

# U.S. Fish and Wildlife Service Species Take Avoidance Measures for Non-Covered Species Related to Selected Oil and Gas Projects within the American Burying Beetle Range in Oklahoma

April 2015

The following species take avoidance measures are provided for oil and gas companies planning construction of new facilities (upstream production and midstream development) and operation and maintenance of those facilities, within the American burying beetle range in Oklahoma. The Service has broadly evaluated upstream and midstream activities and their potential effect to federally-listed species under the Endangered Species Act of 1973, as amended (ESA) and candidate and proposed species. These measures are provided as recommendations to assist oil and gas companies with avoiding impacts to these species. If an activity may result in incidental take of federally-listed species not covered under either an ESA Section 7 consultation or Section 10 Habitat Conservation Plan (HCP), the project proponent would need to seek authorization for that anticipated take (e.g., a separate HCP or consultation) to ensure compliance with Section 9 of the ESA

Section 9 of the ESA, prohibits “take” of federally-threatened and endangered species. The term “take” means to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” (16 USC § 1532(3)(19)). The term “harm” is defined to include any act “which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering” (50 CFR 17.3). The term “harass” is defined as “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering” (50 CFR 17.3). The term “incidental take” means any taking otherwise prohibited, if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (50 CFR 17.3).

The ESA does not prohibit "take" of listed plants on private lands, but landowners must comply with state laws protecting imperiled plants. “[W]ith respect to endangered species of plants, it is unlawful to: import or export; remove the species from areas under federal jurisdiction or maliciously damage or destroy it in those areas; remove, cut, dig up, damage or destroy the species in any other area in violation of state law or in the course of criminal trespass; deliver, receive, carry, transport, ship, sell or offer for sale in interstate or foreign commerce; violate any regulation pertaining to a threatened or endangered plant species” (16 USC § 1538(a)(2)(A) through (E)).

“Take” is a term of art that applies to species that are listed as endangered or threatened pursuant to the ESA – therefore, unless and until a species is listed, “take” does not occur. However, in the following discussion we use the term “incidental take” when discussing impacts to proposed (any species of fish, wildlife, or plant that is proposed in the *Federal Register* to be listed under Section 4 of the ESA) and candidate species (plants and animals for which the Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed

rule to list, but issuance of the proposed rule is precluded (61 FR 7596)). Although proposed and candidate species are not afforded the same protections under the ESA as listed species, treating these species as if they were already listed can benefit project proponents by ensuring that their future impacts will not cause take of such species when, and if, they are listed at some time in the future. These measures also benefit unlisted species by providing early protection that, ideally, prevents subsequent declines and in some cases, the need to list such species. Therefore, we provide take avoidance measures for proposed and candidate species within the American burying beetle range in Oklahoma.

### **Oil and Gas Activities Evaluated**

The following activities were broadly evaluated for potential impacts to federally-listed, candidate, and proposed species.

#### **Upstream Production**

Upstream production includes activities associated with oil, natural gas, and other petroleum products and development of the infrastructure required to extract those resources. Evaluated activities associated with upstream production include:

- Geophysical Exploration – also known as seismic exploration
- Construction, operation, and maintenance of new and existing well field infrastructure and decommissioning of obsolete facilities, including:
  - Well pads
  - Drilling and Hydraulic fracturing
  - Gas flaring
  - Work and access roads
  - Electrical distribution lines (voltage must be 34.5 kilovolts (kV) or less)
  - Off-site impoundments
  - Communication towers

#### **Midstream Development**

Midstream development includes gathering, processing and treatment, transmission, and distribution of crude oil, natural gas, or other petroleum products. Petroleum products may include unprocessed natural gas liquid or condensate streams (including methane, ethane, propane, butane, and pentane). Refined oil products including gasoline, diesel, and kerosene may also be transported via pipeline. Evaluated activities associated with midstream development include the following:

- Construction of gathering, transmission, and distribution pipelines
- Construction of associated surface facilities, including:

- Access roads
  - Booster, compressor, and pump stations
  - Meter stations, mainline valves, pig launchers and receivers, regulator facilities, and other required facilities
  - Natural gas processing and treatment facilities
  - Communication towers
  - Electric distribution lines (voltage must 34.5 kV or less)
  - Electric substations
- Operation and maintenance of pipeline and associated surface facilities
  - Decommissioning and reclamation of pipeline and associated surface facilities

If your proposed activity is identified above, then the measures in this document should be applicable to your project. Because our evaluation of these activities is broad in nature, however, there may be circumstances where these measures may not apply to your specific activity. In those cases, we recommend developing avoidance measures specific to your proposed activity and contacting the Oklahoma Ecological Services Field Office (ESFO) for further guidance before project initiation.

### **Species Not Included in this Document**

Avoidance measures for the American burying beetle are not included in this document. The Service, in working with the representatives of the oil and gas industry, has developed an Industry Conservation Plan (ICP) for the ABB in Oklahoma, under Section 10(a)(1)(B) of the ESA. For more information on this plan, please visit the ABB ICP webpage: <http://www.fws.gov/southwest/es/oklahoma/ABBICP>.

Additionally, the ranges of the lesser prairie-chicken (*Tympanuchus pallidicinctus*) and black-capped vireo (*Vireo atricapilla*) fall outside of the American burying beetle's range thus were not included in this document. For potential impact to those species, we recommend contacting the Oklahoma ESFO for further guidance. It is the Service's intent to eventually broaden these avoidance measures for use throughout Oklahoma.

### **Process for Evaluating Species Impacts**

The process of determining if an individual HCP should be pursued should be based upon the reasonable certainty that incidental take of a federally- threatened or endangered species may occur during the life of the proposed activity. The first step is to determine if the species is present or likely to become present during the life of the proposed oil and gas activity. If the species is present or likely to become present, the second step is to determine if take is likely to occur from the proposed activity. If take is likely, the third step is to determine if take of the species can be avoided, either by changing the location of the project or by implementing other measures to avoid take, such as those provided in this document.. The project proponent may either avoid take of the species or prepare a separate HCP for additional affected species.

*Species and Habitat Presence:*

In the Species Take Avoidance Measures below, the proposed project site is evaluated for presence of each species. This process is based upon the following paired questions:

1. Is the proposed oil and gas facility activity within the range of the species?
  - a. No – A Permit is not needed for this species.
  - b. Yes – Go to question 2.

Explanation: The species range is the coarsest-scale determination of where the species may occur. A species range can be determined based upon historic or present-day distribution. If the present-day distribution of a species is highly restricted and there is not an active re-establishment program, the species range for this purpose may be defined best by the species current distribution. If, however, there is an active recovery effort or the species is highly mobile, the historic distribution may be the best way to define the species range for this purpose. Species range information, historic and present, is available from the Service's Information, Planning, and Consultation System (IPaC) website at: <http://ecos.fws.gov/ipac> or the Oklahoma ESFO (see address below).

Note: IPaC does not include information on eagles or other migratory birds, but these have a potential to occur throughout Oklahoma. Project proponents should plan and implement measures to avoid impacts to these protected species. For additional guidance on eagles and migratory birds avoidance measures, go here:

<http://www.fws.gov/southwest/es/oklahoma/ABBICP>

2. Is the proposed oil and gas activity within the habitat or dispersal/migration range of the species?
  - a. No – A Permit is not needed for this species.
  - b. Yes – Go to question 3.

Explanation: The distribution of a species within its range is usually not uniform. Species are typically associated with specific abiotic and biotic factors that can be used to define the species' habitat. Habitat requirements may change for different life stages and for various life processes – breeding, feeding, sheltering, and migration. All of the various habitats that a species may use during its life history are included in this determination. In addition, if a species is known to disperse between habitat patches across what is not considered typical habitat, a dispersal buffer has been identified within the Species Take Avoidance Measures. Species habitat information and sources of information are provided below in the Species Take Avoidance Measures.

3. Is the habitat occupied or reasonably certain to be occupied during the life of the Permit?
  - a. No – A Permit is not needed for this species.
  - b. Yes – Go to question 4.

Explanation: This is the finest-scale determination of the presence of a species at a proposed oil and gas activity. Species occurrence is typically determined through site-specific surveys

or existing data on occupancy. Site-specific surveys may be expensive and require multiple years of effort to determine if the site is occupied or not. Therefore, in certain cases the project proponent may wish to assume occupancy, especially if Species Take Avoidance Measures are more cost-effective over the life of the project than the survey efforts. This may not be an appropriate option for all species and the project proponent should get agreement from the Oklahoma ESFO before assuming that this is a viable option for a particular species.

The second aspect of occupancy is related to the temporal nature of a proposed project and whether the site is reasonably certain to become occupied. The proposed duration of a Permit is to cover not only construction, but also operation, maintenance, and/or decommissioning. While habitat on or near the site may not be currently occupied, what is the likelihood of occupancy during the life of the facility? This question needs to consider the quality of existing habitat, the potential for improvements in the habitat, the dispersal capabilities of the species, proximity of existing populations, and the reproductive capabilities of the species. Resources that can aid in making this determination can be species leads at the Oklahoma ESFOs and the Oklahoma Department of Wildlife Conservation, and your staff wildlife biologist or consultant.

4. If the Species Take Avoidance Measures are properly implemented, is there a reasonable likelihood that incidental take of federally-listed species will occur during the life of the project?
  - a. No – A Permit is not needed for this species.
  - b. Yes – Contact the local Service ESFO to discuss the need for a separate HCP and Permit.

Explanation: This is the last filter in determining if a project would require a separate HCP for additional species. At this scale, it has already been determined that the species is or is reasonably certain to be present on the site during the life of the oil and gas activities. The issue now is whether incidental take of federally-listed species is reasonably certain to occur as a result of activities associated with the planning, development, construction, operation and maintenance, and decommissioning of the project. In making this determination, the proponent should determine whether the Species Take Avoidance Measures listed below can be implemented as part of the oil and gas facility development and operation. If there are measures available and they can be properly implemented, incorporate the measures into your site development and operation plans and do not include these species in a separate HCP application for a site-specific Permit.

If take federally-listed species cannot be avoided, contact the Oklahoma ESFO to discuss the need to develop an HCP and Permit application for those species. The Oklahoma ESFO should help identify appropriate minimization and mitigation measures for the species that need to be included in the HCP and Permit.

## Section 7 Consultation

Issuance of a section 10(a)(1)(B) Incidental Take Permit is a Federal action subject to section 7 consultation. Section 7(a)(2) of the ESA requires all Federal agencies, in consultation with the Service, to ensure that any action "authorized, funded, or carried out" by any such agency "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification" of designated critical habitat. Because issuance of a section 10 permit involves an authorization, it is subject to section 7(a)(2). The section 7 implementing regulations (50 CFR Part 402) require, among other things, analysis of the direct and indirect effects of a proposed action, the cumulative effects of other activities on listed species, and effects of the action on critical habitat, if applicable. These analyses are necessary for permit issuance.

### **Critical Habitat**

Critical Habitat is a regulatory designation that involves Federal actions and section 7 consultation under the ESA. Critical Habitat is designated on areas that contain those physical and biological features that are essential to the conservation of a given species and that may require special management consideration or protections (50 CFR 424.12). Section 7(a)(2) prohibits the "destruction or adverse modification" of designated critical habitat by any action authorized, funded, or carried out by a Federal agency. The section 7 regulations define "destruction or adverse modification" as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species." The regulations for section 4 of the ESA (50 CFR 424.12) describe the "constituent elements" of critical habitat as "those that are essential to the conservation of the species" including, but not limited to, "roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types."

