Conservation Plan
for the

Proposed Meredosia Energy Center Improvements and CO_2 Pipeline and Storage Reservoir Construction for the FutureGen 2.0 Project

January 2014

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Chief Executive Officer

FutureGen Industrial Alliance, Inc.
Washington, D.C.

DOE Award Number DE-FE0001882

Acknowledgment: This material is based upon work supported by the Department of Energy under Award Number DE-FE0001882.

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Acronyms and Abbreviations

ac	acre(s)
Alliance	FutureGen Industrial Alliance, Inc.
Ameren	Ameren Energy Resources
cm	centimeter(s)
CO_2	carbon dioxide
CRP	Conservation Reserve Program
CP	Conservation Plan
DOE	U.S. Department of Energy
EIA	Energy Information Administration
ft^2	square feet
GAP	Gap Analysis Project
IAC	Illinois Administrative Code
ICF	Illinois chorus frog
IDNR	Illinois Department of Natural Resources
in.	inch(es)
ISGS	Illinois State Geological Survey
ITA	Incidental Take Authorization
m^2	square meter(s)
mi	mile(s)
MW(e)	megawatt(s) electric
NEPA	National Environmental Policy Act
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VRTC	visitor, research, and training center

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1.0 Introduction

The U.S. Department of Energy (DOE) proposes to provide approximately $1 billion in financial assistance to the FutureGen Industrial Alliance (the Alliance) for the proposed FutureGen 2.0 Project. The funding would be used for project design and development, procurement of capital equipment, construction, and to support a 56-month demonstration period for a coal-fueled electric generation plant integrated with carbon capture and storage. The Alliance will design, construct, and operate the FutureGen 2.0 Project, the world's first large-scale oxy-combustion repowering project integrated with carbon dioxide (CO_2) capture and storage technology. FutureGen 2.0 consists of the Oxy-Combustion Large-Scale Test Project and the CO_2 Pipeline and Storage Reservoir Project. A visitor, research, and training center (VRTC) will also be constructed at a suitable location in Jacksonville, Illinois, to support public outreach and communication, and to provide training and research opportunities associated with near-zero emissions power generation and CO_2 capture and storage technologies. A specific site for the VRTC has not been selected.

The proposed action includes improvement of the Meredosia Energy Center and construction of a CO_2 pipeline from that power plant to a proposed injection/geologic storage site near Jacksonville, Illinois (Figure 1). The study area is located in Morgan County, east of the Illinois River. The repowered oxy-combustion power plant will capture at least 90 percent of its CO_2 emissions and reduce other emissions to near zero. The captured CO_2 will be transported through an approximately 28-mi pipeline to injection wells that will be used to inject the CO_2 into a deep subsurface geologic formation for permanent storage.

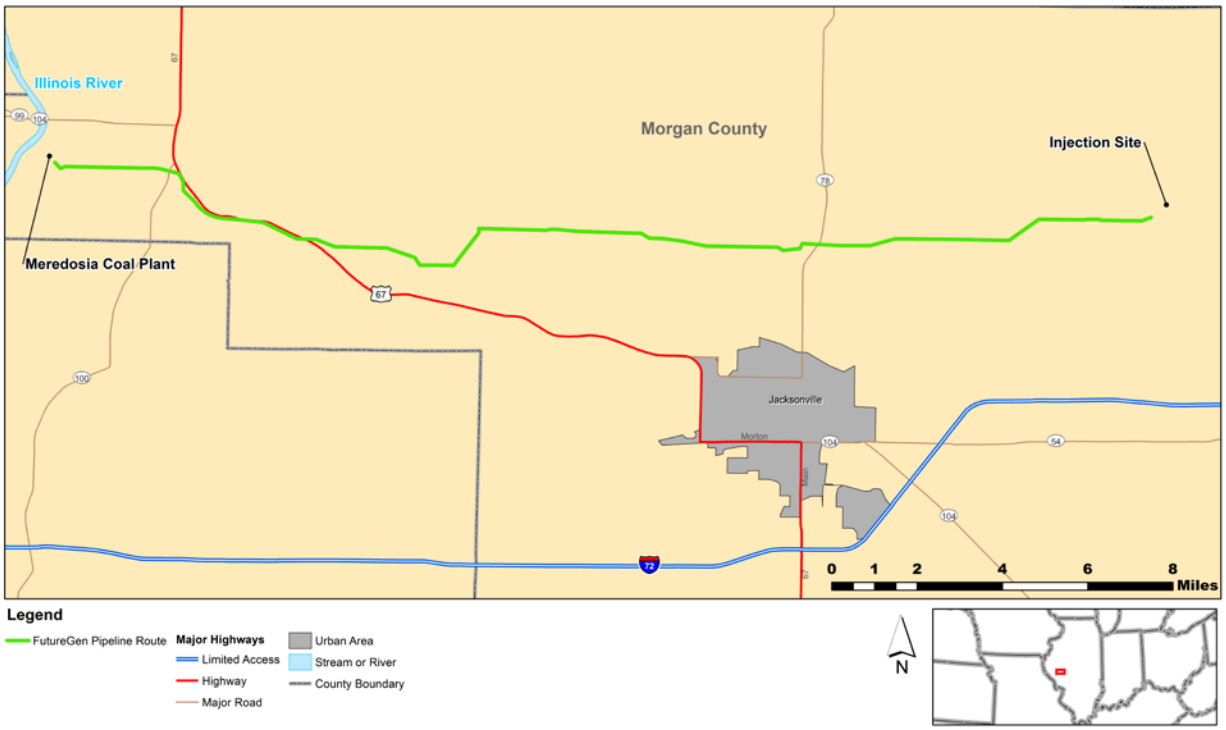

Figure 1. Location of the Meredosia Energy Center and the proposed injection/storage site.

As part of the requirement for an application for an Incidental Take Authorization (ITA) (17 ILL. ADM. CODE CH. I, SEC. 1080), a permit authorized by Section 5.5 of the Illinois Endangered Species Protection Act (520 ILCS 10/5.5), the Alliance is required to create a Conservation Plan (CP) (Section 1080.10). The CP will be used as a planning document to avoid and/or minimize impacts on state-listed or proposed threatened or endangered species and habitats that may occur as a result of the proposed project. State-listed species that may be affected by the proposed project and are covered in this CP are the Illinois chorus frog (ICF) (*Pseudaris streckeri*), regal fritillary butterfly (*Speyeria idalia*), ornate box turtle (*Terrapene ornate*), and the western hognose snake (*Heterodon nasicus)*. Proposed project activities that could result in take for the species that would be covered in the Conservation Plan include construction activities primarily associated with heavy equipment use such as land clearing, trench digging, excavation and hauling debris. Collisions with equipment would be the most likely method of take for most species; however, habitat loss would be due to the removal of such habitat.

