Indiana Crayfish (*Orconectes indianensis)* Conservation Plan

and
Request for Incidental Take Authorization

Southern Illinois Power Cooperative
Marion Plant to Carrier Mills Substation Transmission Line Corridor
Williamson and Saline Counties, IL

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1.0 INTRODUCTION AND BACKGROUND

1.1 Project Background

Southern Illinois Power Cooperative (SIPC) is in the business of generating and distributing electrical power to distribution cooperatives of Southern Illinois. The distribution cooperatives provide electrical power to businesses and homes. To improve service to some customers, SIPC needs to install a new 161-kV transmission line from the Lake of Egypt generating facility to a site near the town of Carrier Mills, Illinois. The new transmission line corridor will be 120 feet wide, will extend approximately 20 miles, and will involve clearing trees in much of the corridor. Early consultation was conducted, resulting in IDNR's letter of June 13, 2014, which identified a number of issues including a possible incidental take authorization for the Indiana crayfish.

1.2 Project Location and Ownership

The proposed project area is linear in nature and extends across portions of 20 Sections in southeastern Williamson County and 5 Sections in southwestern Saline County. The project is located in the following townships: T10S-R2E, T10S-R3E, and T10S-R4E in Williamson County and T10S-R5E and T9S-R5E in Saline County. Please refer to maps in Figure 1 and Appendix A for specific locations of the proposed corridor within individual sections. Land ownership within the proposed corridor area is held largely by private landowners. SIPC has acquired the legal rights to enter and conduct proposed activities by securing easements.

1.3 Species Background Information

The Indiana crayfish is listed by the Illinois Endangered Species Protection Board as endangered. This designation provides protections for the species including a provision for taking the species where such take is incidental to otherwise legal activities. According to the Illinois Endangered Species Protection Board (Nyboer et al. 2006), the species is restricted in Illinois to the Saline River and Honey Creek systems. Habitat is described as rocky riffles and pools of small to medium sized streams. Declining water quality is cited as a threat to the species.

Review of IDNR occurrence records (acquired October 2013 and accessed September 2014), show a number of known Indiana crayfish locations in the Saline River South Fork and Sugar Creek areas near the project location (Figure 2). The project could impact known locations along the Saline River South Fork and could have minimal impacts on one known location along Sugar Creek. The corridor will cross one known location near the center of Section 9, T10S-R3E (Figure 2, Site A). Another known location in the SW ¼ of the SE ¼, Section 8, T10S-R3E is just upstream of the corridor (Figure 2, Site B). Due to the upstream position from the corridor, this known location would likely not be impacted by the proposed activities. Another known location, just west of Highway 166, is located near the center of Section 3, T10S-R3E (Figure 2, Site C). This location is approximately 1.4 stream miles downstream of the corridor, sufficiently far downstream that siltation from the project would probably not be an issue. Another known location near the corridor is in the center of Section 17, T10S-R4E, on Sugar Creek (Figure 2, Site D). This location is 1.2 stream miles downstream of the proposed corridor where it crosses an intermittent tributary of Sugar Creek. Again this distance is sufficiently far that minor amounts of silt generated at the

corridor would probably not be measurable at this location. The known location in the NW ¼ of Section 15, T10S-R4E (Figure 2, Site E) appears to be hydrologically separated from the corridor by a large surface mine lake. Drainage from the corridor flows into this deep lake. Coarser sediments would settle out into this lake whereas finer suspended solids would be quickly diluted, essentially serving as a silt barrier between the corridor and known location E. More detailed discussion of potential impacts to known Indiana crayfish locations and likely locations will follow later in this document.

1.4 Description of Activities

Development of the transmission line will involve removing existing trees within the 120 foot wide corridor throughout its 20.7 mile length. Although some lands within the corridor have no trees, such as agricultural fields, a high percentage of the corridor supports trees which will need to be removed consistent with safe and effective operation of the suspended overhead transmission wires. At predetermined distances support structures will be erected along the length of the corridor to suspend the transmission wires at the design distance above the ground. An effective erosion control herbaceous vegetative ground cover will be established along the length of the corridor, except over roads and open water, and maintained throughout the life of the line. The first phase of tree removal will involve commercial timber harvest operations. Remaining trees will then be cut and burned and/or ground in place. Stumps will be ground down to ground level using stump grinding technology and wood chip mulch will be left to aid in temporary erosion control and rapid establishment of an herbaceous erosion control cover. Stumps will not be physically separated from the soil as is usually done in land clearing operations. For this reason erosion and siltation is expected to be much less than with more traditional tree removal methods. In IDNR's early consultation, a potential adverse impact was discussed involving possible construction of fords or installation of culverts. SIPC is not proposing to construct fords or any type of low water crossing, nor is SIPC proposing to install any culverts. Access to areas where trees are to be removed and lines are to be erected will not involve crossing channels with mobile equipment except at existing culverts or bridges.