Thus, in issuing section 10 permits, the Service must ensure that the constituent elements of critical habitat will not be altered or destroyed by proposed activities to the extent that the survival and recovery of affected species would be appreciably reduced. However, these section 7 obligations typically impose few restrictions on the HCP Permittees in addition to those required by section 10, because the section 10 issuance criteria also prohibit appreciably reducing the "likelihood of the survival and recovery of the species in the wild" [section 10(a)(2)(B)]. Nevertheless, to the extent that a proposed HCP might result in impacts to critical habitat, such impacts should be described and evaluated in the biological opinion concluding section 7 consultation on the permit application. For this reason, we have included discussions of critical habitat for the Species Take Avoidance Measures.

It is possible to approve an HCP that authorizes land use or development activities within an area designated as critical habitat. The activities approved under an HCP could include a variety of land or natural resource use activities that modify critical habitat on a large scale without the activities being deemed an adverse modification contrary to the requirements of section 7(a)(2). The authorization of activities in critical habitat through the HCP process is possible because the adverse modification of critical habitat is analyzed by determining the effects on the entire area designated as critical habitat or an administrative part or unit of the critical habitat, not on a smaller scale of particular individual acres.

## **Plants**

Plants are provided few protections under the ESA, especially on private lands. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants from areas under Federal jurisdiction, or for any act that would remove, cut, dig up, or damage or destroy any such species on any other area in knowing violation of any regulation of any State or in the course of any violation of a State criminal trespass law. In completing the processing of an HCP, the Service will analyze, through section 7 of the ESA, the effects of the HCP and Permits on listed plant species. These effects cannot jeopardize the continued existence of these species in the wild. Therefore, plant species have been included in the Species Take Avoidance Measures and because take is not defined for plants in the ESA, these sections discuss effects.

## **Proposed Species and Candidate Species**

In the Species Take Avoidance Measures we have included 2 proposed species and 3 candidate species. This was done to help evaluate the potential for future impacts to these species. Implementation of the Species Take Avoidance Measures for these proposed and candidate species may assist in reducing threats these species face and result in reducing their need to be listed as threatened or endangered under the ESA. However, if they do become listed, their inclusion here will assist project proponents in addressing these species in the development of site-specific HCPs.

## **Contact Information for Ecological Services Field Offices:**

Oklahoma Ecological Services Field Office  
9014 E. 21<sup>st</sup> St.  
Tulsa, OK 74129  
Phone: 918-581-7458

## SPECIES TAKE AVOIDANCE MEASURES

### THREATENED (T) AND ENDANGERED (E) SPECIES

#### Arkansas River shiner (*Notropis girardi*) - T

##### **Life History**

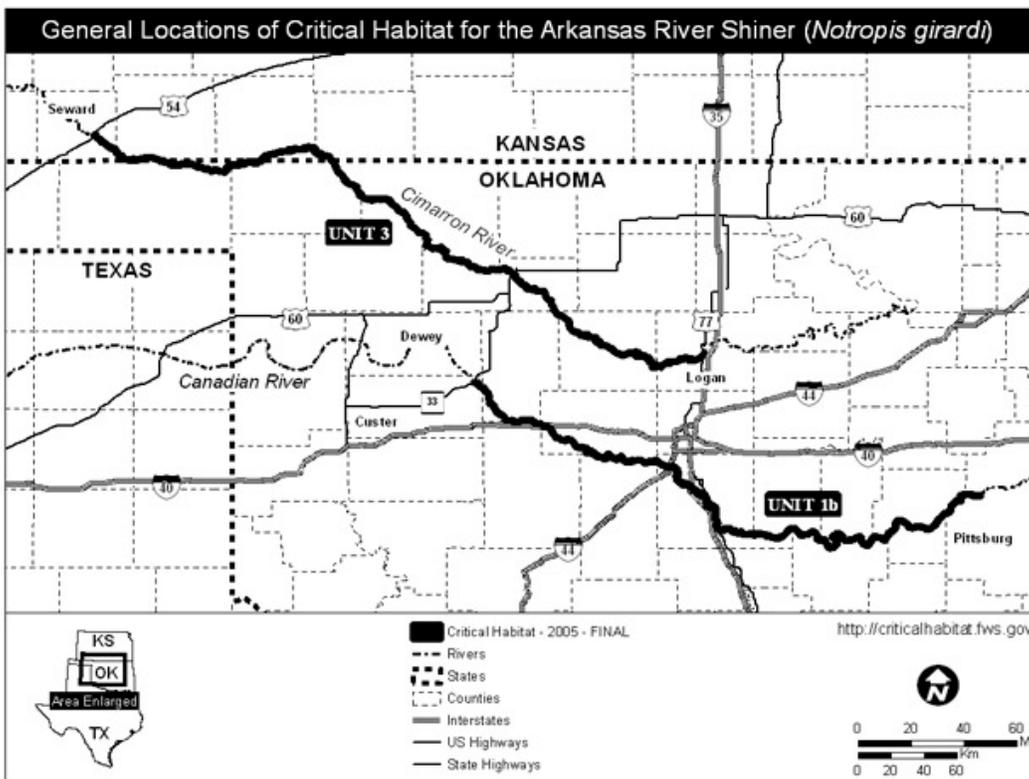
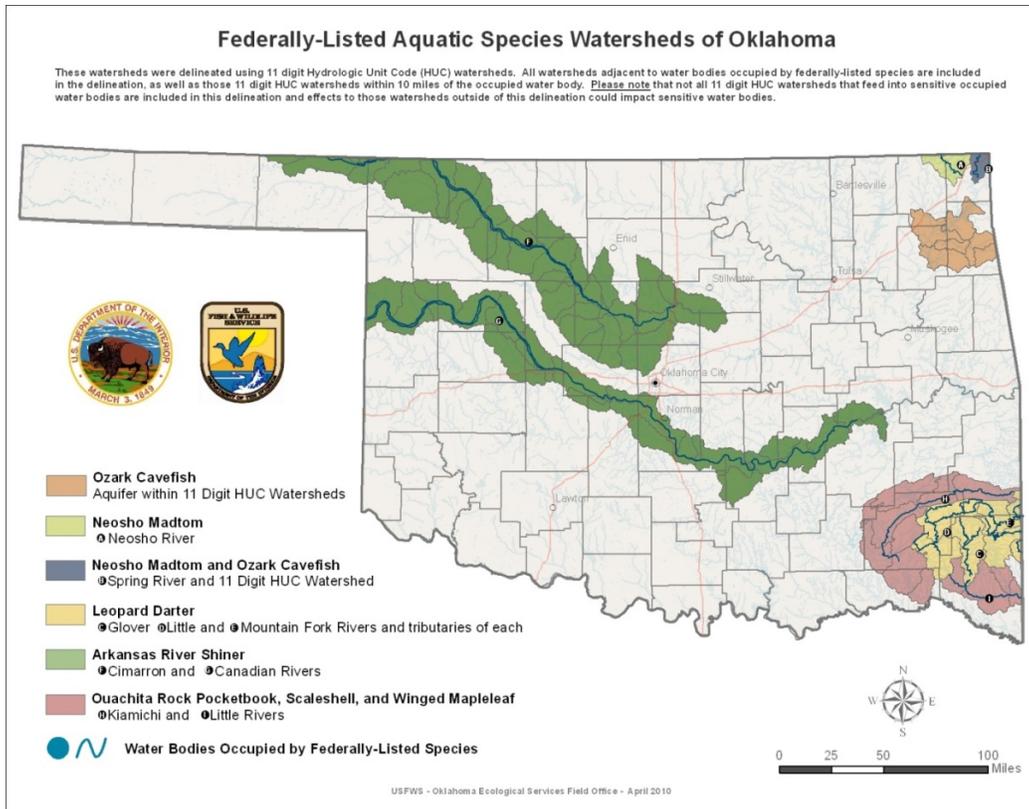
The Arkansas River shiner (ARS) historically inhabited the main channels of wide, shallow, sandy bottomed rivers and larger streams of the Arkansas River basin (Gilbert 1980). Adults prefer to orient into the current just downstream of sand ridges and feed upon organisms washed downstream (Cross 1967). Adults are uncommon in still pools or backwaters, and rarely occur in tributaries having deep water and bottoms of mud or stone (Cross 1967). Juvenile ARS typically inhabit backwater and island habitat types, including tributaries (Polivka and Matthews 1997).

##### **Geographic Area of Concern**

Historically, the ARS was widespread and abundant throughout the western portion of the Arkansas River basin in Kansas (KS), New Mexico (NM), Oklahoma (OK), and Texas (TX) (Gilbert 1980). This species has subsequently disappeared from more than 80 percent of its historical range and as of October 2012 is almost entirely restricted to about 817 kilometers (km) (508 miles) of the South Canadian (Canadian) River in OK, TX, and NM from Ute Reservoir in NM downstream to the Indian Nation Turnpike bridge northwest of McAlester, OK. An extremely small population may still persist in the Cimarron River in OK and KS extending from the U.S. Highway 54 bridge in Seward County, KS, downstream to the U.S. Highway 77 bridge in Logan County, OK. An updated range of the ARS may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

Critical habitat has been designated for the ARS, which includes the Canadian River extending from the State Highway 33 bridge near Thomas, OK, downstream to the Indian Nation Turnpike bridge northwest of McAlester, OK, and the Cimarron River from the U.S. Highway 54 bridge in Seward County, KS, downstream to the U.S. Highway 77 bridge in Logan County, OK. Critical habitat includes the river channels within the identified river reaches mentioned above, and includes a lateral distance of 91.4 meters (m) (300 feet) on each side of the stream width at bank full discharge. For more information on designated critical habitat, go to <http://criticalhabitat.fws.gov>.

**Prospecting and Siting/Development** - To avoid incidental take of the ARS, develop oil and gas activities in areas where it will not be necessary to impact the Canadian or Cimarron rivers and their riparian areas, designated critical habitat for the ARS, or associated tributaries. Impacts that could result in incidental take include water withdrawals from either the Canadian or Cimarron rivers, modification to hydrology or stream morphology of these rivers from surface or groundwater use, increased or decreased runoff due to modifications to topography, increased sedimentation, chemical releases (e.g. fuel spills, herbicides) or other detrimental effects to water quality or quantity, and any activity that requires in-channel work.



This document is based on the best scientific and commercial data available at the time of its development. To ensure you have the most recent version, go to <http://www.fws.gov/southwest/es/oklahoma/ABBICP>

**Construction/Commissioning** – If oil and gas activities will occur where effects to the Canadian or Cimarron rivers as described are possible, the following is recommended to avoid potential take of ARSs. No construction or associated activities (ground disturbance, herbicide application, etc.) may occur within designated critical habitat or within 91.4 m (300 feet) of the Canadian or Cimarron River banks (where CH is not designated). Install and maintain adequate erosion control measures to prevent or minimize movement of sediment into the Canadian or Cimarron rivers or associated tributaries and wetlands. Develop and implement a spill prevention and response plan to contain fuel and other chemicals on-site. Hazardous materials, chemicals, fuels, lubricating oils, and other such substances shall be stored at least 91.4 m (300 feet) outside of the Canadian and Cimarron River banks. Refueling of construction equipment also shall be conducted at least 91.4 m (300 feet) outside of the Canadian or Cimarron River banks.