The Indiana bat is also a state-listed species; however, the Alliance is covering this species through federal consultation with the United States Fish and Wildlife Service (USFWS). Bald eagles (*Haliaeetus leucocephalus*) are federally protected by the Bald and Golden Eagle Protection Act (16 USC 668), the Migratory Bird Treaty Act (16 USC 703), and the Lacey Act (16 USC 3371) and have also been considered in association with the proposed project. Due to the landscape position and proximity to the Illinois River, proposed improvements to the Meredosia Energy Center were evaluated with consideration of potential bald eagle nesting and roosting areas. A survey of bald eagles and their nesting sites was conducted at the Meredosia Energy Center in spring/summer of 2013. No eagles were observed and no nests were found during field surveys and any clearing activities associated with the improvements at the Meredosia Energy Center will be conducted outside nesting season

1.1 Need for Proposed Action

According to the Energy Information Administration (EIA), coal is an abundant and indigenous energy resource that in 2010 supplied 45 percent of electric power in the United States. Electricity is vital to the nation's economy and global competitiveness with demand for electricity is projected to increase by 22 percent from 2010 to 2035. Based on its analyses, the EIA concludes that this power increase can only be achieved if coal use is also increased (EIA 2012). In addition, nearly half of the nation's electric power-generating infrastructure is more than 30 years old, and a significant portion of this infrastructure has been in service for 60 years or more (EIA 2009). These aging facilities are (or soon will be) in need of substantial refurbishment or replacement. Additional capacity must also be put in service to keep pace with the nation's ever-growing demand for electricity. Therefore, nearly 40 percent of the nation's electricity needs will continue to be served by coal for at least the next several decades (EIA 2012).

Implementation of the FutureGen 2.0 Project will support the objectives of the FutureGen Initiative to establish the feasibility and viability of producing electricity from coal with at least 90 percent CO_2 capture and near-zero emissions of other pollutants. The principal need addressed by DOE's proposed action includes the collection and evaluation of data only made available from the experience of actually designing, permitting, operating, and maintaining an industrial-scale oxy-combustion repowering project with CO_2 capture, transport, and geologic storage. A successful project would generate technical, environmental, and financial data from the design, construction, and operation of the integrated electric generation, pipeline, and injection/storage facilities to confirm that oxy-combustion technology with CO_2 capture and permanent underground storage can be implemented at a commercial scale.

1.2 Project Description

The Alliance would acquire portions of the Meredosia Energy Center in west-central Illinois from Ameren Energy Resources (Ameren) and incorporate advanced oxy-combustion technology into the reconstruction of an idle electric generating unit (Unit 4) (Figure 2). The Meredosia Energy Center is located at, 800 South Washington St. Meredosia, IL 62665. Through the use of the existing Meredosia Energy Center, the oxy-combustion component of the FutureGen 2.0 Project would be constructed on a brownfield site (i.e., a previously developed site). The scope of the Oxy-Combustion Large-Scale Test consists of final design, procurement, manufacture, installation, startup, testing, and operation of the proposed integrated oxy-combustion coal boiler. The proposed oxy-combustion technology would include CO_2 capture, purification, and compression equipment. The reconstructed electric generating unit would be designed to generate approximately 168 MW(e) (gross output) with a net output estimated at approximately 99 MW(e). The CO_2 captured from the oxy-combustion facility would be cleaned, compressed for transport, and delivered to a new pipeline for transport to the CO_2 storage reservoir.

The Alliance would also design, construct, and operate a CO_2 transmission pipeline and a geologic injection and storage facility. The pipeline would transport CO_2 from the Meredosia Energy Center (Meredosia, Morgan County, Illinois) to the CO_2 geologic storage area in Morgan County approximately 28 mi east of the Meredosia Energy Center (see Figure 2). The pipeline and geologic storage reservoir would be designed to respectively transport and store up to 22 million metric tons of CO_2 approximately 4,800 feet below the surface over a 20-year operating period. The Injection Site is located at, 2808 Beilschmidt Road, Alexander, IL 62601. In addition, the Alliance would construct and operate the VRTC in Jacksonville, Morgan County, Illinois.

The components and associated property at the Meredosia Energy Center needed for FutureGen 2.0 are the subject of an Asset Purchase Agreement and will be purchased by the FutureGen Industrial Alliance, Inc. Pipeline crossing of private property will be accomplished through easement agreements negotiated with the property owners or acquired through condemnation if no agreement can be reached. FutureGen will require one injection well site and multiple monitoring well sites. The Alliance is currently negotiating either purchase or long-term lease agreements with the well site land owners.

The FutureGen 2.0 Project would begin final design in 2013 after completion of the National Environmental Policy Act (NEPA) (42 USC 4321) process and a decision by DOE to proceed with the project. Construction would begin in 2014, and commissioning in 2017. Operations and monitoring would continue with DOE funding until 2022 (56 months after commissioning). Performance and economic test results would be shared among all participants, industry, non-governmental organizations, and the public. After DOE's involvement ceases, the FutureGen 2.0 Project would be expected to continue commercial operations, including CO_2 capture and storage, for 20 years. After commercial operations cease, post-injection monitoring of the underground CO_2 would continue for up to 50 years.

During the 20-year operations period, the FutureGen 2.0 Project will be paid for with revenues from the sale of electricity generated at the repowered Meredosia Energy Center in accordance with the terms of a power purchase agreements entered into by Ameren Illinois and Commonwealth Edison and the FutureGen Alliance in August 2013. After the 20-year injection period, there will be a post-injection site care period (50 years or until the permitting authority is satisfied that the CO2 plume is stable, not moving, and no further monitoring is needed). Post-injection site care will be funded by a CO2 Trust