1.5 Potential Adverse Effects

Potential adverse effects to the Indiana crayfish can be summarized in three categories: degradation of water quality, thermal impacts, and physical crushing of individual animals by vehicles and equipment. Water quality effects are related to increases in sedimentation associated with tree removal activities. Recognizing that aquatic invertebrates such as crayfish are susceptible to increases in sediment loads, including clay particles which can stay suspended in the water for long periods, SIPC proposes measures herein to reduce and minimize these effects through effective control of erosion and sediment containment measures. Although sedimentation effects can be extremely detrimental to species such as Indiana crayfish, these effects are typically short lived, being mostly confined temporally to the time when construction is taking place and typically do not extend beyond the time period necessary to stabilize freshly impacted areas. Responsible erosion and sediment control during this critical time will generally prevent adverse effects until the area

has re-stabilized. Monitoring and maintenance of effective erosion control cover, which is a routine part of right of way management, will assure continued, long term protection.

Thermal effects are expected to be longer lasting. Recognizing that aquatic invertebrates, particularly those associated with streams are sensitive to differing temperature regimes within the stream, changing this regime could have significant ecological consequences to stream fauna, depending on the extent of such change. The transmission line will be crossing stream channels in a number of locations. Some of these locations currently have no tree cover and water temperatures at these locations would be expected to be higher than at shaded locations and would not be expected to change as a result of the planned work. For those areas currently offering shade to aquatic invertebrates, which will be altered due to removal of trees, limited long term detrimental effects can be expected. The extent of such effects would expected to be relatively low, given the 120 foot width of the corridor. An assessment has been made as to the extent to which habitat conditions will change as a result of decreased shading and associated increases in water temperature. Other than changing the location of the transmission corridor to avoid or minimize stream crossings, little can be done to prevent this type of impact, consistent with proper and safe operation of the line. Therefore measures will focus mostly on mitigation of this impact type.

Regarding crushing individual crayfish with vehicles and equipment, SIPC does not anticipate a need to have any equipment or vehicles in stream channels. Access to areas needing tree removal will be made from either side of a channel and not by crossing a channel, unless there is an existing culvert or bridge. SIPC does not propose to install any new channel crossing structures such as fords, low water crossings, or culverts, nor do they plan to place vehicles or equipment into stream channels. For these reasons we do not anticipate incidental take of Indiana crayfish due to crushing by vehicles or equipment.

1.6 Identification of Habitat Along the Corridor

GIS was used to identify areas along the corridor where proposed activities might conflict with the Indiana crayfish. Recognizing that activities in areas outside of stream buffer zones will probably not impact the species, potential impact areas focused on stream buffer areas. In the mining industry, which is heavily regulated in the areas of sedimentation and erosion control, 100 feet from top of bank has been the standard stream buffer since 1977. The Corps of Engineers also commonly uses this distance for stream protections in the Clean Water Act, section 404 program. Each location where the corridor came within 100 feet of a stream bank was mapped. Because widths of streams were not readily ascertainable, the 100 foot distance was approximated by using 150 feet from the stream center line, which was easily ascertainable using topographical maps in GIS. In the field, these areas will be measured as 100 feet from top of bank. Polygons were only identified in the South Fork drainage area. The east 1.5 miles of the corridor is in the Bankston Fork (Middle Fork) drainage, where the crayfish is not known to occur, therefore conflicts with the species are not expected there. Thirty two areas were identified along the length of the corridor where potential conflicts with Indiana crayfish could occur and these were mapped (Appendix A). Activities in areas to be disturbed outside of these 32 polygons are presumed not to have impacts on the crayfish. Polygons were adjusted to include only areas where trees are to be removed and do

not include portions of the corridors not currently supporting trees, such as agricultural fields, as indicated by current aerial photography.

Typically these polygons occur where the corridor will cross a stream at a more or less perpendicular angle. However, situations were also discovered where the corridor will cross a stream at an oblique angle, increasing the amount of potential habitat to be disturbed. Sometimes the proposed corridor ran along the stream, in the direction of flow, further increasing potential impacts. In some cases the corridor will not disturb the stream bank at all, but was mapped because it came within the 150 feet of a stream located off to the side of the corridor. In this latter scenario, sedimentation protections would still apply, although denuding of banks will not be an issue.

