	0	0	0	0	0	0
	90	0	0.5	80	20	0	0	0	0	0	0
	100	0	0.5	100	0	0	0	0	0	0	0
	110	0	0.6	100	0	0	0	0	0	0	0
	120	0	0.3	100	0	0	0	0	0	0	0
	130	0	0.6	100	0	0	0	0	0	0	0
	140	0	0.3	100	0	0	0	0	0	0	0
	150	2	0.6	0	80	0	20	0	0	0	0
	160	1	0.6	0	80	0	20	0	0	0	0
	170	2	0.6	0	80	0	20	0	0	0	0
	180	1	0.6	0	60	0	20	20	0	0	0
	190	0	0.6	0	60	0	20	20	0	0	0
	200	0	0.6	0	60	0	20	20	0	0	0
T4	10	9	0.5	100	0	0	0	0	0	0	0
	20	7	0.5	0	80	10	10	0	0	0	0
	30	11	0.5	0	80	10	10	0	0	0	0
	40	2	0.5	0	80	10	10	0	0	0	0
	50	1	0.5	100	0	0	0	0	0	0	0
	60	0	0.5	100	0	0	0	0	0	0	0
	70	0	0.5	100	0	0	0	0	0	0	0
	80	0	0.5	100	0	0	0	0	0	0	0
	90	0	0.5	100	0	0	0	0	0	0	0
	100	1	0.5	100	0	0	0	0	0	0	0
	110	1	0.5	0	90	10	0	0	0	0	0
	120	5	0.6	25	50	10	15	0	0	0	0
	130	3	0.3	80	0	0	20	0	0	0	0
	140	9	0.3	80	0	0	10	10	0	0	0
	150	2	0.6	100	0	0	0	0	0	0	0
	160	0	0.5	100	0	0	0	0	0	0	0
	170	0	0.5	100	0	0	0	0	0	0	0
	180	0	0.5	100	0	0	0	0	0	0	0
	190	0	0.5	100	0	0	0	0	0	0	0
	200	2	0.5	0	70	0	15	15	0	0	0

Table 3-2. Live unionids by method and location, Kankakee River, Will County, Illinois, 2014.

	Semi-Quantitative			Quantitative	
Species[1] by Tribe	Left Descending Bank (T1)	Middle (T2 and T3)	Right Descending Bank (T4)	Left Descending Bank	Right Descending Bank
Amblemini					
Amblema plicata	5	-	3	-	4
Pleurobemini					
Cyclonaias tuberculata[2]	21	2	2	1	-
Fusconaia flava	-	-	-	-	1
Pleurobema sintoxia	3	-	-	-	-
Quadrulini					
Megalonaias nervosa	3	-	-	-	-
Quadrula metanevra	5	-	-	-	-
Quadrula p. pustulosa	9	-	2	-	2
Anodontini					
Lasmigona costata	8	-	-	-	-
Strophitus undulatus	1	-	-	-	-
Lampsilini					
Actinonaias ligamentina	222	28	34	5	24
Lampsilis cardium	2	2	1	-	-
Leptodea fragilis	3	-	2	-	-
Ligumia recta[2]	-	2	-	-	1
Obliquaria reflexa	1	-	-	-	-
Potamilus alatus	14	2	6	1	3
Truncilla donaciformis	-	-	-	2	-
Truncilla truncata	1	-	3	3	3
Total Live	298	36	53	12	38
Total No. Live Species	14	5	8	5	7
No. Live / 10 m^2	14.9	0.9	2.7		
No. Live / m^2 (± 2SE)				2.8 ± 1.8	8.9 ± 3.5
% ≤ 5 years old	0.0	0.0	1.9	58.3	23.7

[1]Nomenclature follows Turgeon et al. (1998)

[2]Illinois Threatened species

Table 3-3. Unionids collected throughout the survey area, Kankakee River, Will County, Illinois, 2014.

Species[1] by Tribe	Semi-Quantitative		Quantitative		Total	
	No. Live	%	No. Live	%	No. Live	%
Amblemini						
Amblema plicata	8	2.1	4	8.0	12	2.7
Pleurobemini						
Cyclonaias tuberculata[2]	25	6.5	1	2.0	26	5.9
Fusconaia flava	-	-	1	2.0	1	0.2
Pleurobema sintoxia	3	0.8	-	-	3	0.7
Quadrulini						
Megalonaias nervosa	3	0.8	-	-	3	0.7
Quadrula metanevra	5	1.3	-	-	5	1.1
Quadrula p. pustulosa	11	2.8	2	4.0	13	3.0
Anodontini						
Lasmigona costata	8	2.1	-	-	8	1.8
Strophitus undulatus	1	0.3	-	-	1	0.2
Lampsilini						
Actinonaias ligamentina	284	73.4	29	58.0	313	71.6
Lampsilis cardium	5	1.3	-	-	5	1.1
Leptodea fragilis	5	1.3	-	-	5	1.1
Ligumia recta[2]	2	0.5	1	2.0	3	0.7
Obliquaria reflexa	1	0.3	-	-	1	0.2
Potamilus alatus	22	5.7	4	8.0	26	5.9
Truncilla donaciformis	-	-	2	4.0	2	0.5
Truncilla truncata	4	1.0	6	12.0	10	2.3
Total Live	387		50		437	
Total No. Live Species	15		9		17	
No. Live / 10 m^2	4.8					
No. Live / m^2 (± 2SE)			8.3 ± 3.2			
No. ≤ 5 years old	1	0.3	16	32.0	17	3.9

[1]Nomenclature follows Turgeon et al. (1998)

[2]Illinois Threatened species

Table 3-4. Unionid characteristics by sample method, Kankakee River, Will County, Illinois, 2014.

Species[1] by Tribe	Quantitative				Semi-Quantitative			
	Ave. Age[2]	Age Range	Ave. Length[3]	Length Range	Ave. Age	Age Range	Ave. Length	Length Range
Amblemini								
Amblema plicata	7.0	2-15	41.3	17-80	19.3	11-26	101.0	58-121
Pleurobemini								
Cyclonaias tuberculata	8.0	8	53.0	53	15.4	7-24	77.2	41-100
Fusconaia flava	5.0	5	28.0	28	-	-	-	-
Pleurobema sintoxia	-	-	-	-	13.7	13-14	83.3	77-90
Quadrulini								
Megalonaias nervosa	-	-	-	-	30.7	28-34	152.7	151-155
Quadrula metanevra	-	-	-	-	15.0	8-25	79.8	48-105
Quadrula p. pustulosa	7.5	2-13	35.0	10-60	11.9	6-16	57.1	34-74
Anodontini								
Lasmigona costata	-	-	-	-	16.5	11-24	111.6	82-137
Strophitus undulatus	-	-	-	-	7.0	7	75.0	75
Lampsilini								
Actinonaias ligamentina	12.9	2-23	104.8	22-139	18.9	12-27	127.0	95-152
Lampsilis cardium	-	-	-	-	15.4	8-20	127.2	104-142
Leptodea fragilis	-	-	-	-	9.2	6-13	101.0	74-120
Ligumia recta	9.0	9	106.0	106	11.5	10-13	135.5	123-148
Obliquaria reflexa	-	-	-	-	6.0	6	60.0	60
Potamilus alatus	9.8	3-18	97.3	41-164	15.3	11-25	122.9	87-138
Truncilla donaciformis	6.5	5-8	34.5	28-41	-	-	-	-
Truncilla truncata	4.7	3-8	31.7	17-48	6.0	6	41.0	38-46

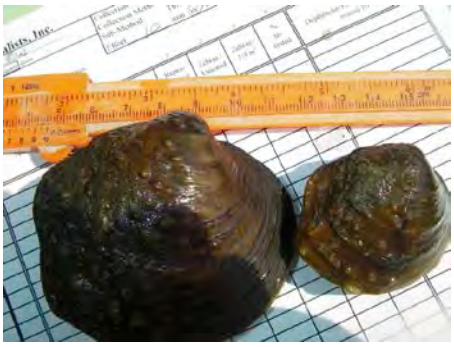
[1]Nomenclature follows Turgeon et al. (1998)

[2]annuli count

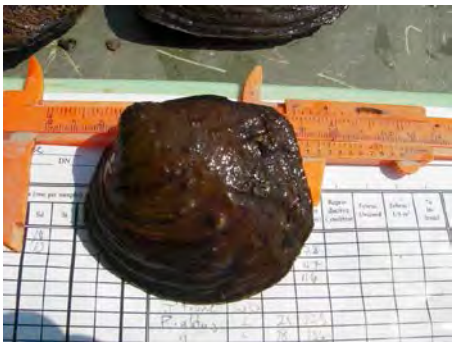
[3]millimeters

Appendix A. Site and Species Photos.