Utilize existing bridges to the greatest extent practicable. When placement of pipelines across either river is necessary, directionally bore under the river or co-locate pipelines with bridges or similar existing structures that span the river. Trenching for pipeline placement would impact channel configuration and ARS habitat, which would result in adverse impacts to the ARS. During boring activities, ensure that drilling mud does not enter the banks of the Canadian or Cimarron River. Do not construct low-water crossings. Do not fill wetlands adjacent to these rivers to accommodate construction. Do not withdraw water from the Canadian or Cimarron rivers for construction or testing activities (e.g., concrete mixing, equipment cleaning, or hydrostatic testing). Do not withdraw water from tributaries of either the Canadian or Cimarron rivers, in amounts that significantly affect hydrology, particularly during low flow conditions. Do not withdraw groundwater in amounts that significantly affect hydrology of the Canadian or Cimarron Rivers, particularly during low flow conditions. To minimize the likelihood of moving invasive aquatic species from one watershed to another, all surface water withdraws should be located within the proposed project's watershed. Additional impacts that should be avoided include modification to hydrology or stream morphology of these rivers, increased or decreased runoff due to modifications to watershed topography, increased or decreased sedimentation, or other detrimental effect to water quality or quantity, or any activity that requires in-channel work.

**Operation/Maintenance** – Assuming all measures recommended during the construction/commissioning phase have been implemented, monitor the project to ensure that precipitation runoff and chemical spills as a result of the project do not adversely affect water quality in any water body to avoid any take of ARS. If this cannot be accomplished within your project design, incidental take is likely and development of a separate HCP for this species should be considered.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions outlined above under Construction/Commissioning to prevent degradation of the Canadian and Cimarron rivers.

## Literature Cited

Cross, F. B. 1967. Handbook of fishes of Kansas. Univ. Kans. Mus. Nat. Hist. Misc. Publ. No. 45. 357 pp.

Gilbert, C. R. 1980. *Notropis girardi* Hubbs and Ortenburger Artkansas River shiner. P. 268 in D.S. Lee *et al.* Atlas of North American freshwater fishes. N. Carolina Biol. Surv. Publ. No. 1980-12. N. Carolina State Mus. Nat. Hist., Raleigh. 854 pp.

Polivka, K. M. and W. J. Matthews. 1997. Habitat requirements of the Arkansas River shiner, *Notropis girardi*: August 1, 1994 - August 7, 1997. Final Rept., Federal Aid Proj. No. E-33. Okla.Dept. Wildl. Cons., Oklahoma City, OK. 13 pp.

### **American burying beetle (*Nicrophorus americanus*)**

Avoidance measures for the American burying beetle are not included in this document. The Service, in working with the representatives of the oil and gas industry, has developed an Industry Conservation Plan (ICP) for the ABB in Oklahoma, under Section 10(a)(1)(B) of the ESA. For more information on this plan, please visit the ABB ICP webpage at <http://www.fws.gov/southwest/es/oklahoma/ABBICP>.

### **Black-capped vireo (*Vireo atricapilla*)**

Avoidance measures for the black-capped vireo are currently in development. Please contact with the Oklahoma ESFO for the lasted guidance for this species.

### **Gray bat (*Myotis grisescens*) - E**

#### **Life History**

The gray bat (GB) is a medium-sized bat that inhabits limestone karst areas of the southeastern and Midwestern United States. Gray bats are one of the few species of bats in North America that inhabit caves year-round, migrating each year between winter and summer caves. They are known to migrate from 17 to 437 km (10 - 272 miles) between summer maternity caves and winter hibernacula (Tuttle 1976b, Hall and Wilson 1966). Gray bats have such specific cave requirements that fewer than five percent of caves are suitable. Summer caves must be warm or have restricted rooms that can trap the body heat of clustered bats. Winter hibernation sites typically are deep vertical caves that trap large volumes of cold air (Tuttle 1976a, Harvey et al. 1981, Harvey 1994, Martin 2007).

Gray bats mate in the fall when they begin to arrive at hibernacula. During hibernation, the species typically forms large clusters with some aggregations numbering in the hundreds of thousands of individuals (Harvey 1994, Tuttle and Kennedy 2005). It is estimated that 90 percent of the species range-wide population hibernates in only nine caves (Tuttle 1979). No hibernating colonies are known from Oklahoma.

Adult females begin to emerge from hibernation in late March, followed by juveniles and adult males. Females become pregnant after emerging in the spring, and form maternity colonies in caves of a few hundred to many thousands of individuals (Harvey 1994, Tuttle and Kennedy 2005). A single offspring is born in late May or early June. Newborns typically become volant (capable of flying) within 21-33 days after birth (Tuttle 1976b, Harvey 1994, Tuttle and Kennedy 2005).

Gray bat summer colonies typically use several roosting caves located along a stream, river, or lake/reservoir. Home range of these colonies usually includes several caves that may extend up to 70 km (43 miles) along a particular river valley (Tuttle and Kennedy 2005).

Gray bats feed on flying insects over bodies of water including rivers, streams, and lakes. Mayflies, caddis flies, and stoneflies make up the major part of their diet, but beetles and moths also are consumed (Harvey 1994, Tuttle and Kennedy 2005). Gray bats are known to travel up to 35 km (21 miles) from caves to prime feeding areas (La Val et al. 1977, Tuttle and Kennedy 2005). However, most caves are within 1-4 km (0.6 – 2.5 miles) of foraging areas (Tuttle 1976b).

### **Geographic Area of Concern**

In Oklahoma, the GB occurs in the Ozark Highlands ecoregion (Omernik 1987) in the northeastern part of the state. Maternity and bachelor colonies are known from caves in Adair, Cherokee, Delaware, and Ottawa counties. No hibernating colonies are known from Oklahoma. The current range of the GB may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – To avoid incidental take of GBs, site the facility outside of the species' current known range. If the site location selected is within the GB's current range, then to avoid incidental take, develop oil and gas facilities where it will not be necessary to impact caves, rivers, streams, or lakes used by the GB. To ensure take of the GB will be avoided, implement the following avoidance measures:

1. Contact the Oklahoma ESFO, Oklahoma Department of Wildlife Conservation, and the Oklahoma Natural Heritage Inventory to determine if any documented GB caves occur on or near the proposed project area.
2. If GB caves are not known to occur on the proposed project area, survey the area for undocumented cave openings and sinkholes.
3. Establish a buffer area of 91.4 m (300 feet) around any caves and sinkholes found during the survey (or during any aspect of project implementation) and avoid any impacts to the area buffered. The Service should be contacted for further evaluation to determine if these sites are used by the GB. If a cave is used by the GB, we may recommend modifications of the proposed project to allow additional buffer areas to be established in order to avoid impacts to the cave and take of the GB.
4. If oil and gas facilities will be placed where impacts to rivers, streams, or lakes are likely, contact the Oklahoma ESFO to determine whether the impact would likely reach the scale where take of the GB would be anticipated due to loss of foraging habitat

and/or harassment. This determination will be based on factors including proximity of the proposed project area and water body to documented GB caves, previous survey work for the GB in or near the project area, and the duration (temporary or permanent), timing (summer maternity season vs. winter hibernation period), and severity of the impact. Additional surveys by a qualified biologist that holds a Service Recovery Permit (ESA § 10(a)(1)(A) permit) for GBs utilizing acoustic bat detectors and/or mist nets may be necessary.

5. All geophysical exploration – also known as seismic exploration – within the known range of the GB will require consultation with the Oklahoma ESFO to avoid disturbance of bats or caves used by bats. Vibration or explosive charges used in geophysical exploration may disturb hibernating or roosting bats in caves, dislodge flightless young, or cause unstable rock formations in caves to shift and alter openings or habitat conditions in caves. Additional disturbance and arousal from hibernation can increase mortality by using fat reserves needed for winter survival.

If a GB cave will be impacted by the proposed project, incidental take is likely and you should contact the Oklahoma ESFO regarding the development of an HCP for your proposed project. The Service may require the cave to be mapped when bats are not present to determine if any additional openings or passages may be affected by the proposed project.

**Construction/Commissioning** – If oil and gas facilities will be placed where short-term/temporary impacts to rivers, streams, or lakes are likely, and it has been determined that the water body is important foraging habitat for the GB, the following is recommended to avoid take of the GB:

1. Implement the project after GBs have migrated to hibernacula for the winter (i.e., between November 15 – March 15).
2. Implement a sediment and erosion control plan during construction such as a) the installation of sediment fencing and straw hay bales to capture sediment, and b) stock piling any excavated material well away from streams and other karst features such as a cave opening so that the material cannot slough back into these areas.
3. Monitor sediment/erosion control measures after precipitation events. Clean, repair, and replace structures as necessary.
4. Monitor sediment/erosion control measures periodically throughout all phases of construction. Clean, repair, and replace structures as necessary.
5. Establish staging areas for the crew, equipment, hazardous materials, chemicals, fuels, lubricating oils, etc., at least 91.4 m (300 feet) away from a stream bank, sinkhole, spring, or cave entrance.
6. Install sediment and erosion controls around staging areas to prevent discharge from these sites.
7. Store construction waste materials, debris, and excess materials at least 91.4 m (300 feet) away from cave openings, sinkholes, and streams.
8. Refuel construction equipment at least 91.4 m (300 feet) away from stream banks, sinkholes, springs, and cave entrances.
9. Develop and implement a spill prevention and response plan to contain fuel and other chemicals on-site.

10. Use the horizontal directional drilling method for proposed pipeline crossings of streams, rivers, and lakes, or co-locate pipelines with existing structures, such as bridges, that span the water body.
11. If the directional drilling method or co-locating pipelines would not be feasible, we recommend that you:
  - a. Conduct stream crossings during a period of low stream flow
  - b. Limit tree trimming and cutting to only what is necessary
  - c. Limit access of construction equipment within the stream channel to one confined location, preferably over an existing bridge, equipment pads, clean temporary native rock fill, or over a temporary portable bridge
  - d. Limit in-stream equipment to that needed to construct a crossing
  - e. Place trench spoil at least 91.4 m (300 feet) away from stream banks
  - f. Use sediment filter devices to prevent flow of spoil off the right-of-way
  - g. De-water the trench, as necessary, to prevent discharge of silt laden water into any stream during construction and backfilling operations
  - h. Return the substrate and contours of the bank and bottom of the channel to pre-project conditions.
12. Maintain natural stream features such as riffles or pools.
13. Keep all machinery out of streams as much as possible.
14. Limit the removal of riparian vegetation to only what is necessary.
15. Replace any woody riparian vegetation unavoidably lost by planting five trees for every tree lost. Only native riparian plants should be used to help prevent the spread of exotics.
16. Re-vegetate all disturbed areas as soon as possible after construction using only native plants to reduce soil erosion. Annual species, such as rye or wheat, may initially be planted along with native species in areas subject to immediate soil loss, such as a steep slope, to provide rapid erosion control. Final re-vegetation should use native species only.
17. Apply fertilizers, herbicides, pesticides, or other chemicals at least 91.4 m (300 feet) away from sinkholes, streams, rivers, springs, and cave openings.
18. Remove and dispose of all debris and excess construction materials properly upon project completion.
19. Evaluate the establishment of vegetation after project completion and inspect all sediment control structures at one month intervals for at least 3 months. Retain sediment control structures until site stabilization is achieved.
20. Remove temporary sediment/erosion control structures upon final site stabilization.