2.0 MINIMIZATION MEASURES

2.1 Minimization Measures

SIPC proposes to minimize adverse impacts to the Indiana crayfish by appropriate siting of the corridor, implementing protective erosion control measures, implementing protective sediment containment measures, removing trees in an incremental fashion, establishing concurrent erosion and sediment control measures, applying special extra precautions to steep sloped areas, avoiding crushing individual crayfish, and monitoring the adequacy of erosion and sediment control measures. Unavoidable impacts which cannot be prevented, after minimization, will be quantified and mitigated.

2.1.1 Avoidance, Location of the Corridor and of Support Structures

Many factors go into establishing a right of way location for a transmission line. Ability to access the area both physically and legally are paramount. Topographic considerations are a part of these decisions with factors such as drainage, slope, and soil conditions. Usually a final location represents some compromises with respect to some aspects. Negotiations with individual landowners for easement rights are often limiting. With these factors in mind, SIPC endeavored to avoid stream crossings where possible. With the number of streams in the area and the length of the needed line, it was not possible to avoid all streams. SIPC was more successful at avoiding streams on the eastern extent of the corridor than on the western end. They would have preferred not to need to cross the South Fork so many times between the third and sixth miles of the line (starting on the west end), but were forced into this configuration by legal right of entry constraints. After that area, heading east, SIPC was more successful at avoiding stream crossings. Final locations of the transmission line supporting structures have not yet been determined; however, all efforts will be made to site these outside the 100 foot stream buffers at each of the stream crossings.

2.1.2 Estimated Area and Amount of Impact

The 32 areas of potential impacts were mapped as polygons and numbered from west to east. They were identified with the letters IC, for “Indiana Crayfish” and numbered as IC1 through IC32. Each IC polygon was then assessed with respect to likelihood of presence of, and impacts to, the Indiana crayfish based on known habitats. One site, IC16, was designated as “known to occur” based on known occurrence data obtained from the Illinois Department of Natural Resources. Any

IC area occurring between 2 known locations was considered to be "highly likely" that the species is present and could be impacted. This assumes that suitable habitat is present. Six IC polygons were designated as "highly likely" (IC10 – IC 14, and IC17). Six sites were designated as "not likely" (IC23, IC28-IC32), based on watershed interruptions due to past surface mining and large impoundments present between these stream segments and known locations. These "not likely" determinations are supported by early consultation with IDNR (Table 1). All remaining polygons were deemed "likely", in the absence of any sampling data to the contrary, since the species is known in the watershed.

The polygons were then evaluated as to the extent to which the banks will be denuded. Of the 26 polygons rated as "known to occur", "highly likely", or "likely", 22 will have both banks denuded, one will have 1 bank denuded, while 4 will not have either bank denuded. Stream bank length to be denuded for each polygon was measured, which totaled 9,889 feet (Table 1). The impact that this change in habitat could have on the species is discussed and quantified later in this plan.

Potential impacts to the species due to potential sedimentation are harder to quantify. Certainly, using traditional methods of tree removal, namely, grubbing stumps with a bulldozer, in the stream buffer zones, would result in significant sedimentation into the streams, causing some degree of negative impact to the species. SIPC proposes to utilize a comprehensive suite of erosion control measures to minimize these impacts. Although unrealistic to think that all such sedimentation impacts can be eliminated, the goal is virtual elimination of these impacts via minimization to the extent practical.

2.2 Incremental Impacts

Tree clearing will be conducted incrementally, that is, not all areas to be cleared will undergo this activity at the same time. As one area is being cleared, erosion and sedimentation control measures will be implemented on the previously disturbed area. Stabilization measures will be implemented before additional areas are disturbed. This practice of incremental disturbance will limit the maximum impacts experienced by the stream community at any given time.

2.3 Concurrent Erosion and Sediment Control

Erosion and sediment control measures will be taken concurrently with disturbance. As soon as areas are cleared, erosion control (measures to prevent erosion) and sediment control (measures to contain sediment) will take place as soon as practical. Concurrent erosion and sedimentation control measures will assist in minimizing impacts.

2.4 Control of Erosion and Sedimentation

The following erosion and sedimentation control measures will be taken in areas IC1 through IC 22 and IC24 through IC27 to protect the Indiana crayfish.