T1 Upstream



Cyclonaias tuberculata



Cyclonaias tuberculata

Cyclonaias tuberculata

Ligumia recta

Actinonaias ligamentina

Quadrula metanevra

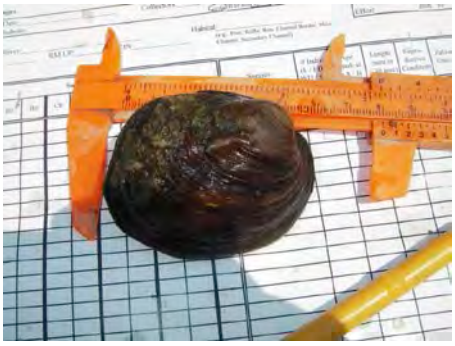
Quadrula p. pustulosa

Lampsilis cardium

Megalonaias nervosa

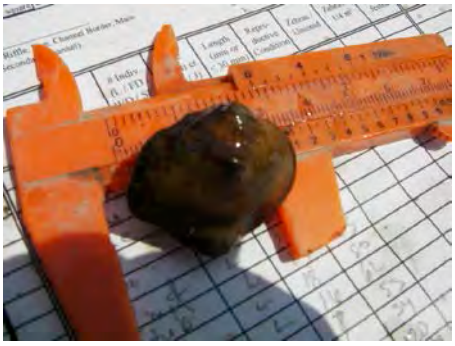
Strophitus undulatus

Pleurobema sintoxia

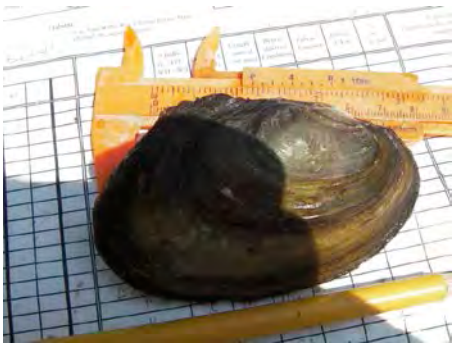


Amblema plicata

Truncilla truncata



Obliquaria reflexa



Leptodea fragilis

Fusconaia flava

ILLINOIS NATURAL HISTORY SURVEY
PRAIRIE RESEARCH INSTITUTE

AQUATIC SURVEY REPORT

Freshwater Mussel Survey in the Kankakee River at the National Railroad Passenger Corp. (AMTRAK) bridge, and Illiana Corridor near Wilmington, Will County, Illinois

IDOT Sequence Numbers: 18444 (R.R. bridge), 16651A, 16651B

Prepared by:
Kevin S. Cummings
Jeremy S. Tiemann

INHS/IDOT Statewide Biological Survey & Assessment Program
Program Report 2014 (84)
November 2014

Project Summary

This report is submitted in response to a request made by Thomas Brooks of IDOT in an email dated 28 March 2014 to Joseph Merritt of INHS, for a mussel survey in the area of proposed High Speed Rail crossing over the Kankakee River in Wilmington, and the Illiana Corridor in Will County, Illinois. The purpose of these surveys were to assess the river for the presence of any state or federally protected freshwater mussel species. Our collection efforts were supplemental to dive surveys being conducted by Eric Belt and staff of Ecological Specialists, Inc. O'Fallon, Missouri. This report summarizes the results of the surveys conducted on 21-22 July 2014. Eighteen species were found alive, and an additional three species were found as fresh dead shells. One live individual of the federally endangered Sheepnose, *Plethobasus cyphyus*, was found at the Illiana Corridor site by Ecological Specialists, Inc. divers. Six individuals of the State Threatened Black Sandshell, *Ligumia recta* and four individuals of the Purple Wartyback, *Cyclonaias tuberculata* were also found. In addition a half valve of the state endangered Salmander Mussel, *Simpsonaias ambigua* was found in the Illinana corridor site. All of the remaining species found alive or as fresh dead shells are relatively common inhabitants of Illinois streams and none are listed at the state or federal level.

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

Surveys Conducted By: Kevin S. Cummings, Malacologist
Jeremy S. Tiemann, Malacologist
Matthew Van Der Bosch, Seasonal Field Assistant

GIS Layers: Janet Jarvis, Remote Sensing Specialist

University of Illinois
Prairie Research Institute
Illinois Natural History Survey
Statewide Biological Survey and Assessment Program
1816 South Oak Street
Champaign, Illinois 61820

TABLE OF CONTENTS

Cover photo: The Kankakee River just upstream of the National Passenger Corp. (AMTRAK) bridge in Wilmington, Will County, Illinois. Photograph is facing the downstream flow direction of the river (J.S. Tiemann photo, 22 July 2014).

INTRODUCTION

This report is submitted in response to a request made by Thomas Brooks of IDOT in an email dated 28 March 2014 to Joseph Merritt of INHS, for a mussel survey in the area of proposed High Speed Rail crossing over the Kankakee River in Wilmington, and the Illiana Corridor in Will County, Illinois. The purposes of these surveys were to assess the river for the presence of any state or federally protected freshwater mussel species. Our collection efforts were supplemental to surveys being conducted by Eric Belt and staff of Ecological Specialists, Inc. O'Fallon, Missouri.

PROJECT LOCATION & METHODS

Sampling for mussels was conducted at a 100 yard stretch along the eastern shoreline of the Kankakee River just upstream of the National Railroad Passenger Corp. (AMTRAK) bridge located in Wilmington, Will County, Illinois (approx. 43.31110°, -88.15000°) (**Figure 1**). Mussels were sampled by hand searching (e.g., feeling the surface of the streambed) for 6 person hours at the HSR site on 21 July 2014 by K.S. Cummings, J.S. Tiemann, and M. Van Der Bosch (INHS).

We also sampled a 200 yard stretch along the western shoreline of the Kankakee River in the proposed Illiana Corridor (approx. 41.32236°, -88.15757°). Mussels were sampled by hand for 12 person hours on 22 July 2014 by K.S. Cummings and M. Van Der Bosch of INHS, and Mariah Scott, and Trevor Hewitt, both of which are students from Central Michigan University. Additionally, all banks were visually searched for the presence of shells. All freshwater mussels were identified and counted. Dead shells of some species were vouchered and deposited into the INHS Mollusk Collection, Champaign (**Table 1**).

Nomenclature used for mussels discussed in this report follows Cummings and Mayer (1992). The current status of threatened and endangered species of freshwater mussels discussed in this report is taken from Illinois Endangered Species Protection Board [IESPB] (2011), and Mankowski (2010, 2012).