In the event that new cave openings or sinkholes are encountered or develop during construction activities, no fill materials should be placed into the opening until Service or Service approved personnel have the opportunity to investigate the site thoroughly. If the cave is used by the GB, we may recommend modifications of the proposed project to allow buffer areas (where no project activities would occur) to be established in order to avoid impacts to the cave and take of the GB. If the cave will be impacted by the proposed project, then incidental take is likely and you should contact the Oklahoma ESFO regarding the development of an HCP for your proposed project.

**Operation** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

**Decommissioning** - Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

### Literature Cited

- Hall, J. S. and N. Wilson. 1966. Seasonal populations and movements of the gray bat in the Kentucky area. *American Midland Naturalist* 75:317-324.
- Harvey, M.J. 1994. Status of summer colonies of the endangered gray bat, *Myotis grisescens* in Tennessee. Unpub. Rep. to the Tennessee Wildlife Resources Agency. Tennessee Technological University, Cookeville, TN. 44 pp.
- Harvey, M.J., J.J. Cassidy, and G.G. O'Hagan. 1981. Endangered bats of Arkansas: distribution, status, ecology, and management. Arkansas Game and Fish Commission, U. S. Forest Service, National Park Service, and Ecological Research Center, Dept. of Biology, Memphis State University, Memphis, Tennessee. 137 pp.
- Laval, R. K., R. L. Clawson, M. L. LaVal and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. *Journal of Mammalogy* 58(4):592-599.
- Martin, C.O. 2007. Assessment of the population status of the gray bat (*Myotis grisescens*). Status review, DoD initiatives, and results of a multi-agency effort to survey wintering populations at major hibernacula, 2005-2007. Environmental Laboratory, U.S. Army Corps of Engineers, Engineer Research and Development Center Final Report ERDC/EL TR-07-22. Vicksburg, Mississippi. 97 pp.
- Omernik, J.M. 1987. Ecoregions of the conterminous United States. Map (scale 1:7,500,000) revised August 2002. *Annals of the Association of American Geographers* 77:(1) 118-125.
- Tuttle, M.D. 1976a. Population ecology of the gray bat (*Myotis grisescens*): Factors influencing growth and survival of newly volant young. *Ecology* 57:587-595.
- Tuttle, M.D. 1976b. Population ecology of the gray bat (*Myotis grisescens*): philopatry, timing and patterns of movement, weight, loss during migration, and seasonal adaptive strategies. Occasional Paper No. 54, University of Kansas Museum of Natural History, Lawrence. 38pp.
- Tuttle, M.D. 1979. Status, causes of decline, and management of endangered gray bats. *Journal of Wildlife Management* 43(1):1-17.
- Tuttle, M.D. and J. Kennedy. 2005. Field guide to eastern cave bats. Bat Conservation International, Inc., Austin, TX. 41pp.

## **Harperella (*Ptilimnium nodosum*) - E**

Note for federally-listed plants: The ESA does not prohibit "take" of listed plants on private lands, but landowners must comply with state laws protecting imperiled plants. "[W]ith respect to endangered species of plants, it is unlawful to: import or export; remove the species from areas under federal jurisdiction or maliciously damage or destroy it in those areas; remove, cut, dig up, damage or destroy the species in any other area in violation of state law or in the course of criminal trespass; deliver, receive, carry, transport, ship, sell or offer for sale in interstate or foreign commerce; violate any regulation pertaining to a threatened or endangered plant species" (16 USC § 1538(a)(2)(A) through (E)).

### **Life History**

Harperella is a rare member of the carrot family, native to a small number of widely separated riverine and pond sites in the southeastern United States. The species depends on narrow hydrologic conditions, and is threatened by hydrologic alterations, siltation, erosion, water quality degradation, disturbance, trampling, land-use conversion, and possibly by invasive plants (USFWS 1988, 1990). Harperella is always found on saturated substrates and reproduces both vegetatively and by seeds. The seeds generally germinate during short-duration spring floods and the plants complete their life cycle by late summer or fall.

### **Geographic Area of Concern**

Harperella populations are centered around 3 disjunct areas of the United States: the mid-Atlantic, the southeast, and the Ouachita Mountains. Within Oklahoma, the only known habitat for harperella exists on the Mountain Fork River in southeast Oklahoma (Buthod and Hoagland 2013). The current range of harperella may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – The most effective means of avoiding effects to harperella is to site oil and gas projects outside of the species' current known range, as obtained from IPaC. If an oil and gas project must be located within harperella's current range, site it in an upland area away from any stream channel. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so it does not flow over land into the Little River, including its tributaries and drainage ways. Effects, such as water withdrawals, other modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that requires in-channel work could impact harperella and should be avoided.

**Construction/Commissioning** – If oil and gas facilities will be placed within harperella's known range (obtained from IPaC), where effects to the Little River are possible, the following measures are recommended to avoid impacts to harperella. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to riparian

areas. On-site hazardous substances such as fuel, lubricants, and other chemicals should be contained in a manner that does not allow stored material to enter waterbodies. Hazardous materials cannot be stored within 30.5 m (100 feet) of a stream bank. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct as a span structure with no in-channel work, particularly if such work would impact river margins or wetlands. When placement of pipelines across streams is necessary, directionally bore under the stream crossing or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could produce adverse impacts to harperella. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within harperella's known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential harperella habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within harperella's known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of harperella, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact harperella directly or indirectly by altering stream habitats or nutrients utilized by harperella. Service approval should be obtained prior to mowing or hand clearing of existing rights-of-way in riparian areas and wetlands.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions outlined above to prevent degradation of streams located within harperella's known range. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

## Literature Cited

Buthod, A.K. and B.W. Hoagland. 2013. Noteworthy collections: Oklahoma. *Castanea* 78(3):213-215.

USFWS (U.S. Fish and Wildlife Service). 1988. Endangered and threatened wildlife and plants; determination of endangered status for *Ptilimnium nodosum*. Federal Register 53(188):37978-37982.

USFWS (U.S. Fish and Wildlife Service). 1990. Harperella (*Ptilimnium nodosum*) recovery plan. USFWS, Newton Corner, Massachusetts. 60 p.

## Indiana bat (*Myotis sodalis*) - E

### Life History

The Indiana bat (IB) is a migratory bat that spends the spring, summer, and fall in wooded areas and hibernates in cool caves and mines in the winter. During the summer, Indiana bats typically roost in trees under slabs of exfoliating bark. They also can be found utilizing hollow trees and cracks within trees (Callahan 1993, Kurta et al. 1993, Carter 2003, Britzke et al. 2003 and 2006). Over 33 tree species are known to be used. The type of tree used is likely more related to the local availability of trees with suitable characteristics (e.g., exfoliating bark, hollow, has cracks and crevices) rather than an overall range wide preference.

Females become pregnant when they emerge from hibernation in spring. Spring migration typically occurs between March 15 and May 15. Reproductive females form small maternity colonies (typically 100 or fewer individuals) and roost in trees with suitable characteristics. Most trees occupied by reproductive females are dead or in the early-to-mid stages of decay, and typically receive direct sunlight for more than half a day (USFWS 2007). Young are typically born in June and July after a 60-day gestation period (Kurta and Rice 2002), and are able to fly within three to five weeks after birth (Mumford and Cope 1958, Easterla and Watkins 1969, Humphrey et al. 1977, Kurta and Rice 2002). The maternity colony begins to disperse after the young have been raised to volancy (USFWS 2007).

Relatively less is known about the summer life history of males and non-reproductive females. Some males spend the summer near their hibernacula (Whitaker and Brack 2002), while others disperse widely. Males and non-reproductive females will roost individually or in small numbers, and tend to use the same types of trees as reproductive females, although the trees used by males are often smaller and more likely to be alive (Kurta and Rice 2002).

During fall, IBs begin their migration toward hibernacula. Most fall migration occurs between August 15 and October 15. The bats swarm and forage around hibernacula to replenish fat stores and mate during this time period prior to entering hibernation. Indiana bats continue to roost in suitable trees during this fall swarming period (Cope and Humphrey 1977). Indiana bats typically begin to enter hibernation in October. Males tend to be active longer into the fall, but typically are in hibernation by mid to late-November. Only a small percentage of caves and

cave-like structures meet the specific conditions required by IBs, which explains why so much of the known population hibernates in just a few sites.

Indiana bats forage for insects along forest edges and in or beneath forest canopy. They also forage over ponds and along streams (LaVal et al. 1977, Brack and LaVal 1985, Garner and Gardner, 1992, Hobson and Holland 1995, Gumbert 2001, USFWS 2007).

### **Geographic Area of Concern**

The current range of the IB in Oklahoma may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – To avoid incidental take of IBs, site the facility outside of the species' current known range. If the site location selected is within the IB's current range, to avoid incidental take develop oil and gas facilities where it will not be necessary to impact caves used by this species or suitable habitat used by this species during the spring, summer, or fall, including roosting, foraging, and commuting areas. Suitable roosting habitat is characterized by the presence of exfoliating bark, cracks, or crevices in trees (alive or dying) or snags that are more than (>) 84 centimeters (cm) (>33 inches) diameter-at-breast height (dbh). Foraging habitat consists of forested patches, wooded riparian corridors, and natural vegetation adjacent to these habitats. Commuting habitat includes wooded tracts, tree-lines, wooded hedgerows, streams or other such pathways that are within or connected to roosting or foraging areas.

To determine if an IB cave would be impacted, implement the following precautionary measures:

1. Contact the Oklahoma ESFO, Oklahoma Department of Wildlife Conservation, and the Oklahoma Natural Heritage Inventory to determine if any documented IB caves occur on or near the proposed project area.
2. If IB caves are not known to occur on the proposed project area, survey the area for undocumented cave openings and sinkholes.
3. Establish a buffer area of 91.4 m (300) feet around any caves and sinkholes found during the survey (or during any aspect of project implementation) and avoid any impacts to the area buffered. The Service should be contacted for further evaluation to determine if these sites are used by the IB. If a cave is used by the IB, we may recommend modifications of the proposed project to allow additional buffer areas to be established in order to avoid impacts to the cave and take of the IB.
4. All geophysical exploration – also known as seismic exploration within the known range will require consultation with the Oklahoma ESFO to avoid disturbance of bats or caves used by the bats. Vibration or explosive charges used in geophysical exploration may disturb hibernating or roosting bats in caves, or cause unstable rock formations in caves to shift and alter openings or habitat conditions in caves. Additional disturbance and arousal from hibernation can increase mortality by using fat reserves needed for winter survival.

If an IB cave will be impacted by the proposed project, then incidental take is likely. We recommend development of an HCP for anticipated take of the species. Please note that the

Service may require the cave to be mapped to determine if any additional openings or passages may be affected by the proposed project.