2.4.1 Erosion Control Measures

The goal of the corridor is to create an open area consistent with the clearance distances needed for safe and effective operation of the overhead transmission lines. This will be

accomplished by removal of trees and establishment of an early successional vegetation community which can be maintained by mowing or spraying. SIPC proposes to utilize stump grinding and chipping technology in lieu of traditional stump grubbing. This technique will not result in the exposure and fragmentation of soil as occurs during grubbing operations, which drastically increase the surface area of soil particles exposed to rainfall. The proposed stump handling technology also has the added benefit of leaving wood chip mulch in place to cover exposed soil, serving as a barrier to erosion until a permanent effective herbaceous erosion control growth has developed.

Areas where trees are removed will be seeded with a herbaceous vegetation mixture of 20 lbs/acre annual rye, 20 lbs/acre creeping red fescue, 20 lbs/acre Kentucky 31 fescue, and 6 lbs/acre medium red clover. The mix includes perennial species needed to maintain a permanent cover. Annual rye is included to establish a quick temporary erosion control cover, to control erosion while the permanent seed mix germinates and matures. Wood chips from stump grinding will serve as mulch to hold moisture and protect soils while herbaceous vegetation is maturing. To further increase robustness of the perennial stand, SIPC will not mow herbaceous vegetation until perennial species have gone to seed, to enhance the soil seed bank of desirable erosion control species.

2.4.2 Sedimentation Control Measures

In addition to erosion control measures taken to prevent soil particles from being washed away by rain, measures will also be taken to contain any sediments that should migrate away from disturbed areas. Containment of potentially migrating sediments will be accomplished by silt fences. Silt fences will be placed at locations where the drainage pattern will result in runoff from disturbed areas flowing towards a stream where Indiana crayfish are known or are likely (i.e. IC1-IC22, IC24-IC27). Installation will follow USDA-NRCS guidelines and will be maintained until perennial vegetation has matured adequately to provide permanent erosion control.

2.4.3 Special Steep Slope Precautions

At polygon IC20, where steep slopes were identified as a concern in early IDNR consultation, measures specified above for sedimentation control will be followed in addition to the following. A minimum of two silt fences will be used in each draw located south and west of the stream, one placed approximately 100 feet downslope of the other. Likewise, two silt fences will be used east of the stream. Additionally, silt fence will be installed along the tops of both banks of the stream crossing IC20, and an additional silt fence will be installed 100 feet upslope of the top of the stream banks. These silt fences will be as long as the portion of the banks being denuded and will be maintained until permanent vegetation has matured enough to provide stable soil conditions and effective erosion control.

Any location along the corridor where stream banks will be denuded will have a silt fence installed at the top of the stream bank and a silt fence installed 100 feet upslope of the top of bank (or as close to this distance as practical in the event that a road or other obstacle prevents this 100 foot distance). Silt fences in these locations (along denuded stream banks) will extend the length of the denuded stream banks. All silt fence installation will follow NRCS installation guidelines. Silt fences will be maintained until permanent erosion control vegetation is well established.

2.5 Avoidance of "Crushing" Take

SIPC does not plan to operate equipment or vehicles in stream channels. Therefore, crushing of individual crayfish by vehicles or equipment will not be a problem.

2.6 Monitoring

All areas where trees are removed in IC1 through IC22 and IC24 through IC27 will be monitored for adequacy of erosion control and sedimentation control measures, annually for the life of the incidental take authorization (ITA), or a lesser time should the Illinois DNR agree that monitoring may be discontinued because areas have been adequately stabilized. An annual report shall be filed (due on the anniversary date of the ITA) which documents the condition of silt fences, and vegetative cover in the IC polygons. Any maintenance activities which occurred, such as repair of silt fences, or reseeding will be reported. Evidence of un-stabilized sediment accumulations shall be noted and corrective actions detailed. Evidence of inadequately controlled silt deposition into a stream will be reported and corrective action proposed. Evidence of uncontrolled rill or gully erosion will be corrected and reported.

2.7 Employee education

SIPC will develop an educational pamphlet which, after approval of IDNR, will be distributed to all employees working in the corridor. The pamphlet will educate employees on what Indiana crayfish are, why they are important, and what measures SIPC has committed to, for conservation of the species.

3.0 MITIGATION MEASURES

3.1 Quantification of Take

As stated above three main types of impacts were identified in early consultation with IDNR as being of concern regarding the Indiana crayfish. Direct crushing of individual crayfish by vehicles and equipment is not anticipated. Therefore, no take is expected as a result of this type of impact.