HABITAT CHARACTERIZATION

The Kankakee River at both the National Railroad Passenger Corp. (AMTRAK) railroad bridge and Illiana Corridor were approximately 125 yards to 200 yards. Water depths in the sampled reach ranged from 0.4 to 1.7 yards, with average of 0.7 yards. Bottom substrates were composed primarily of cobble and gravel intermixed with some fine gravel and sand. The river banks were mostly tree-lined (**Figures 1 & 2**). A city park with mowed, low grass occurred on the east, upstream bank near the R.R. Bridge. Flow was moderate through the entire sampling reach of the Kankakee River. Surrounding land use was mixed urban and forested residential.

Figure 1. The National Railroad Passenger Corp. (AMTRAK) bridge over the Kankakee River (Wilmington, Will County, Illinois) where a freshwater mussel survey was conducted by INHS personnel on 21 July 2014. We sampled for mussels along the southeast shore above and under the bridge. (K.S. Cummings photo).

Figure 2. The Kankakee River at the Illiana Corridor North of Wilmington, Will County, Illinois. Photograph is facing upstream was taken on 22 July 2014. We sampled for mussels along the western shore. (K.S. Cummings photo).

BACKGROUND

The Kankakee River has been well studied with respect to mussels. Four basin surveys have been conducted on the mussel fauna over the past 100 years. The first survey was conducted in 1909 (Wilson and Clark 1912). A second survey was conducted by Matteson (unpubished) in 1960, followed by Suloway (1981) in 1978. A new Kankakee basin survey was just completed in 2010 (Price et al. 2012). Forty species are known historically from the Kankakee River basin (Tiemann et al 2007). However, surveys conducted throughout the past 100 years have documented species' decline and now only 27 species of freshwater mussels are thought to still inhabit the Kankakee River drainage (Suloway 1981; Kwak 1993; Price et al. 2012; INHS Mollusk Collection). Even with these declines the Kankakee River has been recognized as a Highly Valued aquatic resource (Page et al. 1992) and is still known for its faunal diversity (Kwak 1993).

RESULTS AND DISCUSSION

The present survey resulted in the collection 18 live species and three additional species represented by fresh dead shell only. An additional three species were recorded only as relict shells (Table 1). The divers from Ecological Specialists, Inc. found a live federally endangered Sheepnose (*Plethobasus cyphyus*) in the Kankakee River in the Illiana Corridor. We are currently awaiting a report from them with their results. Two state-threatened species were found alive by us in the Kankakee River. The Black Sandshell, *Ligumia recta* was found alive at both locations (two at HSR and four at Illiana) and the Purple Wartyback, *Cyclonaias tuberculata* was found as a fresh dead shell at HSR and four individuals were collected alive at Illiana (**Table 1**). In addition we found a fresh dead shell of the Salamander mussel, *Simpsonaias ambigua* at the Illiana site. Both of these areas support large and diverse mussel communities. A summary of the historical occurrence of these four listed species found alive or fresh dead in this study is given below. The last date of live occurrence is given in parentheses.

FEDERALLY ENDANGERED

Sheepnose (*Plethobasus cyphyus*): The Sheepnose (**Figure 4**) was historically widespread in the mainstem Kankakee River in Illinois with live records from the river at Momence (1960), Sun River Terrace (1960), 3.5 mi NE Aroma Park (2010), Aroma Park (2010), Kankakee (1987) (all Kankakee County), and from the river at Custer Park (1986), Wilmington (1988), and 2.7 mi WNW Wilmington at the BP pipeline crossing (2001, 2004, and 2007), all in Will County. It was not found during the 2009 survey of the river at the BP pipeline crossing. In 2013 INHS botanists David Ketzner, Paul Marcum, and George Geatz collected a fresh dead specimen of the federally endangered Sheepnose, *Plethobasus cyphyus* in the Illliana Corridor in the Kankakee River, ~1200 ft. downstream of its confluence with Forked Creek (Cummings and Tiemann 2013).

STATE ENDANGERED

Salamander mussel (*Simpsonaias ambigua*): To my knowledge, the Salamander Mussel (**Figure 5**) has never been observed alive in Illinois. However, records of fresh dead shells have been found at 13 sites since 1980 in the Fox, Kankakee, Sangamon, and Vermilion of the Wabash drainages. It is known from three sites in the Kankakee drainage: Aroma Park (1994), Kankakee

(1987), and below the dam at Wilmington (1991).

STATE THREATENED

Purple Wartyback (*Cyclonaias tuberculata*): The Purple Wartyback (**Figure 6**) was also historically widespread in the mainstem Kankakee River in Illinois, with live records from the river at Momence (2010), Aroma Park (2007), Kankakee (2010), 2 mi. and 3 mi. NW Bourbonais (2012), Aldorf (2012) (all Kankakee County), and from the river at Custer Park (2000), Resthaven (2008), 5.5 mi. ESE Ritchie (2010), Wilmington (2012, this study), the Interstate 55 bridge (2012, this study), and 2.7 mi WNW Wilmington at the BP pipeline crossing (adjacent to site ILINX-19 in this study) (2009), all in Will County.

Black Sandshell (*Ligumia recta*): The Black Sandshell (**Figure 7**) was also historically widespread in the mainstem Kankakee River in Illinois with live records from near the Indiana state line (1960), Momence (2010), Aroma Park (2010), Kankakee (2012), 2 mi. and 3 mi. NW Bourbonais (2012), Aldorf (2012) (all Kankakee County), as well as Custer Park (2010), 5.5 mi. ESE Ritchie (2010), Wilmington (2012, this study), the I-55 bridge (2012, this study), and 2.7 mi WNW Wilmington at the BP pipeline crossing (2009), all in Will County.

ACKNOWLEDGMENTS

M. Van Der Bosch (INHS), Mariah Scott (Central Michigan University), and Trevor Hewitt (Central Michigan University) assisted with fieldwork.

LITERATURE CITED

Cummings, K.S., and C.A. Mayer. 1992. Field Guide to Mussels of the Midwest. Illinois Natural History Survey Manual 5. xiii +194 pp.

Cummings, K.S. and C.A. Mayer. 1997. Distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionacea). Pp. 129-145, *in* K.S. Cummings, A.C. Buchanan, C.A. Mayer, and T.J. Naimo, eds. Conservation and Management of Freshwater Mussels II: Initiatives for the Future. Proceedings of a UMRCC Symposium, 16-18 October 1995, St. Louis, MO. Upper Mississippi River Conservation Committee, Rock Island, IL. 293 pp.

Illinois Endangered Species Protection Board. 2011. Checklist of Endangered and Threatened Animals and Plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 18 pp.

Kwak, T.J. 1993. The Kankakee River: A case study and management recommendations for a stream diverse in habitat, fauna, and human values. Pages 123 – 1414 in L.W. Hesse, C.B. Stalnaker, N.G. Benson, and J.R. Zuboy (eds.) Proceedings of the symposium on restoration planning for the rivers of the Mississippi River ecosystem. U.S. National Biological Survey Biological Report 19. Washington, D.C.

Mankowski, A., editor. 2010. Endangered and Threatened Species of Illinois: Status and Distribution, Volume 4 - 2009 and 2010 Changes to the Illinois List of Endangered and

Threatened Species. Illinois Endangered Species Protection Board, Springfield, Illinois. iii+38 pp.

Mankowski, A. 2012. The Illinois Endangered Species Protection Act at Forty: a review of the Act's provisions and the Illinois List of Endangered and Threatened Species. Illinois Endangered Species Protection Board, Springfield, Illinois. 152 pp. Published online at: http://www.dnr.illinois.gov/ESPB/Pages/default.aspx.