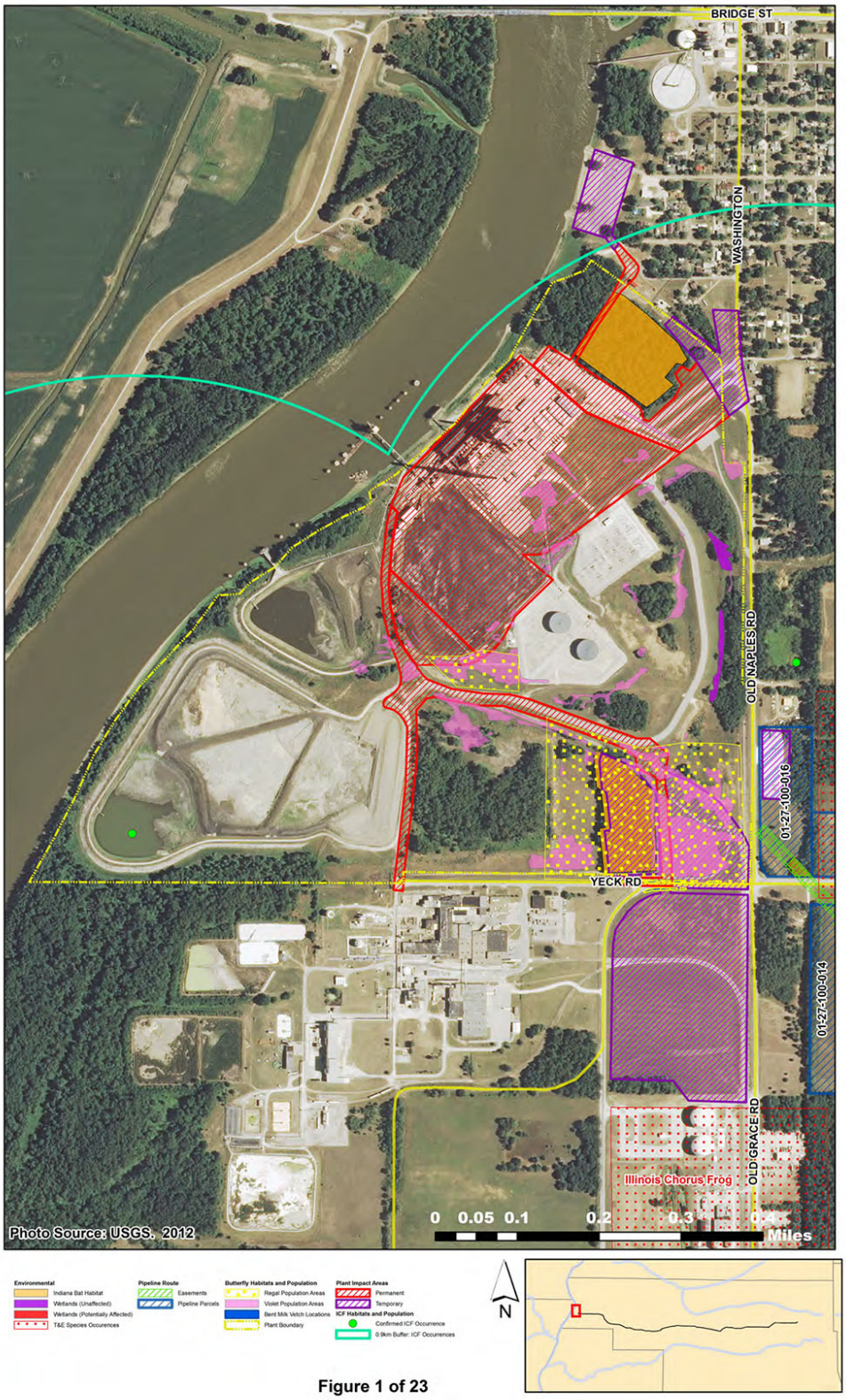

Figure 2. Location of Unit 4 at the Meredosia Energy Center showing impact areas, butterfly population areas and violet population areas.

Fund established by the FutureGen Alliance in accordance with financial responsibility requirements set forth in U.S. Environmental Protection Agency underground injection control regulations (40 CFR 146.85).

The FutureGen project footprint includes four key project components, 1) portions of the Meredosia Energy Center in western Morgan County, IL; 2) a pipeline transporting CO2 to a system of; 3) injection and monitoring wells in eastern Morgan County; and 4) a Visitors and Training Center located in Jacksonville, IL. The construction of all project components will temporarily impact approximately 440 acres within Morgan County. The permanent footprint of the FutureGen project operations will be approximately 90 acres. However, because some of the impacted area involves demolition and reuse of areas of the Meredosia Energy Center previously used for energy production, such as buildings, parking lots, coal piles, or roads, approximately 35 acres of these temporary and permanent impacts will occur on industrial use lands and not on lands suitable for any species evaluated in this Conservation Plan.

1.3 Plan Contents and Organization

The ensuing sections of this CP provide a description of habitat areas within the project area (Section 2.0) containing three components, the plant site, the pipeline, and the injection site. A detailed description of each potentially affected state-listed species, its habitat requirements, and status within the project area is provided in Section 3.0. Section 4.0 contains a description of measures to minimize or mitigate potential effects on the listed species. Section 5.0 described actions considered as alternatives to the proposed project. Finally, Section 6.0 identifies the person who will be responsible for implementation of the CP during the project. Appendix A contains aerial photographs showing wetland and species habitat areas along the proposed pipeline. Appendix B contains reports for the ICF and regal fritillary butterfly that have been conducted to determine possible project impacts on these species.

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2.0 Habitat Types in the Project Area

The project area lies within parts of four natural divisions of Illinois: Upper Mississippi River and Illinois River Bottomlands Division, Illinois River and Mississippi River Sand Areas Division, the Western Forest-Prairie Division, and the Grand Prairie Division (Schwegman 1997). Although agricultural land use now dominates the landscape, some natural plant communities from these divisions remain. These remnants make up the more significant natural communities in the project area. They are generally found in the forested bluffs east of the Illinois River, the sand plain ecosystems throughout the floodplain area south and east of Meredosia, and the forested floodplains associated with the Illinois River.

2.1 Wetlands

In April 2011, the Alliance conducted a wetland field investigation to inspect for the presence of jurisdictional wetlands at the proposed characterization well pad at the storage/injection site. The selected characterization pad—the Beilschmidt Pad—is an approximately 11.25-ac area on the south side of Beilschmidt Road. Jurisdictional wetlands were not identified on the parcel during the investigation (SES 2011a) and the U.S. Army Corps of Engineers (USACE) later concurred with these findings. The stratigraphic well was installed during the period from October to December 2011.

Based on a wetland delineation conducted in May 2011 at the Meredosia Energy Center property, two small wetlands were delineated (Figure 2). Representatives from the USACE visited the site on August 16, 2011, to conduct a Jurisdictional Determination (SES 2011b; PHE 2012). The USACE agreed with the results of the wetland delineation and determined that the two onsite wetlands t are subject to USACE jurisdiction under Section 404 of the Clean Water Act (33 USC 1251). These two wetlands cover areas of 0.37 ac and 0.26 ac, respectively, however occur in an area that will not be impacted during construction.

The Alliance also conducted a wetland delineation of the preliminary locations for soil gas monitoring within the CO_2 storage study area (SES 2011c). This wetland delineation was limited to seven monitoring sites comprising less than 4.6 m^2 (50 ft^2) in total, all of which were located adjacent to county roads. No wetlands were observed during this survey.

The Alliance completed a formal wetland survey of the CO_2 pipeline project area in spring 2013, in accordance with the USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Midwest Region (Version 2.0) along with the Midwest 2012 Final Regional Wetland Plant List (USACE 2010; Lichvar 2012). In the approximately 28 mi of pipeline, thirteen wetland crossings ranging in size from approximately 0.02 to 0.1 ac, for a total of 0.5 ac were identified (Appendix A). The Alliance expects that approximately 0.05 ac of jurisdictional wetlands would be disturbed within the pipeline right-of-way and approximately 0.48 ac of wetlands would be bored under to avoid impacts. The Alliance will submit the wetland delineation to the USACE with a jurisdictional determination request; the USACE will identify which wetlands are considered waters of the United States. An educational facility (the VRTC) is planned for development at a previously developed location in Jacksonville. The facility will support public outreach and communication, and provide training and research opportunities associated with near-zero emissions power and carbon capture and storage technologies. Once a location for the VRTC is finalized it will be surveyed for wetlands.