To determine whether suitable spring, summer, or fall habitat occurs in the project area, conduct a habitat assessment of the project area. We recommend following Phase 1 (i.e., Habitat Assessment) of the most recent Rangewide Indiana Bat Summer Survey Guidance available at the Service's Indiana bat website at (<http://www.fws.gov/midwest/Endangered/mammals/inba/index.html>). This guidance offers a phased approach and provides standardized protocols to determine whether the IB is present or likely absent at a given site during the summer. Results of the habitat assessment should be provided to the Oklahoma ESFO for review and concurrence. Should suitable habitat be present, develop the proposed project so impacts to the habitat will be avoided. If this is not possible, further coordination with the Oklahoma ESFO will be necessary to determine whether take may occur. We will likely recommend surveys for the IB (e.g., acoustic bat surveys and mist net surveys) during the summer (May 15 – August 15) such as those recommended in the subsequent phases of the previously mentioned draft guidance to determine whether the species is present or likely absent at your project site. The final determination regarding whether take would occur will be based on factors including the presence or probable absence of the species at the project site, the abundance and availability of suitable habitat in the area, and the duration (temporary or permanent), timing (summer maternity season vs. winter hibernation period), and severity of the impact. For example, the loss of a single roost tree may be considered discountable and insignificant (i.e., no take anticipated) if this type of habitat is abundant and readily available in the immediate vicinity and the tree would be removed during the winter while bats were hibernating (typically November 15 – March 15).

**Construction/Commissioning** – In the event that new cave openings or sinkholes are encountered or develop during construction activities, no fill materials should be placed into the opening until Service or Service approved personnel have the opportunity to investigate the site thoroughly. If the cave is used by the IB, we may recommend modifications of the proposed project to allow buffer areas (where no project activities would occur) to be established in order to avoid impacts to the cave and take of the IB. If the cave will be impacted by the proposed project, incidental take is likely. We recommend development a separate HCP for anticipated take of the species.

**Operation** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

**Decommissioning** - Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

### Literature Cited

Brack, V., Jr., and R. K. LaVal. 1985. Food habits of the Indiana bat in Missouri. *Journal of Mammalogy* 66:308-315.

- Britzke, E. R., A. C. Hicks, S. L. Von Oettingen, and S. R. Darling. 2006. Description of spring roost trees used by female Indiana bats (*Myotis sodalis*) in the lake Champlain Valley of Vermont and New York. *American Midland Naturalist* 155:181-187.
- Britzke, E. R., M. J. Harvey, S. C. Loeb. 2003. Indiana bat, *Myotis sodalis*, maternity roosts in the southern United States. *Southeastern Naturalist* 2:235-242.
- Callahan, E. V. 1993. Indiana bat summer habitat requirements. M. S. Thesis. University of Missouri, Columbia. 84 pp.
- Carter, T. C. 2003. Summer habitat use of roost trees by the endangered Indiana bat (*Myotis sodalis*) in the Shawnee National Forest of Southern Illinois. Dissertation. Southern Illinois University. Carbondale, IL. 82 pp.
- Cope, J. B., and S. R. Humphrey. 1977. Spring and autumn swarming behavior in the Indiana bat, *Myotis sodalis*. *Journal of Mammalogy* 58:93-95.
- Easterla, D. A. and L. C. Watkins. 1969. Pregnant *Myotis sodalis* in northwestern Missouri. *Journal of Mammalogy* 50:372-373.
- Garner, J. D., and J. E. Gardner. 1992. Determination of summer distribution and habitat utilization of the Indiana bat (*Myotis sodalis*) in Illinois. Final Report: Project E-3. Endangered Species Act Section 6 Report, Illinois Department of Conservation.
- Gumbert, M. W. 2001. Seasonal roost tree use by Indiana bats in the Somerset Ranger District of the Daniel Boone National Forest, Kentucky. M. S. Thesis. Eastern Kentucky University, Richmond, Kentucky. 136 pp.
- Hobson, C. S. and J. N. Holland. 1995. Post-hibernation movement and foraging habitat of a male Indiana bat, *Myotis sodalis* (Chiroptera: Vespertilionidae), in West Virginia. *Brimleyana* 23:95-101.
- Humphrey, S. R., A. R. Richter, and J. B. Cope. 1977. Summer habitat and ecology of the endangered Indiana bat, *Myotis sodalis*. *Journal of Mammalogy* 58:334-346.
- Kurta, A., and H. Rice. 2002. Ecology and management of the Indiana bat in Michigan. *Michigan Academician* 33:361-376.
- Kurta, A., D. King, J. A. Teramino, J. M. Stribley, and K. J. Williams. 1993a. Summer roosts of the endangered Indiana bat (*Myotis sodalis*) on the northern edge of its range. *American Midland Naturalist*. 129:132-138.
- LaVal, R., R. Clawson, M. LaVal, and W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. *Journal of Mammalogy* 58:592-599.

Mumford, R. E. and J. B. Cope. 1958. Summer records of *Myotis sodalis* in Indiana. *Journal of Mammalogy* 39:586-587.

USFWS (U. S. Fish and Wildlife Service). 2007. Indiana bat (*Myotis sodalis*) Draft Recovery Plan: First Revision. U. S. Fish and Wildlife Service, Fort Snelling, MN. 258 pp.

Whitaker, J. O., and V. Brack, Jr. 2002. Distribution and summer ecology in Indiana. Pp. 48-54 in Kurta and J. Kennedy (eds.), *The Indiana bat: biology and management of an endangered species*. Bat Conservation International, Austin, TX. 265 pp.

## **Interior least tern (*Sterna antillarum athalassos*) - E**

### **Life History**

The interior least tern (ILT) is 20 to 25 cm (8 to 10 inches) in length with a black “crown,” a snowy white underside and forehead, grayish back and wings, orange legs, and a yellow bill with a black tip. Interior least terns are migratory, breeding along inland river systems in the United States and wintering along the Central American coast and the northern coast of South America from Venezuela to northeastern Brazil.

Historically, ILTs nested along the Colorado, Red, Rio Grande, Arkansas, Missouri, Ohio and Mississippi River systems. Currently, the species nests in the Mississippi and Rio Grande River basins from Montana south to Texas and from eastern New Mexico and Colorado to Indiana and Louisiana. In Oklahoma, ILTs nest on the larger rivers and salt flats, including Great Salt Plains, Arkansas River, Cimarron River, Canadian River, and Red River. In Texas, ILTs are found at three reservoirs along the Rio Grande River, on the Canadian River in the northern Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, and along the Red River (Texas/Oklahoma boundary) into Arkansas. During migration ILTs can be found at ponds, reservoirs, and streams across all of Oklahoma and Texas.

Interior least terns arrive at breeding areas from early April to early June, and spend 3 to 5 months on the breeding grounds. Interior least terns can nest as individual pairs but typically nest in colonies with two ->100 nests. The nest is a shallow depression in an open, sandy area, gravelly patch, or exposed flat on sand bars, islands, and salt flats. Some terns have adapted to nest on large, flat gravel roofs of buildings. Egg-laying begins in late May-June, with the female laying 1 to 3 eggs over a period of 3 to 5 days. Both parents incubate the eggs, with incubation lasting about 20 to 22 days. The chicks hatch within one day of each other and remain in the nest for only a day or two. Chicks are mobile and may seek shade and shelter in clumped vegetation and debris. Chicks are capable of flight within 3 weeks, but the parents continue to feed them until fall migration. Interior least terns will re-nest until mid-late July if clutches or broods are lost. Interior least terns are opportunistic foragers during the breeding season and have been known to travel almost 12 km (7.5 miles) from the nesting area to feed (Schweitzer and Leslie 1996).

The breeding season is usually complete by late August. Interior least terns migrate in small, loose groups, feeding en route and resting on sandbars, beaches, pilings, and docks (Thompson

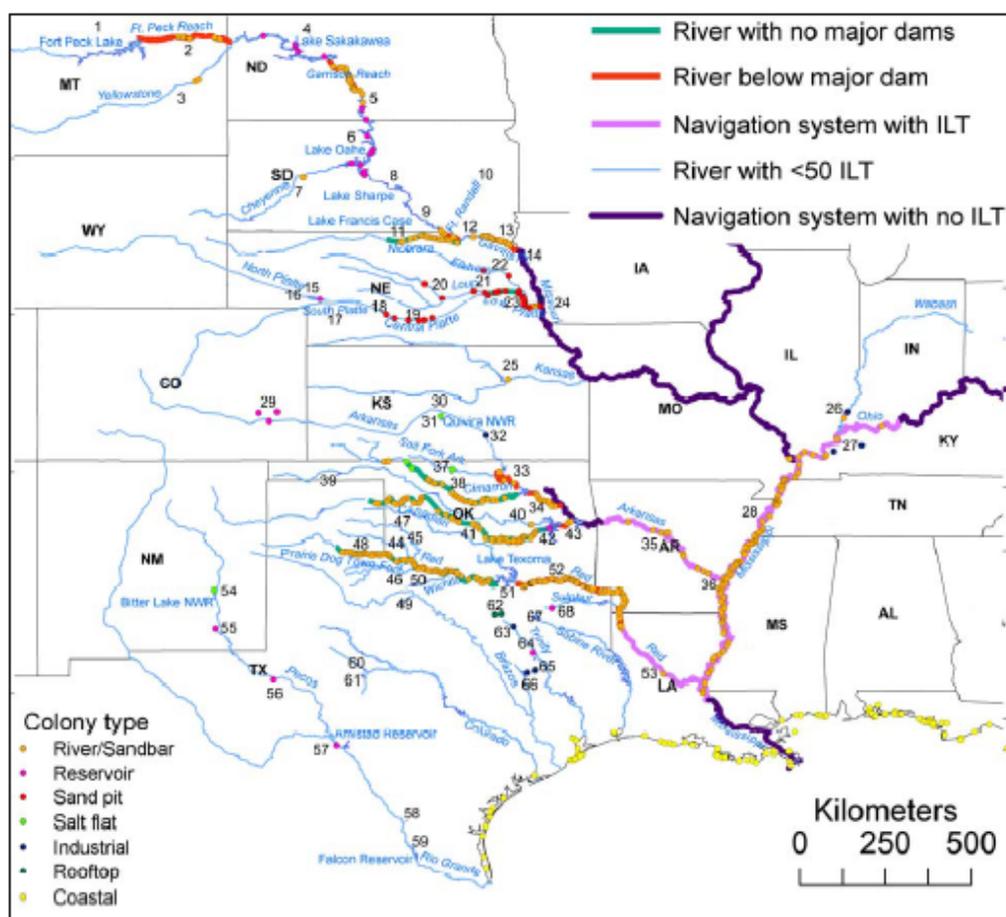
et. al 1997). Interior least terns often return to the same breeding site, or one nearby, year after year.

The ILT is primarily a fish-eater, feeding in shallow waters of rivers, streams, and lakes. The birds are opportunistic and tend to select any small fish within a certain size range. Feeding behavior involves hovering and diving for small fish and aquatic crustaceans, and occasionally skimming the water surface for insects.