Price, A.L., D.K. Shasteen, and S.A. Bales. 2012. Freshwater mussels of the Kankakee River in Illinois. Illinois Natural History Survey Technical Report 2012 (12). Champaign, Illinois. 16 pp. + appendix.

Stodola, A.P., S.A. Douglass, and D.K. Shasteen. 2014. Historical and current distributions of freshwater mussels in Illinois. Report prepared for: Illinois Department of Natural Resources, State Wildlife Grant/Project Number (T-82-R-1) 83 p.

Suloway, L. 1981. The unionid (Mollusca: Bivalvia) fauna of the Kankakee River in Illinois. American Midland Naturalist 105(2):233-239. Tiemann, J.S., K.S. Cummings, and C.A. Mayer. 2007. Updates to the distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionacea). Transactions of the Illinois State Academy of Science 100(1):107-123.

Tiemann, J.S., K.S. Cummings, and C.A. Mayer. 2007. Updates to the distributional checklist and status of Illinois freshwater mussels (Mollusca: Unionidae). Transactions of the Illinois State Academy of Science 100:107-123.

Cummings, K.S., and J.S. Tiemann. 2013. A limited assessment of the unionid fauna associated with streams in the Illiana Expressway Project Corridor Between in Will County, Illinois. IDOT Job No.: P-91-749-10 (Seq. No.: 16651A and B). INHS/IDOT Statewide Biological Survey & Assessment Program Report 2013(15):1-xx + appendices.

Table 1. Freshwater mussels (Family Unionidae) recorded from the Kankakee River, just upstream of the National Railroad Passenger Corp. (AMTRAK) bridge located in Wilmington, Will County, Illinois (approx. 43.31110°, -88.15000°) and along the western shoreline of the Kankakee River in the proposed Illiana Corridor (approx. 41.32236°, -88.15757°). 21-22 July 2014. Data from these surveys, include the number of individuals found alive and those found only as shell (D = dead and R = relict). Species listed as threatened or endangered in Illinois are noted with the superscripts [ST, or SE]

	Scientific name		HSR	Illiana
Anodontinae	*Alasmidonta marginata*	Elktoe	D	R
	Lasmigona complanata	White Heelsplitter	1	2
	Lasmigona costata	Fluted Shell	4	4
	Simpsonaias ambigua [SE]	Salamander Mussel	-	D
	Strophitus undulatus	Creeper	1	-
	Utterbackia imbecillis	Paper Pondshell	-	D
Ambleminae	*Amblema plicata*	Threeridge	8	18
	Cyclonaias tuberculata [ST]	Purple Wartyback	D	4
	Elliptio dilatata [ST]	Spike	R	R
	Fusconaia flava	Wabash Pigtoe	R	1
	Megalonaias nervosa	Washboard	D	2
	Pleurobema sintoxia	Round Pigtoe	R	6
	Quadrula metanevra	Moneyface	1	R
	Quadrula pustulosa	Pimpleback	3	14
	Quadrula quadrula	Mapleleaf	R	R
Lampsilinae	*Actinonaias ligamentina*	Mucket	51	30
	Lampsilis cardium	Plain Pockebook	1	3
	Lampsilis siliquoidea	Fat Mucket	-	R
	Leptodea fragilis	Fragile Papershell	4	1
	Ligumia recta [ST]	Black Sandshell	2	4
	Obliquaria reflexa	Threehorn Wartback	1	2
	Potamilus alatus	Pink Heelsplitter	14	10
	Truncilla donaciformis	Fawnsfoot	2	3
	Truncilla truncata	Deertoe	2	3
Species live (fresh-dead): 18(3)			**14(3)**	**16(2)**
Species Relict: 3			**4**	**5**
SPECIES TOTAL: 24			**21**	**23**

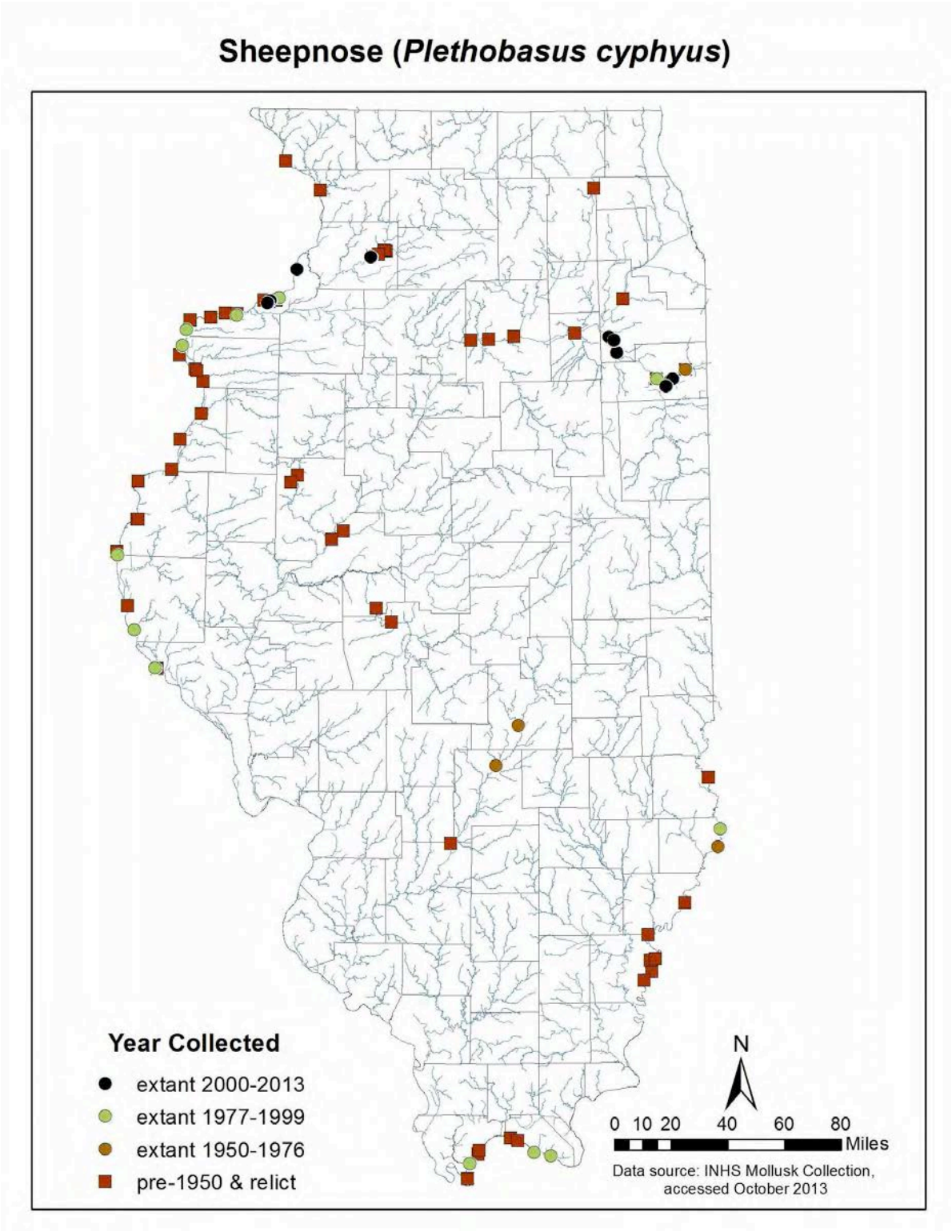


Figure 3. Range map for the Federally endangered Sheepnose, *Plethobasus cyphyus* (map from Stodola et al. 2014).