2.2 Other Habitat Types

Habitat types present in the proposed project area listed in Table.1 are a combination of 2003 Illinois State Geological Survey (ISGS) landcover data confirmed by the Alliance during threatened and endangered species field surveys and wetland delineation activities (ISGS 2003; PHE 2012; SES 2011a; SES 2011b).

Table 1. Habitat types present in the three components of the project area.

Cover Type	Meredosia Energy Center (Acres)	Percent Project Area	CO_2 Pipeline (Acres)	Percent Project Area	Injection Site (Acres)	Percent Project Area
Agricultural land	0	0	249	84.7	30.1	88.5
Pasture/non-native grassland	48.6	18.5	32.5	11.1	1.05	3.1
Upland forest (dry to mesic)	10.4	4.0	8.14	2.8	1.58	4.6
Partial canopy/savannah	6.8	2.6	0.75	0.26	0.0	0
Floodplain forest (wet-mesic to wet)	14.5	5.5	0.54	0.18	0.37	1.1
Other (roadside, railroad, and powerline right-of-way)	93.2	35.4	2.69	0.91	0.0	0

Source: ISGS 2003

2.2.1 Agricultural Land

Cropland is the dominant land-cover type in the pipeline corridor and over the injection site. This cover type includes agricultural fields planted in corn and soybeans, as well as temporarily fallow fields containing a variety of cool season grasses. Some fields are planted with a winter rye (*Secale cereale*) cover or winter wheat crop.

Some agricultural land contains fence rows. Fence rows in the project area are typically a single row of trees with a shrub/sapling understory and relatively dense herbaceous layer. The availability of light creates a multilayer edge habitat. Trees may form a contiguous canopy cover or can be sporadic in places. Common fence-row tree species include boxelder (*Acer negundo*), black cherry (*Prunus serotina*), elm (*Ulmus* spp.), eastern black walnut, (*Juglans nigra*) and Osage orange (*Maclura pomifera*). Shrubs and saplings typically include honeysuckle (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), and various berry bushes (*Rubus* spp., *Ribes* spp). Herbaceous grasses such as Canadian and Virginia wild rye (*Eylmus canadensis* L. and *Eylmus virginicus* L.) may mix with broadleaf species such as stinging nettle (*Urtica dioica*) and longstyle sweetroot (*Osmorhiza longistylis*). Vining species such as common cinquefoil (*Potentilla simplex*) and Virginia creeper (*Parthenocissus quinquefolia*) are also present.

Agricultural areas in the historic Illinois River floodplain that have sandy soil have been left fallow long enough that they have developed a mixture of species common in sand prairie communities, but mixed with the more dominant common weeds. Characteristic species include cheatgrass (*Bromus tectorum*), eastern prickly pear (*Opuntia humifusa*), crown vetch (*Securigera varia*), horseweed (*Conyza canadensis*), common evening primrose (*Oenothera biennis*), and American field pansy (*Viola bicolor*). Left fallow long enough, these areas would likely develop into mesic sand forest.

2.2.2 Pasture/Non-Native Grassland

Cool season grasses planted for livestock pasture include open-land-dominated species such as tall fescue (*Festuca arundinacea*), smooth brome (*Bromus inermis*), and Kentucky bluegrass (*Poa pratensis*). Mowed roadsides are not mapped with this cover type.

2.2.3 Upland Forest (Dry to Mesic)

Forested areas south of Meredosia in the historic Illinois River floodplain and ridges and the valleys associated with the bluffs of the historic Illinois River floodplain offer a diversity of moisture regimes (Schwegman 1997). Within the historic Illinois River floodplain, the dominant species is red oak (*Quercus rubra*). American elm (*Ulmus americana*) and black cherry (*Prunus serotina*) are also present. Young understory species also include hackberry (*Celtis occidentalis*) and Morrow's honeysuckle (*Lonicera morrowii*).

On the bluffs of the historic floodplain, in areas that are too steep for agriculture, shingle oak (*Quercus imbricaria*), eastern black walnut, and red mulberry were the most abundant species observed. White ash (*Fraxinus americana*), Osage orange (*Maclura pomifera*), hackberry, and red elm (*Ulmus rubra*) were also common in the mid-story. Understory and shrub species included eastern red cedar (*Juniperus virginiana)*, Morrow's honeysuckle, Missouri gooseberry (*Ribes missouriense*), and deerberry (*Vaccinium stamineum*).

2.2.4 Partial Canopy/Savannah

Partial canopy areas within the project area are only considered "savannah" in that their tree canopy cover is less than 80 percent and greater than 10 percent. These are not the fire-dependent natural communities described by White and Madany (1978). In contrast, these communities are typically disturbed mesic forests that are maintained in partial canopy by livestock grazing or severely degraded soils (e.g., historic hog containment areas). Dominant woody species include Osage orange, red-black jack oak hybrid *(Quercus rubra* X *Q. marilandica*), honey locust (*Gleditsia triacanthos*), and black cherry. Russian olive (*Elaeagnus angustifolia*) and multiflora rose may be present. Characteristic herbaceous species include cool season grasses (*Festuca arundinacea, Dactylis glomerata, Phleum pratense*) and weeds (*Solidago* spp,. *Erigeron annuus, E rugosa, Verbena urticifolia V. hastata*).

2.2.5 Wet-Mesic Floodplain Forest

Wet-mesic floodplain forests in the project area are typically located adjacent to intermittent tributaries and streams, transected by the CO_2 pipeline route. Dominant species include silver maple, (*Acer saccharinum*), white oak (*Quercus alba*), eastern black walnut, black cherry, American elm, and

hackberry. Although herbaceous ground cover may be sparse, it may also be locally abundant where canopy openings permit. The most common herbaceous species include tall fescue, Kentucky bluegrass (*Poa pratensis*), wild rye (*Elymus virginicus* and *E. canadensis*), and poison hemlock (*Conium maculatum*).

2.2.6 Tributary Waterways

Tributary waterways within the project area occur on a scale undetectable by the Illinois State Geological Survey (ISGS 2003) Gap Analysis Project (GAP). Waterways throughout the project area are typically intermittent tributaries or perennial streams that are transected by the proposed CO_2 pipeline route. In most cases, vegetation is absent from the waterway channel; however, reed canarygrass (*Phalaris arundinacea*), bluejoint grass (*Calamagrostis canadensis*), and various sedges (*Carex* spp.) may be present. In most cases, the channel substrate consists of unconsolidated muck and sand; occasionally containing gravel.

2.2.7 Other (Roadside, Railroad, and Powerline Right-of-Way)

Variously disturbed rights-of-way and developed land are present throughout the project area. This cover type is typically dominated by species similar to those found in pasture grassland, but contains more weedy species such as common ragweed (*Ambrosia artemisiifolia*), goldenrod (*Solidago* spp.), Rugel's plantain (*Plantago rugelii*), yellow sweet clover (*Melilotus officinalis*), field pennycress (*Thlaspi arvense*), and thistle (*Cirsium* spp.) In some areas, however, ground cover for erosion control is more prominent. In these areas, crown vetch (*Securigera varia*) and ryegrass replace the common cool season grasses. Adjacent to railroads, trees such as mulberry (*Morus rubra*) and black cherry were also present.