Migration routes and patterns of the ILT are not well understood. Interior least terns appear to migrate cross-country, as indicated by terns seen (1986–1993) in central Texas >150 km from known nesting areas in major river drainages (Thompson et. al. 1997). Some interior populations appear to follow major river basins to the confluence of the Mississippi and then South to the Gulf of Mexico. Spring migration likely follows similar major routes along marine coasts and rivers, but such movements have not been extensively documented or monitored.

### Geographic Area of Concern

Missouri, Yellowstone, Cheyenne, Loup, Elkhorn, Niobrara, Platte, Arkansas, Cimarron, Canadian, and Red (Texas and Oklahoma) Rivers in the states of Montana, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas (USFWS 1990).



2005 breeding distribution of the Interior Least Tern (Lott 2006).

**Prospecting** – Avoid any work or entry into river beds or salt flats that support ILT nesting during the nesting season or conduct surveys (by qualified, permitted individuals) to determine if ILTs are nesting near the proposed activity (such as seismic exploration). Within Oklahoma, ILTs nest on the Arkansas River, Cimarron River, Canadian River, and Red River and flats of major river systems including Salt Plains National Wildlife Refuge in northwestern Oklahoma.

- Within Oklahoma, near the Arkansas, Cimarron, Canadian, and Red Rivers (within 1.6 km (1 mile) of the mainstems only and including any reservoirs)
  - Mark new lines that cross or are within 1.0 mile of potentially suitable habitat (i.e., nesting, foraging, stop-over or roosting habitat, primarily large rivers and wetlands) and if possible, an equal amount of existing lines according to the Service recommendations described in APLIC 2012. Consult the Service to determine the most appropriate existing lines to mark.
  - Avoid impacts to designated critical habitat at Salt Plains National Wildlife Refuge and contact the refuge if any impacts are anticipated.

**Siting/Development** – See Prospecting above and avoid placement of overhead power lines, drilling equipment or any other tall vertical structures within 200 yards of ILT nesting areas. Bore under the above rivers to avoid potential impacts related to pipelines.

**Construction/Commissioning** – See Prospecting above and avoid placement of overhead power lines, drilling equipment, or any other tall vertical structures within 200 yards of ILT nesting areas. Bore under the river to avoid potential impacts related to pipelines.

**Operation** - See all recommendations above.

**Decommissioning** - Restore the affected habitat to pre-construction conditions if all other avoidance measures have been met. See Prospecting.

## Literature Cited

- Lott, C.A. 2006. Distribution and Abundance of the Interior Population of the Least Tern (*Sternula antillarum*), 2005: A Review of the First Complete Range-Wide Survey in the Context of Historic and Ongoing Monitoring Efforts. U.S. Army Corps of Engineers Report ERDC/EL TR-06-13.
- Stienen, E.W. M., Courtens, W., Everaert, J., and van der Walle, M. 2008 Sex-biased Mortality of Common terns in Wind Farm Collision. *The Condor* 110(1); 154-157.
- Schweitzer, S.H., and Leslie, Jr. D.M. 1996. Foraging patterns of the Least Tern (*Sterna antillarum*) in North-Central Oklahoma. *The Southwestern Naturalist*, v41, No.3, pp. 307-314.

Talent, L. G., and L. A. Hill. 1985. Final report: breeding ecology of snowy plovers, American avocets, and interior least terns at Salt Plains National Wildlife Refuge, Oklahoma. Oklahoma State University, Stillwater.

Thompson, B.C., Jackson, J.A., Burger, J., Hill, L.A., Kirsch, E.M., and Atwood, J.L. 1997. Least Tern (*Sterna antillarum*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/scpies/290>.

USFWS (U.S. Fish and Wildlife Service), 1990. Recovery Plan for the Interior Least Tern (*Sterna antillarum*).

## **Leopard darter (*Percina pantherina*) - T**

### **Life History**

The leopard darter (LD) is a small percid fish native to upland stream habitats of the Little River drainage of Oklahoma and Arkansas (Robinson 1978). Leopard darters typically live less than two years, but individuals older than three years have been found (Robinson 1978; Jones *et al.* 1983; James *et al.* 1991). Most LDs spawn only once in their lifespan. Spawning occurs in riffles during March and April, but may occur as early as February. Fertilized eggs are buried in gravel and the average clutch size is about 65 eggs (James 1988; James and Maughan 1989, James *et al.* 1991). Young LDs begin to appear in May of each year. Food items include aquatic insects and micro crustaceans (Page 1983; James *et al.* 1991; Williams *et al.* 2006).

### **Geographic Area of Concern**

Historically, LDs occurred in upland, large stream habitats of the Little River drainage in Oklahoma and Arkansas. As of October 2012, scattered populations are found within the species' historic range (Miller 1972; Cloutman and Olmstead 1974; Robison *et al.* 1974; Hubbs and Pigg 1976). In Oklahoma, it has been located within the Mountain Fork, Glover, and Little rivers and their larger tributaries, in LeFlore, McCurtain, and Pushmataha counties. In Arkansas, the LD has been found in the Cossatot, Robinson Fork, and Mountain Fork rivers in Howard, Polk, and Sevier counties (USFWS unpublished data). An updated range of the LD may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

Critical habitat for the LD in the Little River begins at the confluence of Cloudy Creek (sec. 3, T. 3 S., R. 20 E.) and extends upstream to the Pushmataha-LeFlore County line. Critical habitat within the upper Little River includes Black Fork Creek from its confluence with the Little River (sec. 22, T. 1 S., R. 20 E.) upstream to the State Highway 144 crossing (sec. 12, T. 1 S., R. 19 E.) near Nashoba, Oklahoma. In the Glover River, critical habitat includes the main channel from the State Highway 7 crossing (sec. 28, T. 5 S., R. 23 E.) upstream incorporating portions of the East (sec. 5, T. 2 S., R. 24 E.) and West (sec. 7, T. 2 S., R. 23 E.) forks. Critical habitat in the Mountain Fork River consists of the main channel of the river from the mouth of Boktuklo Creek (sec. 9, T. 2 S., R. 25 E.) upstream to Mountain Fork, Arkansas (sec. 29, T. 1 S., R. 32 W.). At the time critical habitat was designated, the Service determined that the critical habitat areas selected supported the environmental constituent elements necessary for reproduction and

growth, and were essential for the species' recovery (43 FR 3711). For more information on designated critical habitat, go to <http://criticalhabitat.fws.gov>.

**Prospecting and Siting/Development** – To avoid incidental take of LDs, site the facility outside of the species' current known range obtained from IPaC. As of April 2014, the species' current known distribution within Oklahoma includes the Glover, Little, and Mountain Fork rivers and their tributaries in Leflore, McCurtain, and Pushmataha counties, Oklahoma. If the site location selected is within the LD's current range, impacts that result in take must be avoided. Those include water withdrawals, modification to hydrology (increased or decreased runoff due to modifications to topography) increased sedimentation, chemical releases (e.g., fuel spills, herbicides) or other detrimental effect to water quality, riparian area disturbance, use of low-water crossings, and construction of new bridges that require in-channel work. If such impacts cannot be avoided, incidental take is likely and development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas activities will occur within the LD's known range (obtained from IPaC), where effects to streams occupied by LDs are possible, the following is recommended to avoid take of the LD. Install and maintain adequate erosion control measures to minimize movement of sediment into streams within these watersheds. Avoid impacts to riparian areas adjacent to occupied streams. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. A spill prevention and rapid response plan should be developed and implemented to ensure fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work will impact riffles or gravel bars. When placement of pipelines across the streams is necessary, directionally bore the crossing under the stream or co-locate pipelines with bridges or similar existing structures that span the river. Trenching for pipeline placement would impact channel configuration, increase sedimentation, and likely impact LD habitat, which would result in take of the LD. When boring a stream, ensure that drilling mud does not enter the creek or its banks. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the LD's known range. If withdrawal is necessary from a known occupied stream or their tributary, it is recommended that the project proponent contact the Service to ensure that occupied habitat will not be affected. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact LDs. Following construction, all bare soil should be revegetated as soon as feasible and plants native to the area should be used whenever possible.

**Operation** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that precipitation runoff and chemical spills do not adversely impact water quality within the LD's known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing

operation and contingencies for rescue of LDs, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact LDs directly or indirectly by altering stream habitats or the food resources utilized by LDs. Mowing or hand clearing of existing rights-of-way is permissible provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions outlined above to prevent degradation of streams located within the LD's known range.

### Literature Cited

- Cloutman, D. G., and L. L. Olmsted. 1974. A survey of the fishes of the Cossatot River in southwestern Arkansas. *Southwest Nat.* 19: 257-266.
- Hubbs, C., and J. Pigg. 1976. The effects of impoundments on threatened fishes of Oklahoma. *Proc. Okla. Acad. Sci.* 5: 113-117.
- James, P. W. 1988. Reproductive ecology and habitat preference of the leopard darter, *Percina pantherina*. Oklahoma Dept. of Wildl. Conser. Federal Aid Proj. No. E-2-R-1, Oklahoma City. 27 pp.
- James, P. W., and O. E. Maughan. 1989. Spawning behavior and habitat of the threatened leopard darter, *Percina pantherina*. *Southwest. Nat.* 34: 298-301.
- James, P. W., O. E. Maughan, and A. V. Zale. 1991. Life history of the leopard darter, *Percina pantherina*, in Glover River, Oklahoma. *American Midland Naturalist* 125:173-179.
- Jones, R. N., O. E. Maughan, H. W. Robison, and R. J. Miller. 1983. The leopard darter, *Percina pantherina*: status of populations in Glover Creek, McCurtain County, Oklahoma and Cossatot River, Arkansas. *End. Species Rpt. No. 12*. U. S. Fish and Wildlife Service, Albuquerque, NM. 68 pp.
- Miller, R. R. 1972. Threatened freshwater fishes of the United States. *Trans. Amer. Fish Soc.* 101(2): 239-252.
- Page, L. M. 1983. *Handbook of darters*. TFH Publications, Neptune City, NJ. 271 pp.
- Robison, H. W. 1978. The leopard darter (a status report). *Endangered Species Report No. 3*, U.S. Fish and Wildlife Service, Albuquerque, NM. 28 pp.
- Robison, H. W., G. A. Moore, and R. J. Miller. 1974. Threatened fishes of Oklahoma. *Proc. Okla. Acad. Sci.* 54: 139-146.

Williams, L. R., M. G. Williams, A. R. Grubh, and E. E. Swinehart. 2006. Food habits of the federally threatened leopard darter (*Percina pantherina*). *American Midland Naturalist* 156: 208-211.

### **Lesser-prairie chicken (*Tympanuchus pallidicinctus*)**

Avoidance measures for the black-capped vireo are currently in development. Please contact with the Oklahoma ESFO for the guidance for this species.

### **Neosho madtom (*Noturus placidus*) - T**

#### **Life History**

The Neosho madtom (NMT) is a small member of the catfish family (Ictaluridae) endemic to the Neosho, Cottonwood, and Spring rivers of Kansas, Oklahoma, and Missouri (Moss 1981, Luttrell *et al.* 1992, Wilkinson *et al.* 1996, Wildhaber *et al.* 2000). Individuals typically inhabit loosely-packed gravel in riffles during the breeding season, retreating to adjacent, deeper habitats in winter. Specific substrates used during winter are unknown, but are presumed to include gravel to rubble sized rocks. The primary food source is aquatic invertebrates, primarily insect larvae, with the bulk of feeding and other activity occurring at night (Cross and Collins 1995). High river flows in late spring and early summer seem to be a key component leading to successful spawning.