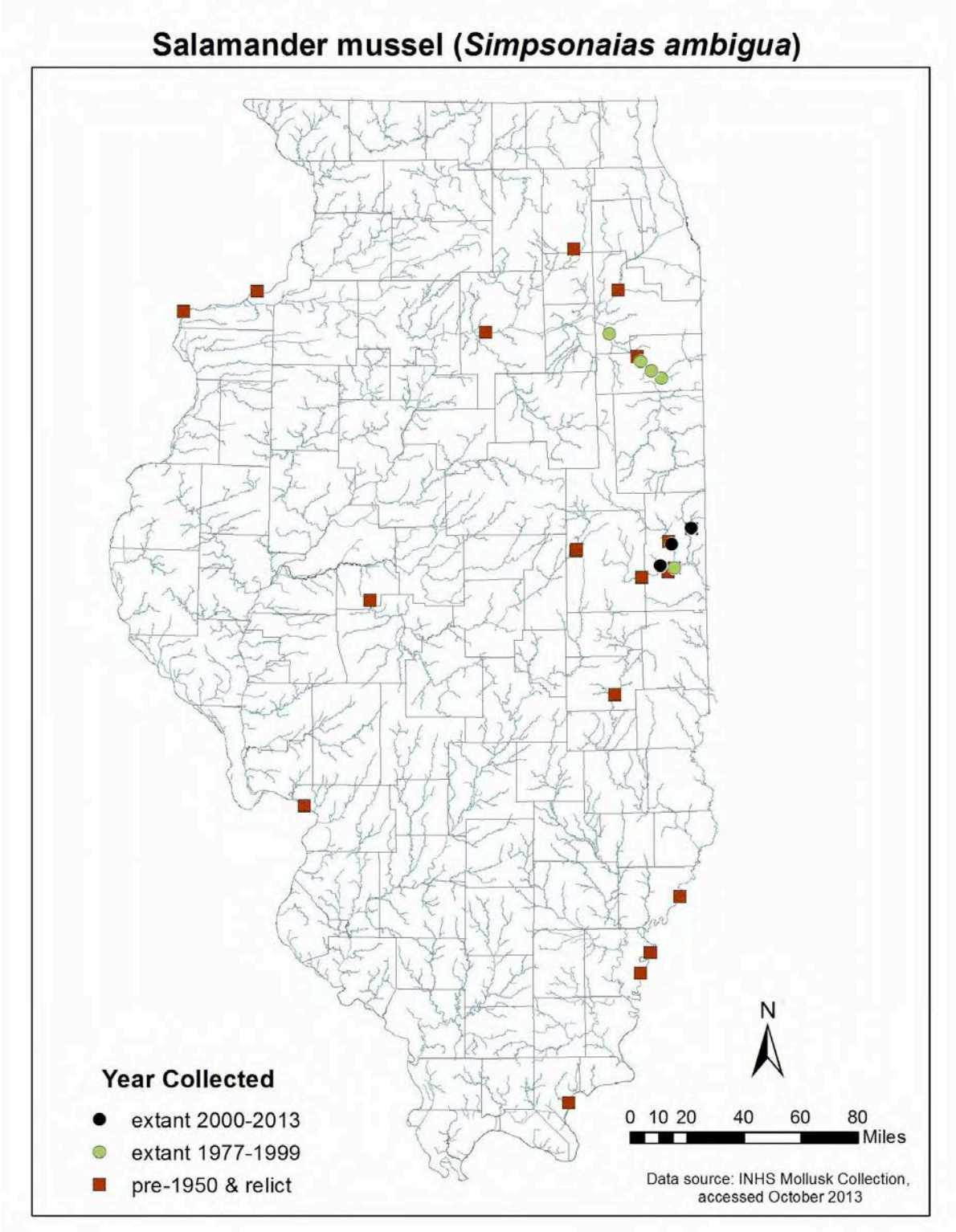


Figure 4. Range map for the State endangered Salamander Mussel, *Simpsonaias ambigua* (map from Stodola et al. 2014).

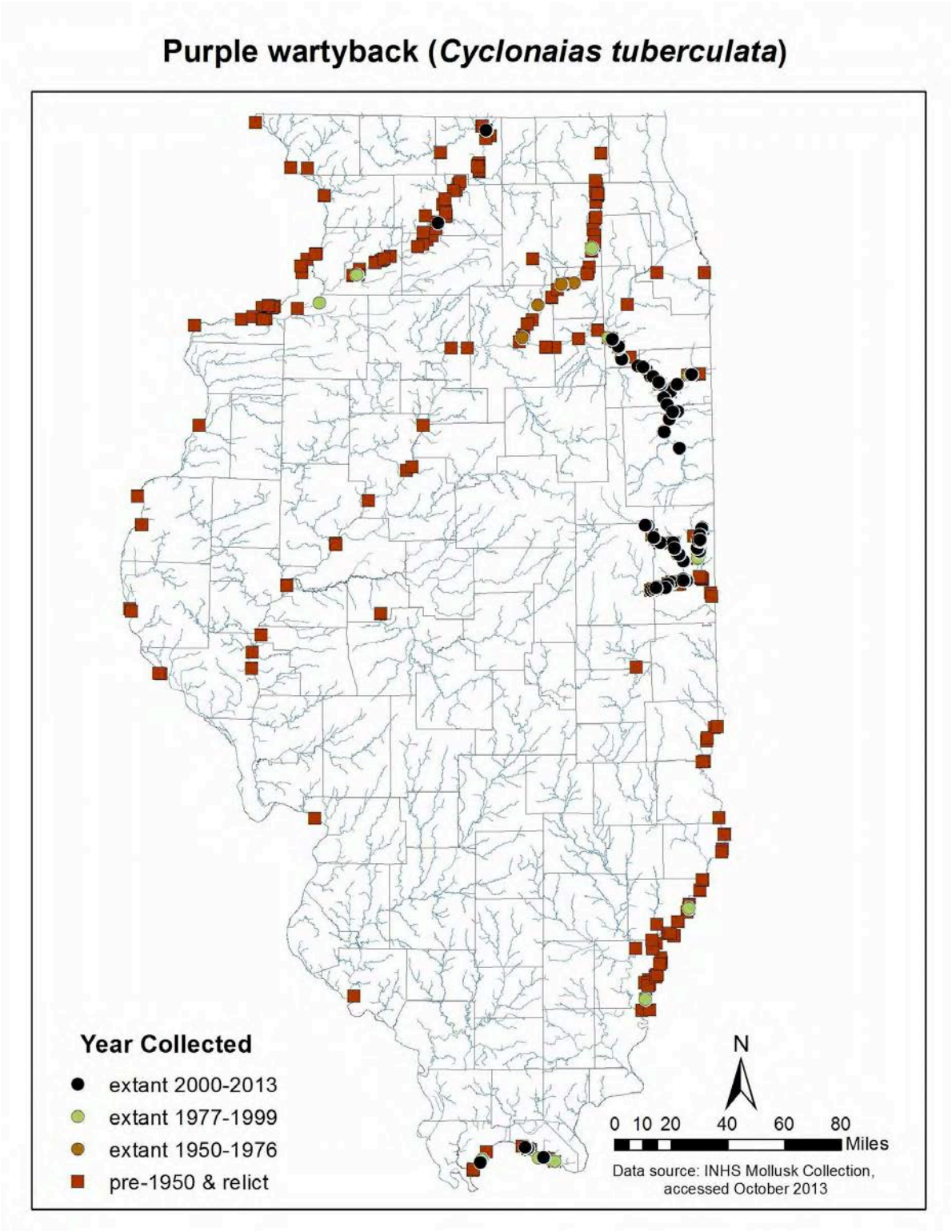


Figure 5. Range map for the State threatened Purple Wartyback, *Cyclonaias tuberculata* (map from Stodola et al. 2014).