2.3 Impacts on Habitat Types

Impact acreages for each cover type described above are summarized in Table 2. The impact acreages were calculated based on GAP data (ISGS 2003). The forested community impacts were further refined during the Indiana bat habitat surveys conducted throughout the entire project area in 2013. The total acreage of forest impacts throughout the entire project area is 15.2 ac, which includes up to 7.47 ac at the plant site, 5.8 ac within the 28-mi pipeline right-of-way, and 1.95 ac at the storage site. It is important to note that anticipated impacts on forests within the pipeline right-of-way have been minimized due to boring under collocated wetlands. Impacts on forests have also been minimized on the plant site due to reconfiguring of site features on previously disturbed areas.

Table 2. Acreage of affected habitat types within the project area.

Cover Type	Meredosia Energy Center (ac)	CO_2 Pipeline (ac)	Injection Site (ac)	Total Impacts (ac)
Agricultural land	0.0	249	30.8	280
Pasture/non-native grassland	12.5	28.6	1.05	42.2
Upland forest (dry to mesic) [(a)]	4.20	10.0 [(b)]	1.58	15.83
Partial canopy/savannah	1.45	0.75	0.0	2.2
Floodplain forest (wet-mesic to wet) [(a)]	3.29	0.54[(b)]	0.37	4.2
Other (roadside, railroad, and powerline right-of-way)	33.8	2.69	0.00	36.5

Source: ISGS 2003.
a. Forest data were further refined by on-the-ground surveys for potential summer bat habitat. These data were used instead of the GAP data because the numbers are more precise than GAP data alone.
b. Only 5.74 ac of the 10.54 ac will be affected as a result of boring under 4.8 ac of wetlands collocated with forests within the pipeline right-of-way.

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3.0 Potentially Affected State-Listed Species

Historic occurrences of the state-threatened regal fritillary butterfly (*Speyeria idalia*) (Drury), and ICF *(Pseudaris streckeri illinoensis*) have been recorded recently in the Illinois River valley in the vicinity of the proposed project (Appendix A). Extensive surveys for these species were conducted in 2012 and 2013 in the project areas where they have the potential to occur. Results from these surveys are discussed below.

Historic occurrences have been recorded for the ornate box turtle (*Terrapene ornate)* and the western hognose snake (*Heterodon nasicus*) in Morgan County; however, both of these historical occurrences were documented more than 30 years ago. Due to the unlikelihood that these species would occur in the project area, targeted surveys for these two species were not conducted. However, any reptiles observed during surveys for the ICF and butterfly were recorded. No ornate box turtles or western hognose snakes were observed during any of the frog or butterfly surveys.

Estimates of incidental take for each species is provided in Table 3 and justification of the estimated take numbers for each species are described in the following sections.

Table 3. Estimates for Incidental Take and Potential Habitat Acres Affected.

Species	Estimated Take (# of Individuals)	Habitat Acres
Illinois chorus frog	– 1-10	– 62.6
Regal fritillary butterfly	– 1-30	– 23.9
Western hognose snake	– 1-5	– None
Ornate box turtle	– 1-5	– None

3.1 Illinois Chorus Frog

The ICF grows to a maximum length of 1.5 in. (3.7 cm). It has a stout toad-like body, no toe pads, robust forearms, dark mask-like stripe from snout to shoulder, dark spot under the eye, and a V- or Y-shaped mark between the eyes.

3.1.1 Habitat Requirements

The ICF is a small early spring resident of central Illinois in areas that have sandy soils. ICFs use sand prairies and remnants such as agricultural fields and waste areas as habitat. They burrow in sand and emerge after heavy early spring rains to breed in nearby flooded fields, ditches, and other vernal pools, then they return under the sand (Phillips et al. 1999).

3.1.2 Species Status in the Action Area

The ICF, listed as threatened in Illinois, is endemic to the Illinois River and Mississippi River Sand Areas Natural Division. This division includes several discrete patches of sand areas and dunes in the bottomlands of the Illinois and Mississippi rivers (IDNR 2013; IESPB 2006). The subspecies is also known from similar disjunct areas of Arkansas and Missouri (NatureServe Explorer 2011; Trauth et al. 2006). The Illinois River section occurs along the eastern side of the river and is characterized by flat to gently rolling sand plains and sand dunes (IDNR 2013). There are several known occurrences of this species within 1 mi of the project area.

Given the known occurrences of the ICF in the floodplain near the plant and pipeline and the species' tendency to breed in agricultural and forested areas, it is likely that if present it could be affected by the project, either at the plant, within the pipeline right-of-way, or both. The project could also affect non-breeding aestivating/hibernating individuals following dispersal from nearby breeding areas. Potential impacts exist only in the floodplain area of the project.

Surveys for the ICF were conducted during the 2012 and 2013 seasons. A study area was identified with areas around the energy center fence line and along the proposed pipeline alignment for 10 mi, from the Meredosia Energy Center entrance, through the floodplain, and along the proposed pipeline alignment east to areas near Chaplin, Illinois. Also, all ICF Habitat Model sites within 3 mi of this study area were monitored. In 2013, the route was extended all the way to the injection site area.

The 2012 season featured an early warm dry spring, during which ICFs were not documented near Meredosia, Illinois. In 2013, spring was wetter and cooler, and ICFs were documented in nearly all historic ICF breeding pool areas within the survey locations on the plant site and near a portion of the pipeline right of way (in close proximity to the plant site) (Figure 2 and Appendix A). No ICFs were documented within the construction footprint on the Meredosia Energy Center property or along the pipeline alignment. Impacts on this species from the proposed project are not expected. Reports on the ICF are included in Appendix B.

The range of potential take for this species is 1-10 individuals. Annual surveys have been conducted in the construction footprint and all historical ICF sites in this region and no ICF were observed (see appendix B of the CP). A 2900 ft buffer was placed around the historical ICF occurrence data points and around the 2013 survey location where frogs were heard in order to identify how many acres of potential ICF habitat acres may be affected within the proposed project area. The outer boundaries of the buffered areas are shown on the power plant site of Figure 2 and for the pipeline in Appendix A on Figures 1, 2, 3, and 4. Within the area encompassed by the 2900 ft buffer zones the project will temporarily impact approximately 62.6 acres of potential ICF habitat during construction, and will only permanently impact 16.6 acres of potential ICF habitat within the entire 440-ac project area. Mitigation activities have been established in the unlikely event that an ICF is encountered during trenching and/or during plant construction (see Section 4.0 for details).

Temporary and permanent impacts from the proposed construction activities will not have long term effects on this species because there is no ICF breeding habitat within the construction footprint of the project. It is highly unlikely that the ICF would be encountered. Mitigation activities employed during the proposed project would protect them in the future if they populate any project area. Proposed project

activities would not likely affect the ICF and would not reduce the likelihood of the survival of the species in Illinois, their biotic community or essential habitat.