Thermal change in streams as a result of denuding banks is expected to have potential long term impacts on stream ecology in small localized areas. Page and Mottesi (1995) commented that portions of streams where trees have been removed, provide less suitable habitat for the species compared with shaded banks. GIS analysis showed a total of 9,889 feet of stream bank will be denuded. This is equivalent to 4945 feet of stream being denuded on both sides of the stream. With an average normal high water flow of the stream at 20 feet wide, this translates to a stream area of 98,900 ft^2 (4,945 x 20) or 9,188 m^2 .

This figure (9,188 m^2) assumes that all trees removed have contributed to shading of the stream. This assumption would not be true however, as it relates to trees on the north bank for a channel flowing east. In that case, trees on the north bank would cast shadows north, northeast, and northwest of the stream, and not over the water. This would also hold true if the axis of the north

bank shifted to some degree to the northeast and northwest. Taking this factor into account, the lengths of denuded streambanks were adjusted to exclude those portions of the banks which do not contribute to shading of the flow. Banks were considered not to contribute to shading where the axis of the north bank was such that mid-day shadows are cast northwest (315^{o}) through northeast (45^{o}). The 9,889 foot figure is thus reduced to 7,004 ft, which is equivalent to 3,502 feet of stream where both banks are denuded and contributing to shading. Assuming the 20 foot width, this equates to an area of 70,040 ft^2, or 6,503 m^2 (which is a very small portion of the habitat available in the area). Assuming this entire area is "preferred habitat" (worst case scenario) with a density of 0.76 Indiana crayfish per m^2 (Simon and Thoma 2006), this area of habitat would support 4,942 Indiana crayfish. A complete abandonment of these reaches by the species (again, a worst case scenario) would therefore represent a reduction of habitat for 4,942 Indiana crayfish.

Unchecked erosion and sedimentation from traditional tree clearing methods, including grubbing, would undoubtedly cause sufficient water quality degradation to adversely affect the species, perhaps to the extent of "take" under the Illinois Endangered Species Protection Act. SIPC's plan to not use traditional tree clearing methods, but rather employ stump grinding technology, in conjunction with temporary erosion control vegetation, permanent erosion control vegetation, mulching, silt fences, incremental impacts, and concurrent sediment and erosion control, reinforced by follow up monitoring and remedial measures if warranted, are predicted to reduce potential sedimentation impacts to below "take" levels. No take is expected from sedimentation, due to SIPC's commitment to these measures.

3.2 Likelihood of Survival of Species in Illinois

The listing of the Indiana crayfish in Illinois is due to a reduction of its range particularly in the North Fork of the Saline River. The South Fork continues to support a population density, consistent with the species being "fairly common" (Page and Mottesi 1995). The South Fork population could therefore experience some minor reduction in habitat without that being detrimental to the existence of the species as a whole, especially if that reduction were adequately mitigated. The following mitigation method is proposed, to that end.

3.3 Proposed Mitigation

Correcting the denuded banks situation would involve re-establishing trees along the banks which will be denuded. That activity is fairly easy to assign a monetary value to. Assuming that the shading of streams is due to trees within 20 feet of the top of bank, the area that would need re-forestation would encompass some 3.22 acres (20ft x 7,004ft / 43,560 ft^2 per acre). At $1,700 per acre (State of Illinois, Office of Mines and Minerals bonding rates), this activity would have an associated dollar value of $5,474. SIPC proposes to award this amount to a bona fide research institution in Illinois for study of the Indiana crayfish in the Saline River watershed, based on competitive proposals utilizing procedures and schedules as deemed appropriate by the Illinois DNR.

4.0 FINANCIAL ASSURANCES

SIPC is an established ongoing business of continuous operation for several decades and prospects of continuing that business for several more decades, at least. SIPC has an annual operating budget including funds for right of way development, maintenance, and environmental compliance. SIPC financial planners will assure that provisions agreed to herein will be funded by appropriate allocation of funds as part of SIPC's annual operating budget. Commitments made herein represent a minor part of SIPC's annual operating budget and will be easily incorporated into these budget provisions.

5.0 ALTERNATIVES ANALYSIS

There are four alternatives considered for this project as follows.