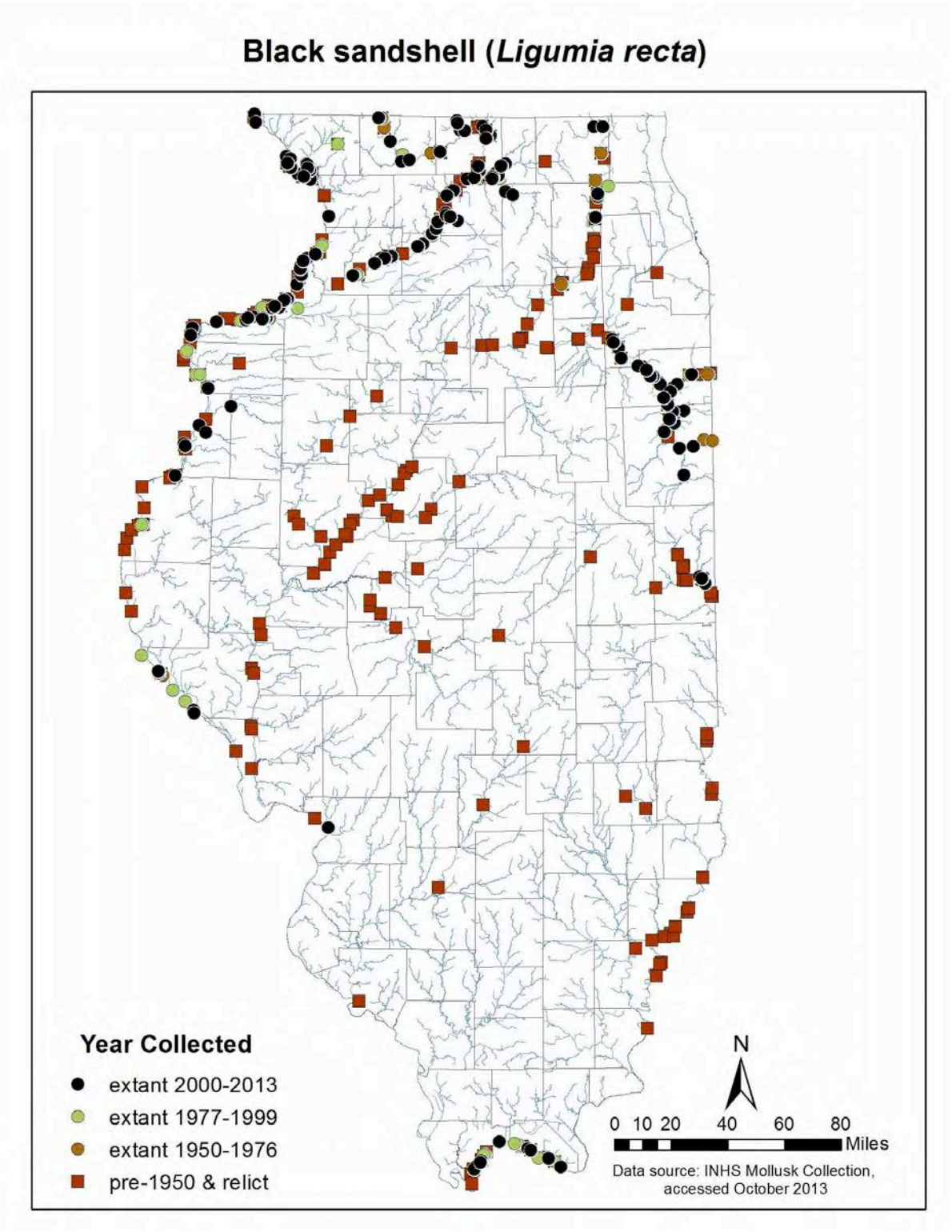


Figure 6. Range map for the State threatened Black Sandshell, *Ligumia recta* (map from Stodola et al. 2014).

ILLINOIS NATURAL HISTORY SURVEY
PRAIRIE RESEARCH INSTITUTE

AQUATIC SURVEY REPORT

Fish Survey in Kankakee River at the National Railroad Passenger Corp. (AMTRAK) bridge, Wilmington, Will County, Illinois

IDOT Sequence Number: 18444

Prepared by:
Christopher A. Taylor
Jeremy S. Tiemann
Rachel M. Vinsel

INHS/IDOT Statewide Biological Survey & Assessment Program
Program Report 2014 (43)
26 August 2014

PROJECT SUMMARY

This report is submitted in response to a request from IDOT for INHS personnel to conduct a fish survey in the Kankakee River at the National Passenger Corp. (AMTRAK) bridge in Wilmington, Will County, Illinois. The fish survey was conducted on 22 July 2014 using a boat-mounted 220-volt electroshocker for one and a half hours. Twenty-six species of fish were collected during the survey. Five state endangered Pallid Shiners, *Hybopsis amnis,* and three state threatened River Redhorse, *Moxostoma carinatum,* were collected within the survey area. No other species listed at either the state or federal level were collected or observed.

Report Approved By:

Kevin Cummings, Further Studies Aquatics
Group Coordinator-Malacologist

GIS Figure Prepared By: Janet Jarvis, GIS Specialist

University of Illinois
Prairie Research Institute
Illinois Natural History Survey
Statewide Biological Survey and Assessment Program
1816 South Oak Street
Champaign, Illinois 61820

TABLE OF CONTENTS

Cover photo: The Kankakee River just upstream of the National Passenger Corp. (AMTRAK) bridge in Wilmington, Will County, Illinois. Photograph is facing the downstream flow direction of the river (J. S. Tiemann photo, taken 22 July 2014).

INTRODUCTION

This report is submitted in response to a request made by Thomas Brooks of IDOT in an email dated 28 March 2014 to Joseph Merritt of INHS, for a fish survey in the area of proposed High Speed Rail crossings (Seq. No.: 18444) over the Kankakee River in Wilmington, Will County, Illinois. The purpose of this survey was to assess the River for the presence of any state or federally protected fish species.