3.2 Regal Fritillary Butterfly

The regal fritillary is a member of the family Nymphalidae, or brush-footed butterflies. This species is a large, strong-flying butterfly and its flight dates are 4 June–16 September (Sedman and Hess 1985; Bouseman and Sternburg 2004). After feeding and completing six instars, they pupate. In early June adult males emerge and are followed by adult females approximately 2 weeks later (Scudder 1889; Kopper et al. 2001). Mating begins soon after female emergence with each female copulating once. After 2 weeks of mating, the male regal fritillaries die (Nagle et al. 1991; Kopper et al. 2001), and fertilized females enter reproductive diapause for the next 2 months (Kopper et al. 2001). The diapause period between mating and oviposition is the most precarious time in the life span of the regal fritillary. If drought, disease, predation, parasitism, or other environmental catastrophes occur, the entire brood for the following year is at risk. By early September females begin oviposition, depositing more than 1,000 eggs in clusters on violets (Wagner et al. 1997; Kopper et al. 2001). The eggs hatch and larva feed on the egg case and enter winter dormancy (Scudder 1889; Mattoon et al. 1971; Kopper et al. 2001; Zercher 2002).

3.2.1 Habitat Requirements

In the spring, larvae begin feeding on birds-foot violet (*Viola pedata* L.), arrow-leaved violet (*Viola sagittata* Air), and prairie violet (*Viola pedatifida* G. Don) (WDNR 2000), and they have been documented to use the annual Johnny jump-up (*Viola rafinesquii* Greene) in central Illinois (LaGesse et al. 2004). In general, larvae of Lepidoptera are very specific in their feeding requirements and in many cases require a specific species (Ehrlich and Raven 1964). During reproductive diapause, females consume nectar on common milkweed (*Asclepias syriaca* L.), butterfly milkweed (*Asclepias tuberosa* L.), dogbane (*Apocynum spp.*), bull thistle (*Cirsium pumilum* (Nutt.)) Spreng, and boneset (*Eupatorium perfoliatum* L.) (Sedman and Hess 1985; LaGesse et al. 2006).

3.2.2 Species Status in the Action Area

The regal fritillary has been historically documented from 33 states (Selby 2007). Historic loss, fragmentation, and degradation of prairie landscape have been the primary factors contributing to the decline of regal fritillary populations. The regal fritillary is listed as endangered in Michigan, New York, Ohio, Indiana, and Wisconsin; as threatened in Illinois (IESPB 2006; IDNR 2006); and as a species of concern in four states. It is presumed extirpated in 7 states, and possibly extirpated in an additional 10 states (Selby 2007). The USFWS lists this species as a species of concern. The Nature Conservancy's Global Rank for this species is G3 (global vulnerable) and is very rare or local throughout its range or found locally in a restricted range (21 to 100 occurrences) (NatureServe 2004).

Regal fritillary populations have declined in Illinois (Herkert 1992). Currently, Mason and Cass counties contain the largest known metapopulations of this species (Personal communication with Wiker

2012[1]). Large populations exist in the Illinois River valley in Cass and Morgan counties around the towns of Meredosia, Beardstown, and Arenzville.

Surveys for regal fritillary butterflies were conducted during the 2012 and 2013 seasons on the plant site and in the vicinity of the pipeline right of way. Three transects were established in areas of degraded sand prairies on the plant site, and one within a Conservation Reserve Program (CRP) prairie planting along the pipeline right-of-way (Figure 3). Violet surveys were also investigated as the host plant for larvae habitat and to determine violet densities associated with regal fritillary butterfly habitat. Adult regal fritillary butterflies were documented from May 29, 2012, through July 7, 2012, in transects 1 through 4 in the survey area described above (Figure 3). Results from the surveys are summarized in Table 4 below.

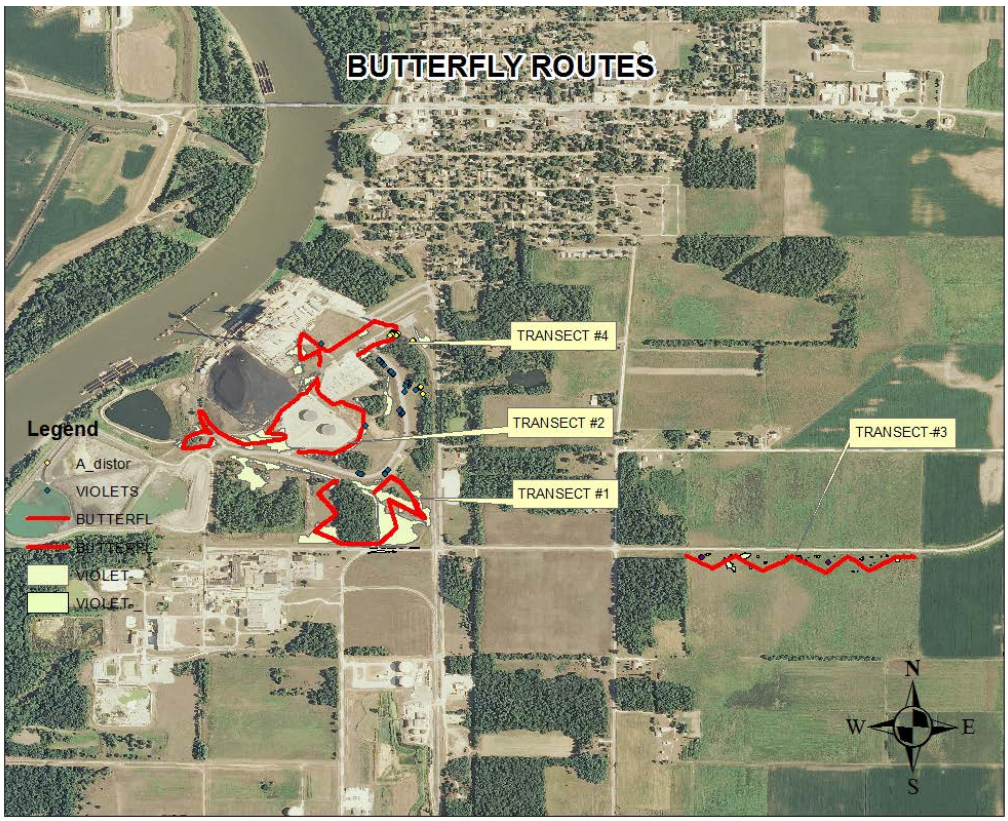

Figure 3. Survey transects on and in the vicinity of the plant site where butterflies were observed.

[1] Vern LaGesse, July 10, 2012. "Local Regal Populations of Cass and Morgan Counties." [Phone conversation with James R Wiker, Adjunct Research Associate Illinois State Museum, Springfield, Illinois.

Table 4. Summary of butterfly adult census 2012 results.