A. The "No Action" Alternative would be to not install the new transmission line. The "No Action" alternative would result in negative effects including:

- Unreliable electric power supply. This unreliability will work against economic growth and prevent increases in quality of life.
- Loss of indirect jobs including vendors and suppliers.
- Loss of tax revenue to the State of Illinois and Federal government through income taxes and sales taxes.
- Economic losses to the company would be significant as large investments in rights of way acquisition, design, and permitting will be lost.

B. The "Project Relocation Alternative" would involve relocating the corridor outside any areas that could negatively affect the Indiana crayfish. This alternative is not a viable alternative because the crayfish is presumed to be so widely distributed in the watershed. Relocating the corridor would involve opening negotiations with numerous new landowners, many of whom are probably not open to such negotiations. SIPC contends that the proposed corridor configuration represents the best compromise between legal right of entry options and limited conflicts with the Indiana crayfish, taking into account best use of the terrain in meeting the technical prerequisites of safe and efficient operation of the transmission line.

C. The use of "Alternative Electrical Supply Techniques" including solar power and wind power to supply the additional electrical supply needed. Solar power would not be able to economically or efficiently provide the power needed in the quantities needed. The area is not well suited to the requirements of generating electricity using wind power.

D. The "Preferred Action" alternative is to provide the additional electric supply infrastructure as proposed by the corridor as currently configured, which represents the best compromise between legal right of entry, physical access, and minimization of impacts to streams and listed species. This alternative recognizes that some impacts to listed species may occur and allows for minimization of impacts to acceptable levels and mitigation of unavoidable impacts, to the extent required by law.

In summary, there are no pragmatic alternatives to the project as proposed; therefore, the preferred action should proceed.

6.0. INCIDENTAL TAKE AUTHORIZATION TERM

SIPC proposes a term of four years for the incidental take authorization.

7.0 IMPLEMENTING AGREEMENT

An implementing agreement is included as Appendix B.

8.0 LITERATURE CITED

Nyboer, R.W., J.R. Herkert, and J.E. Ebinger. 2006. Endangered and threatened species of Illinois: status and distribution. Illinois Endangered Species Protection Board. Springfield, Illinois. 181 pp.