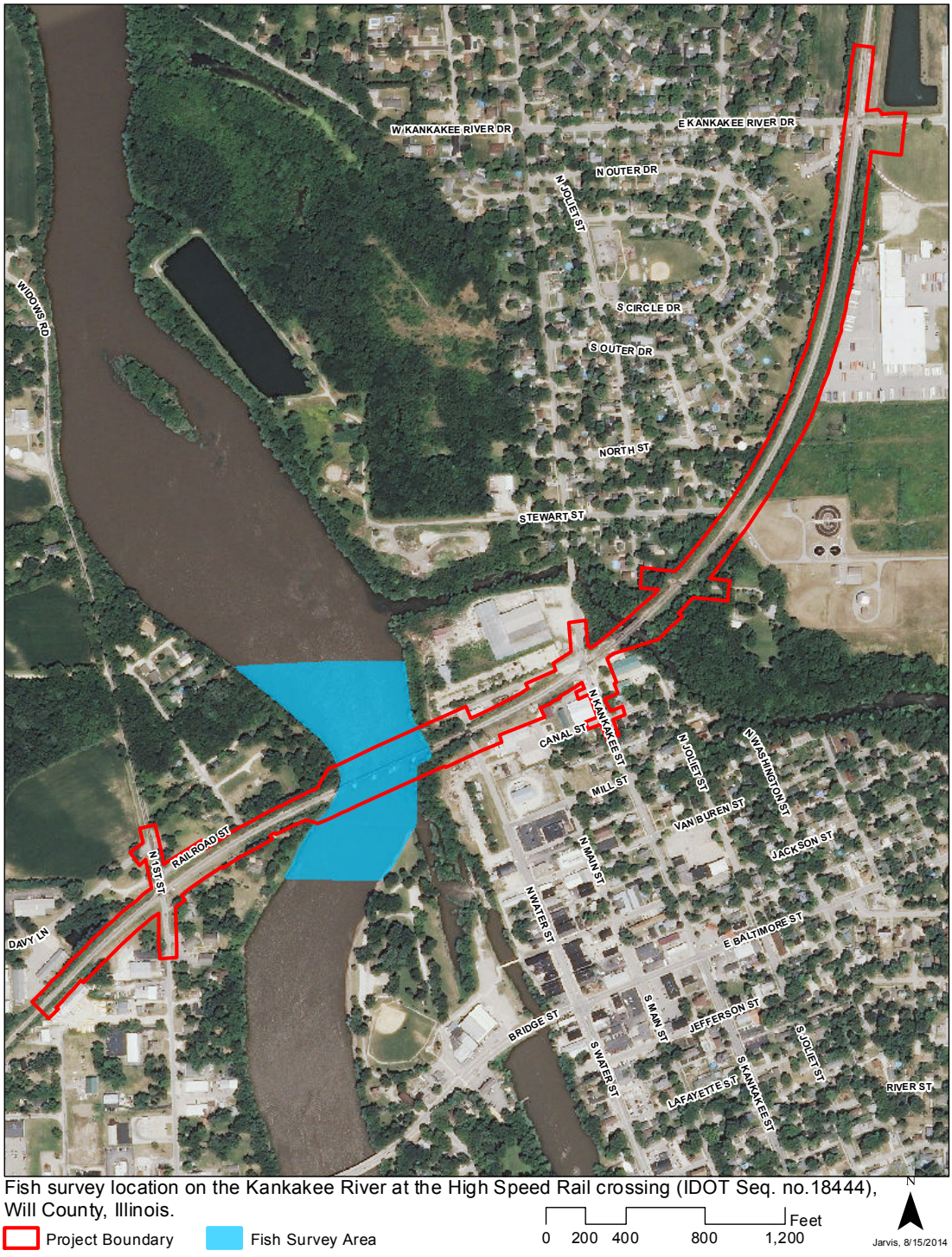
Nomenclature used for fishes discussed in this report follows Page and Burr (2011) except that subspecies are not recognized. The current status of threatened and endangered species of fishes discussed in this report is taken from Illinois Endangered Species Protection Board [IESPB] (2011), and Mankowski (2010, 2012).

PROJECT LOCATION

Sampling for fishes was conducted in a 400 yard stretch of the Kankakee River bisected by the National Railroad Passenger Corp. (AMTRAK) bridge located in Wilmington, Will County, Illinois (**Figure 1**). A point centered on that bridge is used for the following locality information as a reference point for the project: latitude 41.31108°N, longitude 88.15051°W. **Appendix 1** references a shapefile with sampling point information for the Kankakee River project site, as discussed in this report.

HABITAT CHARACTERIZATION

The Kankakee River at the National Railroad Passenger Corp. (AMTRAK) railroad bridge was approximately 125 yards wide but then widened to approximately 200 yards both up and downstream of the bridge. Water depths in the sampled reach ranged from 0.4 to 1.7 yards, with average of 0.7 yards. Bottom substrates were composed primarily of cobble and gravel intermixed with some fine gravel and sand. River banks upstream of the bridge were tree-lined and commercially developed while those downstream were more densely tree-lined or wooded (**figures 1 and 2**). A city park with mowed, low grass occurred on the east, upstream bank. Flow was moderate through the entire sampling reach of the Kankakee River. Surrounding land use was predominately urban.



Fish survey location on the Kankakee River at the High Speed Rail crossing (IDOT Seq. no.18444), Will County, Illinois.

Figure 1. The National Railroad Passenger Corp. (AMTRAK) bridge over the Kankakee River (Wilmington, Will County, Illinois) where a fish survey was conducted by INHS personnel on 22 July 2014. Area in blue indicates the stretch of the Kankakee River in which the fish survey was conducted. Map created by J. L. Jarvis (INHS).

Figure 2. The Kankakee River just upstream of the AMTRAK bridge, Wilmington, Will County, Illinois. Photograph is facing the downstream flow direction of the River and was taken on 22 July 2014 (J. S. Tiemann photo).

BACKGROUND

The Kankakee River drainage has been sampled extensively by INHS, Illinois Department of Natural Resources, and U.S. Geological Survey personnel over the past 30 years, and the fish fauna is well documented with over 200 known collections. A total of 91 species in 14 families are known from the Kankakee-Iroquois drainage including five species of fishes listed as state endangered and three listed as state threatened species (IESPB 2011). Habitat information presented below was taken from Page and Burr (2011) and Smith (1979). Records for fishes are taken from the Illinois Natural History Survey Fish Collection, Southern Illinois University at Carbondale Fish Collection, and the Field Museum of Natural History Fish Collection.

The state threatened River Redhorse, *Moxostoma carinatum*, is known to occur commonly in the Kankakee River drainage of Illinois upstream of the I-55 bridges (Will Co.). The INHS Fish Collection contains 17 records for the species collected between I-55 and the town of Momence (Kankakee Co.). These 17 records were collected from 1975 to 2008. In addition, a recent study by Butler and Wahl (2012) summarized occurrences of the species in the Kankakee

River from other sources, including the Illinois Department of Conservation Fisheries Metrics database. They reported 75 occurrences of River Redhorse in the Wilmington Reach of the river from 1975 to 2011. The River Redhorse usually occurs in small to medium rivers with moderate flow over rock and cobble substrates (Page and Burr 2011). Butler and Wahl (2012) reported that radio-tracked River Redhorse were usually encountered in deep (>1.6 yard) runs with moderate flows ranging from 0.3 to 0.6 meters per second) during fall months.

Other than a single locality on the Mississippi River and a recently discovered (July 2012) location on the Des Plaines River at the I-55 bridge, the state endangered Pallid Shiner, *Hybopsis amnis*, is present only in a 12 mile segment of Kankakee River downstream of the Will / Kankakee County line to its confluence with the Des Plaines River. More than 120 specimens from 10 locations have been collected between 1978 and 2005 in this segment. While most of the records occur near the town of Custer Park, the species has also been collected at and downstream of Wilmington on 6 occasions between 1990 and 2002. The most recently collected specimen was collected just below the dam in Wilmington. The preferred habitat of the Pallid Shiner is pools and slower moving stretches of small to large rivers.

Three specimens of the state endangered Western Sand Darter, *Ammocrypta clarum*, have been collected in the Kankakee River between 1988 and 1992. All three records are from a 4-mile stretch from 0.5 mi W Custer Park, downstream, to the town of Wilmington (Will Co.). The Western Sand Darter is known to occur in shallow sandy areas of medium to large rivers.

The state endangered Northern Brook Lamprey, *Ichthyomyzon fossor*, has been collected sporadically in the Kankakee River. The species was collected in 1963 1 mi W Momence (Kankakee Co.), in 1966 at Aroma Park (Kankakee Co.), in 1975 at the Illinois / Indiana state line (Kankakee Co.), and in 1991 at the Illinois Hwy. 50 bridge in Kankakee (Kankakee Co.). The preferred habitat of the Northern Brook Lamprey is clean riffles and runs of small rivers.