Transect	Temperature Min/Max (°C)	Number of Butterflies
1	71 - 90	9
2	74 - 89	2
3	70 - 95	45
4	74 - 90	1
	Total	57

Adult regal fritillary butterflies were also documented emerging from 11 other CRP field plantings north and south of Meredosia by Tim Kelley, Illinois Department of Natural Resources (IDNR) Heritage Biologist. During the 2012 growing season, the study area experienced very hot and drought conditions. The female regal fritillary butterfly lives more than 4 months, while developing eggs and requires fresh nectar at least every other day to survive. Regal fritillary butterflies have been documented to drop out of areas during extended drought conditions. Surveys have continued to document the presence/absence of the regal fritillary butterfly. Currently they have not been documented in the planned impact area (see Figure 2). Reports on the regal fritillary butterfly are included in Appendix B.

We estimate the potential take to be within a range of 1 to 30 individuals for this species. We do not expect to impact the highest number of the range because of the low numbers of individuals observed during annual surveys and the mitigation activities (fully described in the CP) that will be employed throughout the project and the fact that only marginal regal fritillary butterfly habitat exists in two small areas within the project area.

The most regal butterflies observed during surveys were in the 2012 butterfly season when 28 individuals were observed in one day on two transects (23 at the pipeline CRP field and 5 in the southeast corner of the power plant). 2012 was the best year for regal fritillary butterfly observations. During the late part of the 2012 season summer conditions went into an extreme drought with high daytime temperatures. This was an impact to the regal female butterflies trying to find nectar sources as flowers were drying up and not producing nectar under these conditions. During the 2013 regal season only one population (10 individuals) was observed and that was in the CRP field where the proposed pipeline is routed.

The project may impact up 1 to 30 regal fritillary butterflies; however, due to mitigation activities and conditions (climate and habitat) that are present to the regal populations at this time, it is likely the take would be far less than 30. Both regal areas present in the project area are marginal habitat for this species. They are forced to migrate to find later season food sources. There are other potential habitat areas within the region they could use.

Temporary and permanent impacts from the proposed construction activities that will affect the marginal butterfly habitat within the plant site and pipeline ROW will not have long term effects on this species and would not reduce the likelihood of the survival of the species in Illinois, their biotic community or essential habitat. There is suitable habitat nearby that the butterfly can use during the construction period and during plant operation. The post construction restoration proposed in the

Conservation Plan would create improved butterfly habitat within the project area by introducing other native perennial violets and many other nectar sources.

3.3 Western Hognose Snake

The western hognose snake (*Heterodon nasicus*) is a medium size, stout-bodied snake (up to 24 in. long) with a gray or tan back covered with 35−40 dark blotches and a sharply upturned scale at the tip of its nose. The belly and underside of the tail are predominantly black. The scales are keeled and the anal plate is divided. A transverse bar lying between the eyes extends downward behind each eye to the corner of the mouth (Phillips et al. 1999).

The snakes mate in the spring and lays eggs in July. The 8 to 10 young per clutch hatch in August or September. The diet of the western hognose includes toads and other amphibians, reptiles, and their eggs, birds, and small mammals, and the species is not as dependent on toads as the related eastern hognose snake (*Heterodon platyrhinos*) (Phillips et al. 1999).

The range of potential take for this species is 1-5 individuals. The western hognose snake was not observed during the two years of butterfly and frog surveys that were conducted for this project. There are no known occurrences in the project area (IDNR Heritage Database) and the documented occurrences in Morgan County (not the project area) were in the 1980s. There will be no western hognose snake habitat affected by this project. This species was included in the Conservation Plan at the suggestion of IDNR staff, but take as a result of this proposed project is highly unlikely. Mitigation activities outlined in the CP would be employed to prevent or minimize any impacts to the western hognose snake should any be encountered during project activities.

Temporary and permanent impacts from the proposed construction activities will not have long term effects on this species. The western hognose snake has not been observed in the project area during surveys and has not been recorded in Morgan County in over 30 years. This species would benefit from any mitigation and/or restoration efforts that are carried out during the proposed project.

3.3.1 Habitat Requirements

The western hognose is a prairie or savannah species, preferring grasslands with adjacent woodlots and well-drained sandy or gravelly soils for burrowing (INHS 2012; Ernst and Ernst 2003). In Illinois, it is most often observed crossing sandy roads in brushy or weedy sand prairie remnants (Phillips et al. 1999).

3.3.2 Species Status in the Action Area

In Illinois, the western hognose snake is known historically from only 21 locations in 10 counties (IDNR 2006) and is currently listed as threatened (IESPB 2006). The western hognose snake is not known to occur within the action area and has not been documented in Morgan County since prior to 1980 (INHS 2012; Phillips et al. 1999).

During the summer butterfly investigations, four species of reptiles were observed on the Meredosia Energy Center property. The six-lined sandrunner (*Cnemidophorus sexlineatus*) was observed to be

locally common on the site. The bullsnake, (*Pituophis melanoleucus*), common garter snake, (*Thamnophis sirtalis*), and the rat snake (*Elaphe obsolete*) were only occasionally seen. No western hognose snakes were observed during any field investigations.

3.4 Ornate Box Turtle

The ornate box turtle (*Terrapene ornate*) is small (up to 13 cm) with a brown carapace, yellow mid-back stripe, and discrete yellow lines radiating from the center of each scute (INHS 2012). This species sometimes has a spotted head. Males differ from females in that they have a slightly concave plastron and red, rather than brown, eyes. The yellow lines on the adults appear as spots on hatchlings (INHS 2012). Females lay one or more clutches of eggs (approximately 35 x 20 mm) in June. The ornate box turtle begins hibernation in mid-to-late October, and emerges in spring (INHS 2012). This species tends to feed mostly on insects, earthworms, bird eggs, hatchings, and or carrion, but will also eat vegetation such as fruits and berries (INHS 2012; Phillips et al. 1999).

3.4.1 Habitat Requirements

The ornate box turtle prefers sand prairies and open fields or former prairies with loose sand. These sand habitats are important for overwintering and nesting. Other parts of the year they will use tall grass prairies if available, and short grass prairies if needed, but only if there are shrubs present for keeping cool (INHS 2012).

3.4.2 Species Status in the Action Area

This species is currently listed as threatened and is considered to be uncommon to rare where it occurs (INHS 2012; IESPB 2006; Phillips et al. 1999). The ornate box turtle is not known to occur within the action area and no specimens have been documented in Morgan County since prior to 1980 (INHS 2012). During the butterfly investigations on the Meredosia Energy Center, only three species of turtles were observed: the slider turtle (*Trachemys scripta*), the Painter turtle (*Chrysemys picta*), and a snapping turtle (*Chelydra serpentine*). These three species are associated with the Illinois River. Each was only observed a few times and all were laying eggs.

The range of potential take for this species is 1-5 individuals. No ornate box turtles were observed during the two years of butterfly and frog surveys that were conducted for this project. There are no known occurrences in the project area (IDNR Heritage Database) and the documented occurrences in Morgan County (not the project area) for this species were in and before the 1980s. There will be no ornate box turtle habitat affected by this project. This species was included in the Conservation Plan at the suggestion of IDNR staff, but take as a result of the proposed project is highly unlikely. Mitigation activities outlined in the CP would be employed to prevent or minimize any impacts to the ornate box turtle should any be encountered during project activities.