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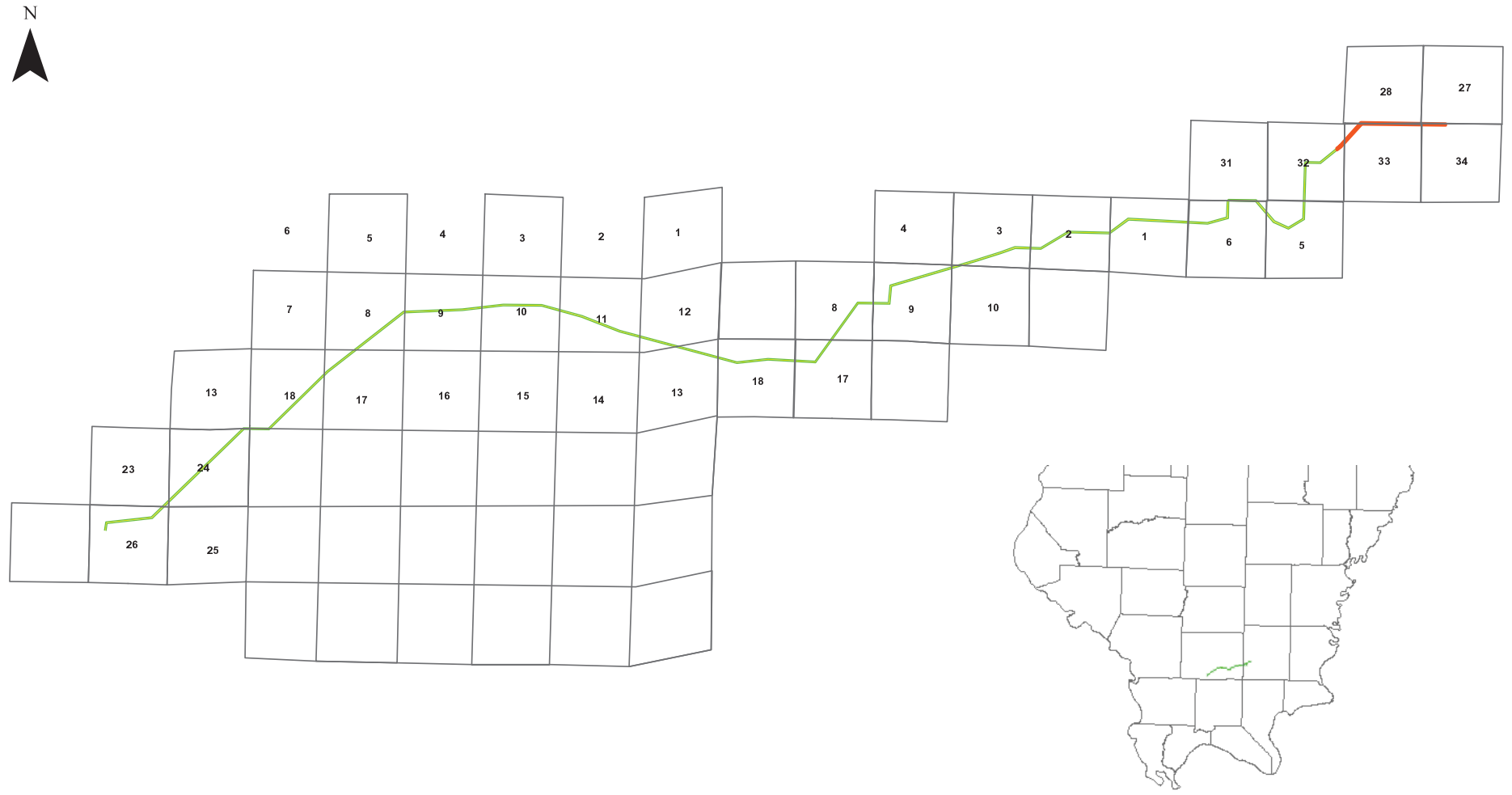
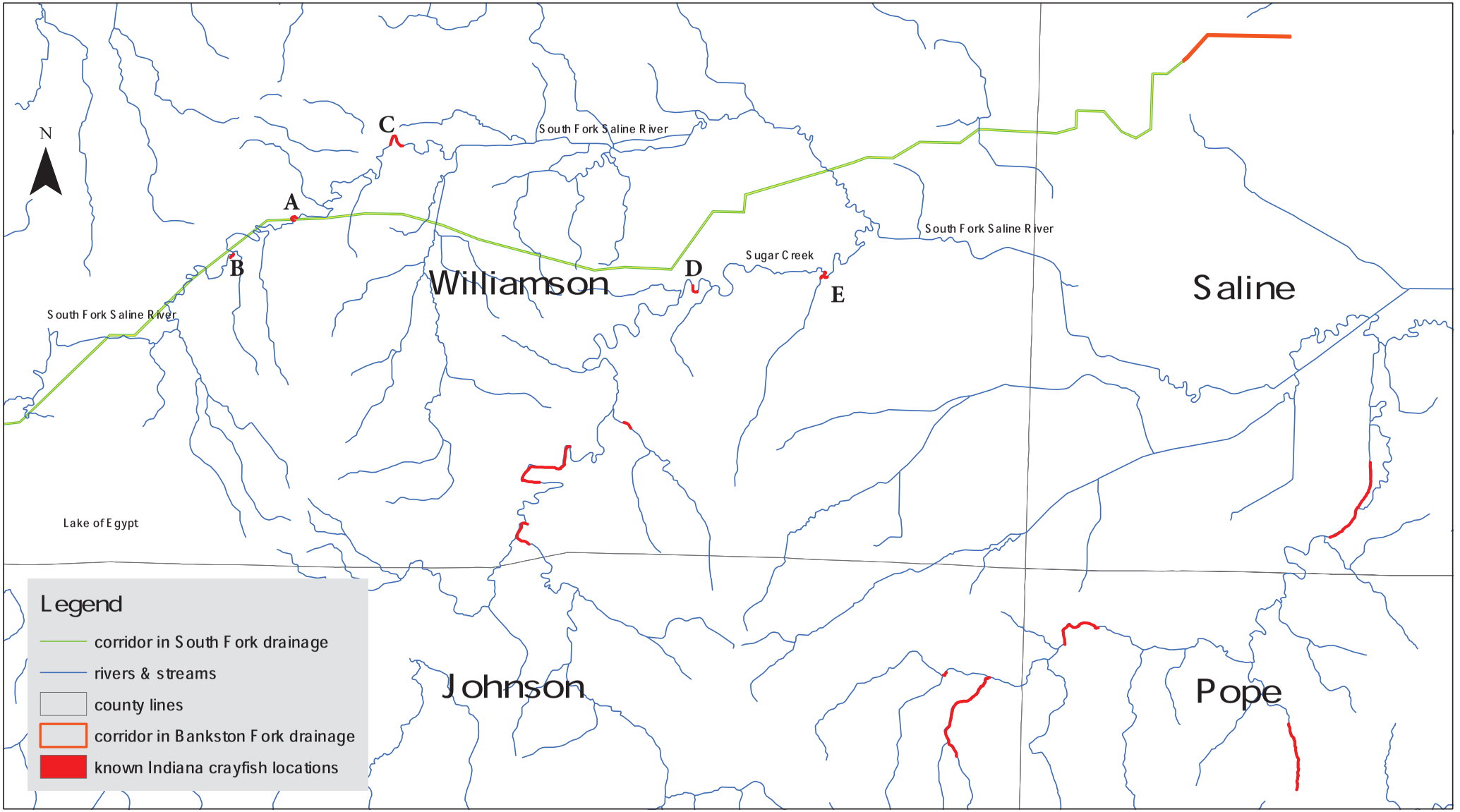