The state threatened Starhead Topminnow, *Fundulus dispar*, occurs in the Kankakee River and associated backwaters upstream of Momence (Kankakee Co.) and the Beaver Creek drainage in eastern Kankakee County. The INHS Fish Collection contains 12 records for the Starhead Topminnow from this region of Kankakee drainage from 1960 to 2014. Starhead Topminnows normally occur in well-vegetated lakes, sloughs and backwaters of larger rivers.

Between 1901 and 1967 the state endangered Blacknose Shiner, *Notropis heterolepis,* was collected at six sites in tributaries of the Kankakee River in Kankakee and Iroquois Counties. The state threatened Ironcolor Shiner, *Notropis chalybaeus,* occurs in the Kankakee River near Momence (Kankakee Co.), Spring Creek S of Momence (Kankakee Co.), and in the Beaver Creek drainage (Kankakee and Iroquois cos.). Between 1960 and 2002 the Ironcolor Shiner was collected on 22 different occasions from this region of Illinois. The state endangered Weed Shiner, *Notropis texanus*, also occurs in the Kankakee River near Momence and in the Beaver Creek drainage. The species was also collected from the Kankakee River approximately 4 mi E

Kankakee on 8 August 1978. Between 1960 and 2000 the Weed Shiner was collected on 15 different occasions from this region of Illinois. The Weed Shiner, Blacknose Shiner, and Ironcolor Shiner all occur in clear, vegetated, sand bottomed pools and slow runs of creeks and small rivers. The Blacknose Shiner is also known to occur in clear vegetated lakes.

METHODS

A 400-yard stretch of the Kankakee River at the National Railroad Passenger Corp. (AMTRAK) bridge located in Wilmington, Will County, Illinois was sampled for fishes by INHS personnel C. M. Rhoden, C. A. Taylor, and J. S. Tiemann on 22 July 2014 using a boat-mounted DC electro-fisher generating approximately 220 volts. Sampling was conducted for 1.5 hr. by driving the boat parallel to both banks for the entire reach. All fishes were identified, counted, and released, with the exception of a few specimens that were vouchered and deposited into the INHS Fish Collection (**Table 1**).

RESULTS AND DISCUSSION

One hundred fifty individuals from 26 species of fishes in eight families (**Table 1**) were collected in the project location (**figures 1, 2**). Five state endangered Pallid Shiners, *Hybopsis amnis,* and three state threatened River Redhorse, *Moxostoma carinatum,* were collected within the survey area. All five Pallid Shiners were vouchered as identification in the field is difficult. No River Redhorse specimens were vouchered. No other species listed at either the state or federal level were collected or observed.

We believe that our sampling efforts resulted in an accurate assessment of the fish community present at the National Railroad Passenger Corp. (AMTRAK) bridge site. Given the results of our sampling and historical records for both the Pallid Shiner and River Redhorse, it is apparent that reproducing populations of both species occur in the Kankakee River near the proposed project site in Wilmington. Suitable habitat for the River Redhorse occurred under and both immediately up and downstream of the bridge. Pallid shiners generally prefer slower flowing reaches of rivers and such habitat is present immediately upstream of the bridge where River width increases. The lack of historical records for the Northern Brook Lamprey near Wilmington and the lack of well-vegetated reaches of River with clear water and sand substrates argues for the absence of populations of other species of special concern discussed in Background section of this report. River Redhorse most likely spawn in Illinois from early April to late May. Little is known about the life history of Pallid Shiners and spawning dates for the species in Illinois are unknown. Cursory data from Tennessee suggest that the species is possibly a late spring to early summer spawner (Etnier and Starnes 1993)

ACKNOWLEDGMENTS

J.L. Jarvis (INHS) assisted in preparing the map in **Figure 1** and the associated shape file referenced in **Appendix 1**. Cody M. Rhoden assisted with fieldwork.

LITERATURE CITED

Butler, S.E. and D.H. Wahl. 2012. Evaluation of the distribution, movements, and habitat use of the River Redhorse (*Moxostoma carinatum*) and Greater Redhorse (*Moxostoma valenciennesi*) in the upper Illinois River basin. Final Report to Illinois Endangered Species Protection Board, Springfield, IL. 65pp.

Etnier, D. A. and W. C. Starnes. 1993. The Fishes of Tennessee. University of Tennessee Press, Knoxville, Tennessee.

Illinois Endangered Species Protection Board. 2011. Checklist of Endangered and Threatened Animals and Plants of Illinois. Illinois Endangered Species Protection Board, Springfield, Illinois. 18 pp.

Mankowski, A., editor. 2010. Endangered and Threatened Species of Illinois: Status and Distribution, Volume 4 - 2009 and 2010 Changes to the Illinois List of Endangered and Threatened Species. Illinois Endangered Species Protection Board, Springfield, Illinois. iii+38 pp.

Mankowski, A. 2012. The Illinois Endangered Species Protection Act at Forty: a review of the Act's provisions and the Illinois List of Endangered and Threatened Species. Illinois Endangered Species Protection Board, Springfield, Illinois. 152 pp. Published online at: http://www.dnr.illinois.gov/ESPB/Pages/default.aspx.

Page, L.M. and B.M. Burr. 2011. Peterson Field Guide to Freshwater Fishes of North America North of Mexico. Houghton Mifflin Harcourt, Boston. xix + 663 pp.

Smith, P.W. 1979. The Fishes of Illinois. University of Illinois Press, Champaign, Illinois.

Appendix 1

This Project Location section references <18444_HSR_Kankakee_Fish_Survey.zip> – containing an ArcGIS shapefile with sampling point information for the Kankakee River site discussed in this report where a survey for fishes was conducted by INHS personnel on 22 July 2014.

The ArcGIS shapefile and this report were both submitted to IDOT via the IDOT Site Assessment Tracking System extranet website (Frostycap) on 26 August 2014.

Table 1. Fishes collected by INHS personnel C. A. Taylor, J. S. Tiemann, and C. M. Rhoden on 22 July 2014 from the Kankakee River at National Railroad Passenger Corp. (AMTRAK) bridge in Wilmington, Will County, Illinois. # = number of individuals collected; SE – State Endangered; ST = State Threatened.

Family	Scientific name	Common name	#
Clupeidae	*Dorosoma cepedianum*	Gizzard Shad	6
Lepisosteidae	*Lepisosteus osseus*	Longnose Gar	5
Cyprinidae	*Hybopsis amnis*	Pallid Shiner - SE	5
	Cyprinella spiloptera	Spotfin Shiner	2
	Notropis volucellus	Mimic Shiner	14
	Pimephales notatus	Bluntnose Minnow	2
	Pimephales vigilax	Bullhead Minnow	2
Catostomidae	*Hypentelium nigricans*	Northern Hogsucker	1
	Moxostoma anisurum	Silver Redhorse	1
	Moxostoma carinatum	River Redhorse - ST	3
	Moxostoma duquesnei	Black Redhorse	14
	Moxostoma macrolepidotum	Shorthead Redhorse	14
Ictaluridae	*Ictalurus punctatus*	Channel Catfish	7
	Pylodictis olivaris	Flathead Catfish	1
Centrarchidae	*Ambloplites rupestris*	Rock Bass	2
	Lepomis cyanellus	Green Sunfish	2
	Lepomis humilis	Orangespotted Sunfish	3
	Lepomis macrochirus	Bluegill	8
	Lepomis megalotis	Longear Sunfish	13
	Micropterus dolomieu	Smallmouth Bass	2
	Micropterus salmoides	Largemouth Bass	4
Percidae	*Etheostoma nigrum*	Johnny Darter	1
	Percina caprodes	Logperch	19
	Percina maculata	Blackside Darter	1
	Stizostedion vitreum	Walleye	13
Sciaenidae	*Aplodinotus grunniens*	Freshwater Drum	5