Temporary and permanent impacts from the proposed construction activities will not have long term effects on this species. The ornate box turtle has not been observed in the project area during surveys and has not been recorded in Morgan County in over 30 years. This species would benefit from any mitigation and/or restoration efforts that are carried out during the proposed project.

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4.0 Measures to Minimize and/or Mitigate Potential Effects

The Alliance was informed of the presence of the ICF and regal fritillary butterfly in an initial meeting with IDNR Staff on February 9, 2012 and was informed about the possibility of ornate box turtle, western hognose snake in the project area on May 9, 2013.

The potential effects on the four state-threatened species will be minimized by taking the actions listed below.

- Hire an endangered species coordinator to oversee and implement an ITA plan.
- Educate work crews to about what each species looks like, its habitat, and where on the project they might encounter the species. Develop a work crew brochure.
- Train and coordinate work crews in the operation of vehicles and heavy equipment to reduce any extra soil disturbance and monitor parking practices to reduce soil compaction.
- Post temporary signs for reduced speeds in sensitive locations.
- Conduct post-construction surveys to monitor habitat restoration and endangered species effects.
- Establish onsite protocols to notify IDNR, after new sightings of any of the four species.

The Alliance will minimize the potential effects on each of the three state-endangered species by taking the actions listed for each of them below.

- Illinois chorus frog
  - Continue pre-construction surveys.
  - Bore pipe under all jurisdictional wetland areas within the pipeline alignment.
  - Inspect all open pipeline trenches at the beginning and the end of each workday while in the Illinois floodplain soils and the associated bluff line and remove any frogs that might have fallen into the trench to avoid and injury to these individuals.
  - Conduct post-construction survey and monitoring.
- Regal fritillary butterfly
  - Continue pre-construction surveys.
  - Restore pre-existing sand prairie after the construction phase.
  - Reintroduce native perennial and annual violets during restoration.
  - Enhance native nectar sources in sand prairie restorations by introducing native nectar forbs.
  - Conduct post-construction survey and monitoring.
- Ornate box turtle
  - Restore pre-existing sand prairie after the construction phase.
- Western hognose snake
  - Restore pre-existing sand prairie after the construction phase.

In order to deal with unforeseen circumstances that could affect the minimization or mitigation measures that were established for the proposed project, a threatened and endangered species expert will be on-site during construction and all workers will be trained to be aware of the ITA requirements and species ID prior to construction. The expert will inspect all trenches before work starts each day, inspecting for ICF, western hog-nosed snake and ornate box turtles that may have fallen into the trench overnight. By having them on-site they will be involved with the day to day decisions that might arise during the construction season. They have the power to stop and/or change work as in effects our compliance with the ITA permit. They will be responsible for establishing the IDNR notification policy.

5.0 Alternative Actions Considered

Part 3 of 17 Illinois Administrative Code (IAC) Section 1080 requires a description of alternative actions the applicant has considered that would not result in taking state-listed threatened or endangered species. This should also include a no-action alternative. The Alliance and DOE considered the following alternatives for the FutureGen 2.0 Project: 1) no-action alternative, and 2) an alternative pipeline route.

5.1 No-Action Alternative

The no-action alternative would be to not improve the Meridosia Energy Center, construct the pipeline route, or develop the injection/storage site. In this case, an ITA for the four species in this CP would not be necessary, and the lands within the project area would not be affected. However, the purpose and need for the FutureGen 2.0 Project—producing electricity from coal with at least 90 percent CO_2 capture and near-zero emissions of other pollutants—would not be met. In addition, some benefits to the species covered in this CP would not be realized without implementation of the mitigation/ conservation measures suggested in this document.

5.2 Alternative Pipeline Layout

As part of the NEPA process for the FutureGen 2.0 Project, the Alliance and DOE considered an alternative pipeline route and injection/storage site. Through the process of conducting the necessary environmental review for this project, the preferred route (described in Section 1.0) was selected because it featured the least amount of potential environmental impacts.

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6.0 Implementing Agreement

The Alliance will implement the Conservation Plan upon approval of the Conservation Plan and issuance of the ITA. The Alliance will be solely responsible for meeting the terms and conditions of the ITA and will allocate sufficient personnel and resources to ensure effective implementation of the Conservation Plan. The Alliance will be responsible for planning, contract execution and construction supervision for the entire project.

The Alliance will implement this Conservation Plan in coordination with the IDNR. The Conservation Plan Coordinator will be responsible for Conservation Plan implementation, planning, and coordination with IDNR as specified in this Conservation Plan and as required in the ITA. The local Threatened and Endangered Species Specialist will be responsible for any onsite work that requires an experienced biologist with local knowledge and project history. The Alliance's Vice President for Generation will be the Officer of Record for the Conservation Plan and this Implementing Agreement, and bears the corporate responsibility for compliance with the terms and conditions of the ITA.

The following Conservation Plan Coordinator, who will serve as a representative of the Alliance, has been identified as:

Tom Anderson,
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928-515-2330
Cell: 303-885-3353

The local Threatened and Endangered Species Specialist identified by the Alliance in coordination with the IDNR is:

Vernon LaGesse
1619 S Pasfield
Springfield, IL 62704
217-525-1410 office
217-553-2060 mobile
vlagesse@fgi.net

Should the Conservation Plan Coordinator or local Threatened and Endangered Species Specialist leave his or her position for any reason, the most appropriate replacement will be determined in coordination with the IDNR.

Schedule

The construction of the CO2 pipeline, injection wells, monitoring wells, and associated infrastructure will begin in June 2014 and be completed by August 2015. The first work to begin will be the roadway improvements and other site civil work to support the drilling of the deep wells. The deep well drilling will begin in July 2014 and continue throughout the construction period. The pipeline construction will begin in the fall of 2014 and be completed by August 2015. Modifications at the Meredosia Energy Center beginning with construction early works (limited to mass civil, demolition and construct a warehouse) will commence February 2014 and be complete in June 2014. The major power plant work will start on June 2014 and be completed in the fall of 2016. At that time the project will transition into startup and commissioning with commercial operation date estimated for of Sept 2017.

Quarterly progress reports will be provided to IDNR throughout the construction phase. After construction is complete, annual reports will be provided to IDNR for a period of 2-3 years while habitat restoration efforts are monitored and evaluated.

As an Officer of the FutureGen Industrial Alliance, Inc., I, Mark Williford, am responsible for the implementation of this Conservation Plan and the terms and conditions of the ITA.

Signature: _____ Date: 1/13/2014

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7.0 References

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16 USC 703 et seq. Migratory Bird Treaty Act.

16 USC 3371. Lacey Act Amendments of 1981.

33 USC 1251 et seq. Federal Water Pollution Control Act of 1972 [also referred to as Clean Water Act].

42 USC 4321 et seq. National Environmental Policy Act (NEPA) of 1969, as amended.

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