Figure 1. General location and corridor layout relative to section lines.



Data Source: Illinois Dept of Natural Resources, Illinois Nature Preserves Commission, Illinois Endangered Species Protection Board, and the Illinois Natural Heritage Database, October 2013, accessed September 2014.

Figure 2. Known locations of Indiana crayfish in the vicinity of the proposed transmission corridor.

Table 1. Areas of SIPC proposed transmission line corridor where potential Indiana crayfish conflicts might exist.

Area ID	Beginning Station	Ending Station	Indiana crayfish liklihood	banks to incur tree removal (where likely to occur)	feet of banks to incur tree removal	feet of bank where trees are to be removed, not involved in shading	bank length contributing to shading (ft)	perennial or intermittent
IC1	43+30	49+80	likely	2	886	260	626	p
IC2	57+60	60+120	likely	2	240	90	150	i
IC3	115+40	118+60	likely	2	264	0	264	i
IC4	118+80	127+40	likely	2	280	140	140	p
IC5	128+40	141+20	likely	2	616	220	396	p
IC6	170+10	178+00	likely	2	760	380	380	p
IC7	180+80	184+10	likely	2	290	100	190	p
IC8	187+40	205+40	likely	2	1968	510	1458	p
IC9	207+40	211+30	likely	2	270	0	270	p
IC10	228+10	232+20	highly likely	2	254	127	127	p
IC11	245+90	247+20	highly likely	2	272	136	136	p
IC12	250+70	253+90	highly likely	2	514	170	344	p
IC13	254+50	256+10	highly likely	2	242	90	152	p
IC14	256+20	260+10	highly likely	2	264	132	132	p
IC15	268+90	273+80	likely	2	662	200	462	i
IC16	279+10	283+10	known	2	322	140	182	p
IC17	300+90	307+00	highly likely	1	111	0	111	p
IC18	321+70	324+50	likely	2	256	0	256	i
IC19	383+10	386+00	likely	2	238	0	238	p
IC20	453+50	460+90	likely	2	246	0	246	i
IC21	483+20	485+50	likely	0	0	0	0	i
IC22	532+60	535+80	likely	2	330	0	330	i
IC23	611+80	617+50	not likley	0	0	0	0	N/A
IC24	692+90	693+80	likely	0	0	0	0	N/A
IC25	705+80	708+50	likely	2	90	0	90	i
IC26	775+80	784+70	likely	0	0	0	0	N/A
IC27	787+40	793+00	likely	2	514	190	324	i
IC28	807+00	808+50	not likley	0	0	N/A	0	N/A
IC29	842+40	844+60	not likley	0	0	N/A	0	N/A
IC30	863+20	866+40	not likley	0	0	N/A	0	N/A
IC31	985+00	988+70	not likley	0	0	N/A	0	N/A
IC32	992+10	994+60	not likley	0	0	N/A	0	N/A
totals					9889		7004	

Table 2. Measurements at selected stream sites, November 12, 2014.

site	turbidity	bankfull width (ft)	bankfull depth (ft)	terrace width (ft)	terrace depth (ft)	% run	% riffle	% pool	% bedrock	% boulder	% cobble	% gravel	% sand	% silt	% clay
IC 10	clear	35.0	2.8	51.0	9.7	100	0	0	0	0	0	0	50	40	10
IC 16	clear	32.6	4.0	57.0	12.0	100	0	0	0	0	0	0	0	50	50
IC 19	clear	4.9	0.3	51.0	9.0	50	40	10	0	0	5	60	30	5	0