#### **Geographic Area of Concern**

Within Oklahoma, the only potential habitat for the NMT is the Neosho and Spring rivers in Craig and Ottawa counties, OK.



Craig County



Ottawa County

**Prospecting and Siting/Development** – The most effective means of avoiding impacts to the NMT is to develop oil and gas projects in areas where they will not impact the Neosho or Spring rivers or their associated riparian zones. Impacts that could result in incidental take include modification to hydrology (increased or decreased runoff due to modifications to topographic grade (Bryan *et al.* 2006)), channel configuration (riffle-pool-run sequence or substrate composition) and alignment, degradation of the stream bank, riparian zone and other activities that result in increased sedimentation, chemical releases (fuel spills), construction and use of low-water crossings, and construction of new bridges that require in-channel work (Tiemann *et al.* 2004). Site projects in areas where existing bridges can be utilized for access, where construction runoff can be contained without flowing into the Neosho or Spring rivers, including their tributaries and drainage ways, and in upland areas away from stream channels. Co-locate projects in areas where previous disturbance exists (e.g., locate any new distribution lines within

or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors). When conducting seismic exploration, avoid establishing shot holes or using thumper trucks within the riparian zone. This will help minimize impacts to sensitive riparian vegetation and the potential for sound to inflict physiological damage on aquatic organisms. While such damage is unlikely, and typically is temporary in duration, there is little specific information regarding impacts of seismic work on inland freshwater organisms. Because sound moves more readily underwater than in the air, some disturbance or avoidance behavior may result from detonation of charges, particularly if work is conducted adjacent to streams and rivers.

**Construction** – If oil and gas facilities will be placed where effects to the either the Neosho or Spring rivers are possible, the following is recommended to avoid take of the NMT. Install and maintain adequate erosion control measures to minimize movement of sediment into these waterbodies. In some instances, placement of facilities adjacent to tributaries of the Neosho and Spring rivers could lead to impacts within these rivers. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. A spill prevention and rapid response plan should be developed and implemented to ensure fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work will impact riffles or gravel bars. When placement of pipelines across the Neosho or Spring River is necessary, directionally bore the crossing under the stream or co-locate pipelines with bridges or similar existing structures that span the river. Trenching for pipeline placement would impact channel configuration and likely require some dewatering of the stream channel, which would result in adverse impacts to the NMT. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from the river channel (Brown *et al.* 1998). Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact NMTs. Following construction, all bare soil should be revegetated as soon as feasible and native plants should be used whenever possible.

**Operation** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that precipitation runoff and chemical spills do not adversely impact water quality in either the Neosho or Spring rivers. A spill prevention and response plan should be developed that includes frequent inspection of ongoing operation and contingencies for rescue of NMT, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact NMT directly or indirectly by altering stream habitats or the food resources utilized by NMT (Wildhaber *et al.* 2000). Mowing or hand clearing of existing rights-of-way is permissible provided stability of stream banks is not compromised. If hydrostatic

testing of pipeline segments is required, do not withdraw water from the river channel. Water withdrawals can cause entrainment and impingement of fishes.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions previously outlined to prevent degradation of the Neosho or Spring rivers from these activities. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### Literature Cited

- Brown, A.V., M.M. Lyttle and K.B. Brown. 1998. Impacts of gravel mining on gravel bed streams. *Transactions of the American Fisheries Society* 127:979-994.
- Bryan, J.L.; M.L. Wildhaber, D.B. Noltie. 2006. Influence of water flow on Neosho madtom (*Noturus placidus*) reproductive behavior. *American Midland Naturalist*, 156:305-318.
- Cross, F.B., and J.T. Collins. 1995. *Fishes in Kansas*, 2nd edition. University Press of Kansas, Lawrence.
- Luttrell, G.R., R.D. Larson, W.J. Stark, N.A. Ashbaugh, A.A. Echelle, and A.V. Zale. 1992. Status and distribution of the Neosho madtom (*Noturus placidus*) in Oklahoma. *Proceedings of the Oklahoma Academy of Science* 72:5–6.
- Moss, R.E., Life History Information for the Neosho madtom, *Noturus placidus*. Kansas Fish & Game Comm. Contract No. 38 (1981).
- Tiemann, J.S., D.P. Gillette, M.L. Wildhaber and D.R. Edds. 2004. Effects of lowhead dams on riffle-dwelling fishes and macroinvertebrates in a midwestern river. *Transactions of the American Fisheries Society* 133:705-717.
- Wilkinson, C., D. Edds, J. Dorlac, M. L. Wildhaber, C.J. Schmitt, and A. Allert. 1996. Neosho madtom distribution and abundance in the Spring River. *Southwestern Naturalist* 41:78–81.
- Wildhaber, M.L., A.L. Allert, C.J. Schmitt, V.M. Tabor, D. Mulhern, K.L. Powell & S.P. Sowa. 2000a. Natural and anthropogenic influences on the distribution of the threatened Neosho madtom in a midwestern warmwater stream. *Trans. Amer. Fish. Soc.* 129: 243–261.

## **Neosho mucket (*Lampsilis rafinesqueana*) – E**

### **Life History**

The Neosho mucket (NM) is a freshwater mussel endemic to the Ozark Highlands and Central Irregular Plains ecoregions (Omernik 1987). Though exhibiting a restricted and declining range, the mucket sometimes occurs in significant densities and can even be a dominant member of the mussel community. The species has been adversely affected by dams, channelization, pollution, and sedimentation within its historic range (USFWS 2012). The life cycle of the NM, like that of most freshwater mussels, is unusual and complex. Its eggs develop into microscopic larvae (glochidia) within the gills of the female. The female discharges its glochidia outside of its shell where they must attach to gills or fins of a fish to continue developing. Each mussel species has specific fish species (host fish) that are needed for development of that species' glochidia; the known host fish for the NM are smallmouth bass, largemouth bass, and spotted bass. Glochidia continue growing on the host fish and transform into juveniles. After a few weeks, they drop off, settle into the river bottom, and continue maturing. After early development, mussels feed by filtering algae, bacteria, other microorganisms, and detritus from their surroundings.

### **Geographic Area of Concern**

Historically, the NM occurred widely in the Verdigris, Neosho, and Illinois river systems, but now is restricted to limited sections of those drainages. Within the Oklahoma, the only known habitat for the NM exists in the Spring and Illinois rivers in northeast Oklahoma (USFWS 2012). The current range of the NM may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

Proposed critical habitat for the NM in Oklahoma includes the Illinois River from the Oklahoma-Arkansas state line downstream to the confluence with the Baron Fork, and the Elk River from the Oklahoma-Arkansas state line downstream to the confluence with Buffalo Creek (USFWS 2012). These proposed critical habitat areas appear to support the environmental constituent elements necessary for reproduction and growth, and will be essential for the species' recovery. For more information on designated critical habitat, go to <http://criticalhabitat.fws.gov>

**Prospecting and Siting/Development** – The most effective means of avoiding impacts to the NM is to site oil and gas projects outside of the species' current known range, as obtained from IPaC. If an oil and gas project must be located within the NM's current range, then site it in an upland area away from stream channel. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so that it does not flow over land into the Spring or Illinois rivers, including their tributaries and drainage ways. Effects that could result in take must be avoided. Examples of such effects include water withdrawals, other modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that

requires in-channel work. If such effects cannot be avoided, then incidental take is likely and development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas facilities will be placed within the NM’s known range (obtained from IPaC), where effects to the Spring or Illinois rivers are possible, the following measures are recommended to avoid take of the NM. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to riparian areas. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work would impact apparent mussel concentrations (beds). When placement of pipelines across streams is necessary, directionally bore under the stream or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could produce adverse impacts to the NM. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the NM’s known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential NM habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within the NM’s known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of the NM, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact the NM directly or indirectly by altering stream habitats or the food resources utilized by the NM. Mowing or hand clearing of existing rights-of-way is permissible, provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction condition, using precautions outlined above to prevent degradation of streams located within the NM’s known range. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an

established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### **Literature Cited**

- Omernik, J.M. 1987. Ecoregions of the conterminous United States. Map (scale 1:7,500,000) revised August 2002. *Annals of the Association of American Geographers* 77:(1) 118-125.
- USFWS (U.S. Fish and Wildlife Service). 2012. Endangered and threatened wildlife and plants; proposed endangered status for the Neosho mucket, threatened status for the rabbitsfoot, and designation of critical habitat for both species; proposed rule. *Federal Register* 77(200):63440-63536.

## **Ouachita rock pocketbook (*Arkansia wheeleri*) - E**

### **Life History**

The Ouachita rock pocketbook (ORP) is a freshwater mussel that inhabits pools, backwaters, and side channels of certain streams in or near the southern slope of the Ouachita Mountains. This species inhabits only high quality mussel habitats and even in such habitats, occurs at very low densities (Vaughn and Pyron 1995). It has been adversely affected by dams, channelization, pollution, sedimentation, gravel excavation, and water use within its historic range (USFWS 2004, Galbraith *et al.* 2008). The life cycle of the ORP, like that of most freshwater mussels, is unusual and complex. Its eggs develop into microscopic larvae (glochidia) within the gills of the female. The female discharges its glochidia outside of its shell where they must attach to the gills or fins of a fish to continue development. Each mussel species has specific fish species (host fish) that are needed for development of that species' glochidia; development is not successful on non-host fish species. Glochidia continue growing on the host fish and transform into juveniles. After a few weeks, they drop off, settle into the river bottom, and continue maturing. After early development, mussels feed by filtering algae, bacteria, other microorganisms, and detritus from their surroundings.

### **Geographic Area of Concern**

The ORP occurred historically in the Kiamichi River of southeast Oklahoma, the Little River of southeast Oklahoma/southwest Arkansas, and the Ouachita River of central Arkansas. Shells of the species, but no live individuals, have also been found in Pine and Sanders creeks in northeast Texas. Within Oklahoma, the only known habitat for the ORP exists in the Kiamichi and Little rivers in southeast Oklahoma (USFWS 2004, Galbraith *et al.* 2008). The current range of the ORP may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – The most effective means of avoiding impacts to the ORP is to site oil and gas projects outside of the species' current known range, as obtained from IPaC. If an oil and gas project must be located within the ORP's current range, site it in an upland area away from stream channels or co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline

corridors. Contain all surface runoff from construction areas so it does not flow over land into the Kiamichi or Little rivers, including their tributaries and drainage ways. Effects that could result in take must be avoided. Examples of such effects include water withdrawals, other modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that requires in-channel work. If such effects cannot be avoided, incidental take is likely and development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas facilities will be placed within the ORP’s known range (obtained from IPaC), where effects to either the Kiamichi or Little rivers are possible, the following measures are recommended to avoid take of the ORP. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to riparian areas. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work would impact apparent mussel concentrations (beds). When placement of pipelines across streams is necessary, directionally bore the stream crossing or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could result in take of the ORP. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the ORP’s known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential ORP habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within the ORP’s known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of the ORP, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within 30.5 m (100 feet) of the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact the ORP directly or indirectly by altering stream habitats or the food resources utilized by the ORP. Mowing or hand

clearing of existing rights-of-way is permissible, provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction condition, using precautions outlined above to prevent degradation of streams located within the ORP’s known range. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### Literature Cited

- Galbraith, H.S., D.E. Spooner, and C.C. Vaughn. 2008. Status of rare and endangered freshwater mussels in southeastern Oklahoma. *Southwestern Naturalist* 53(1):45-50.
- USFWS (U.S. Fish and Wildlife Service). 2004. Ouachita rock pocketbook (*Arkansia wheeleri* Ortmann and Walker, 1912) recovery plan. USFWS, Albuquerque, New Mexico.
- Vaughn, C.C. and M. Pyron. 1995. Population ecology of the endangered Ouachita rock-pocketbook mussel, *Arkansia wheeleri* (Bivalvia: Unionidae), in the Kiamichi River, Oklahoma. *American Malacological Bulletin* 11:145-151.

## **Ozark big-eared bat (*Corynorhinus townsendii ingens*) – E**

### Life History

The Ozark big-eared (OBEB) bat is an insectivorous bat that occurs in the Ozark Highlands and Boston Mountains ecoregions (Omernik 1987) of northeastern Oklahoma, and northwestern and north-central Arkansas. Ozark big-eared bats inhabit caves year-round. The caves typically are located in oak-hickory hardwood forests.

Colonies typically begin to form at hibernacula in October and November (Clark et al. 1996 and 2002). Both sexes hibernate together in clusters that typically range from 2 -135 individuals (Clark et al. 1993, 1997 and 2002). Ozark big-eared bats mate during fall and winter. Females store sperm in their reproductive tract during the winter hibernation period (Kunz and Martin 1982, U. S. Fish and Wildlife Service 1995).

Hibernating colonies gradually begin to break up in spring from April through May (Clark et al. 2002). Females also become pregnant during this time (Kunz and Martin 1982) and slowly begin to congregate at warm maternity caves to give birth and rear their young over the summer (Clark et al., 1993, 1996, and 2002). Distances between hibernacula and summer caves are known to range from 6.5 to 65 km (4 to 40 miles). The exact timing of the formation of maternity colonies varies between years, but usually occurs between late April and early June (Clark et al. 2002, USFWS 1995). Like other temperate bats, the species exhibits strong roost

fidelity, returning to the same maternity sites and hibernacula year after year (Kunz and Martin 1982, Clark et al. 1996, Weyandt et al. 2005).

The OBEB typically forages in edge and forested habitats. They primarily feed on moths, but also are known to eat beetles and other flying insects (USFWS 1995, Leslie and Clark 2002, Dodd and Lacki 2007, Dodd et al. 2008). Females forage relatively close to the maternity cave (about 1.0 – 2.0 km; 0.6 – 1.2 miles) during the early and middle portions of the maternity season. Female bats likely forage only short distances from the cave in order to return several times during the night to take care of flightless young. As the season progresses, average distance to foraging sites (up to about 7.3 km; 4.5 miles) increases (Clark et al. 1993, Harvey 1992). Foraging farther distances from the cave later in the summer may reduce competition with newly volant young that have begun to forage.

### **Geographic Area of Concern**

The OBEB utilizes caves in Oklahoma year round, and forages in close proximity to these caves during the spring and summer when insects are active. Potential impacts to the OBEB should be considered for proposed projects in Adair, Cherokee, Delaware, Sequoyah, and Ottawa counties. The current range of the OBEB may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – To avoid incidental take of the OBEB, site the facility outside of the species' current known range. If the site location selected is within the range of the species, to avoid incidental take develop oil and gas facilities where it will not be necessary to impact caves or oak-hickory forests used by the OBEB. To ensure take of the OBEB will be avoided, implement the following precautionary measures:

1. Contact the Oklahoma ESFO, Oklahoma Department of Wildlife Conservation, and the Oklahoma Natural Heritage Inventory to determine if any known OBEB caves occur on or near the proposed project area.
2. If OBEB caves are not known to occur on the proposed project area, survey the area for undocumented cave openings and sinkholes.
3. Establish a buffer area of 91.4 m (300 feet) around any caves and sinkholes found during the survey (or during any aspect of project implementation). The Service should be contacted for further evaluation to determine if these sites are used by the OBEB. If a cave is used by the OBEB, we may recommend modifications of the proposed project to allow additional buffer areas to be established in order to avoid impacts to the cave and take of the OBEB.
4. If the development of oil and gas facilities would result in the permanent loss of oak-hickory forest, contact the Oklahoma ESFO to determine whether the impact would likely reach the scale where take of the OBEB would be anticipated due to loss of foraging habitat and/or harassment. This determination will be based on factors including proximity of the proposed project area to documented OBEB caves, previous survey work for the species in or near the project area, and the duration (temporary or permanent), timing (summer maternity season vs. winter hibernation period), and severity of the impact. Additional surveys by a qualified biologist that holds a Service

Recovery Permit (ESA § 10(a)(1)(A) Permit) for OBEBs utilizing acoustic bat detectors and/or mist nets may be necessary.

5. All geophysical exploration – also known as seismic exploration within the known range will require consultation with the Oklahoma ESFO to avoid disturbance of bats or caves used by the bats. Vibration or explosive charges used in geophysical exploration may disturb hibernating or roosting bats in caves, dislodge flightless young, or cause unstable rock formations in caves to shift and alter openings or habitat conditions in caves. Additional disturbance and arousal from hibernation can increase mortality by using fat reserves needed for winter survival.

If cave used by the OBEB will be impacted by the proposed project incidental take is likely and you should contact the Oklahoma ESFO regarding the development of an HCP for your proposed project. The Service may require the cave to be mapped when bats are not present to determine if any additional openings or passages may be affected by the proposed project.

**Construction/Commissioning** – In the event that new cave openings or sinkholes are encountered or develop during construction activities, no fill materials should be placed into the opening until Service or Service approved personnel have the opportunity to investigate the site thoroughly. If the cave is used by the OBEB, we may recommend modifications of the proposed project to allow buffer areas to be established in order to avoid impacts to the cave and take of the OBEB. If the cave will be impacted by the proposed project, incidental take is likely and you should contact the Oklahoma ESFO regarding the development of an HCP for your proposed project.

**Operation** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

**Decommissioning** - Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

### Literature Cited

- Clark, B. S., B. K. Clark, and D. M. Leslie, Jr. 2002. Seasonal variation in activity patterns of the endangered Ozark big-eared bat (*Corynorhinus townsendii ingens*). *Journal of Mammalogy* 83(2):590-598.
- Clark, B. K., B. S. Clark, D. M. Leslie, Jr., and M. S. Gregory. 1996. Characteristics of caves used by the endangered Ozark big-eared bat. *Wildlife Society Bulletin* 24(1):8-14.
- Clark, B. S., D. M. Leslie Jr., and T. S. Carter. 1993. Foraging activity of adult female Ozark big-eared bats (*Corynorhinus townsendii ingens*). *Journal of Mammalogy* 74:422-427.
- Clark, B. S., W. L. Puckette, B. K. Clark, and D M. Leslie, Jr. 1997. Status of the Ozark big-eared bat (*Corynorhinus townsendii ingens*) in Oklahoma, 1957 to 1995. *The Southwestern Naturalist* 42:20-24.

- Dodd, L. E. and M. J. Lacki. 2007. Prey consumed by *Corynorhinus townsendii ingens* in the Ozark Mountain region. *Acta Chirpterologica* 9:451-461.
- Dodd, L. E., M. J. Lacki, and L. K. Rieske. 2008. Variation in moth occurrence and implications for foraging habitat of Ozark big-eared bats. *Forest Ecology and Management* 255: 3866-3872.
- Harvey, M. J. 1992. Bats of the eastern United States. Arkansas Game and Fish Commission, Little Rock, Arkansas. 46 pp.
- Kunz, T. H., and R. A. Martin. 1982. *Plecotus townsendii*. *Mammalian Species* 175:1-6.
- Leslie, D. M. and B. S. Clark. 2002. Feeding habits of the endangered Ozark big-eared bat (*Corynorhinus townsendii ingens*) relative to prey abundance. *Acta Chiropterologia* 4(2):173-182.
- Omernik, J.M. 1987. Ecoregions of the conterminous United States. Map (scale 1:7,500,000) revised August 2002. *Annals of the Association of American Geographers* 77:(1) 118-125.
- USFWS (U. S. Fish and Wildlife Service). 1995. Ozark Big-Eared Bat (*Corynorhinus townsendii ingens*) Revised Recovery Plan. Tulsa, OK. 50pp.
- Weyandt, S. E., R. A. Van Den Bussche, M. J. Hamilton, and D. M. Leslie, Jr. 2005. Unraveling the effects of sex and dispersal: Ozark big-eared bat (*Corynorhinus townsendii ingens*) conservation genetics. *Journal of Mammalogy* 86:1136-1143.

## **Ozark cavefish (*Amblyopsis rosae*) – T**

### **Life History**

The Ozark cavefish (OCF) is a subterranean freshwater fish that occurs in the Springfield Plateau region of the Ozarks. The range of the species includes portions of northeastern Oklahoma, northwestern Arkansas, and southwestern Missouri (Miller and Robison 2004). Ozark cavefish tend to occur in caves with groundwater recharge and generally are acknowledged to be a groundwater obligate. Ozark cavefish occur in flowing cave streams with chert rubble substrate and pool areas. They also have been found in wells and sinkholes.

Knowledge of OCF life history is limited. The species is believed to have low reproductive capacity and to be slow to reproductive maturity (Robinson and Buchanan 1988). The size and shape of the gill chamber indicate that the species may be a gill chamber brooder. Only about 20 percent of the population is believed to breed in any given year (Poulson 1963). Infrequent reproduction may be an adaptation to a limited food supply in caves.

The OCF primarily feeds on small crustaceans such as copepods, isopods, and amphipods. Ozark cavefish also prey upon small crayfish, oligochaetes (e.g., segmented worms), small salamanders, and salamander larvae (Poulson 1963).

### **Geographic Area of Concern**

The current range of the OCF may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – To avoid incidental take of the OCF, site the facility outside of the species' current known range. If the site location selected is within the OCF's current range, to avoid incidental take develop oil and gas facilities so impacts to caves used by this species would not occur and site the project outside of the recharge area of caves (i.e., the area that contributes water to a cave) used by this species. To ensure take of the OCF will be avoided, implement the following precautionary measures:

1. Contact the Oklahoma ESFO, Oklahoma Department of Wildlife Conservation, and the Oklahoma Natural Heritage Inventory to determine if any documented OCF caves occur on or near the proposed project area. The Oklahoma ESFO also can assist in determining whether the proposed activity would occur within the recharge area of an OCF cave. If oil and gas facilities will be placed within the recharge area of an OCF cave, additional coordination with the Oklahoma ESFO will be necessary to determine whether the activity likely would reach the scale where take of the OCF would be anticipated. This determination will be based on factors including proximity of the proposed project to the cave, and the duration (temporary or permanent), timing, and severity of any likely impacts. The incorporation of appropriate Best Management Practices (BMPs) into the plans of proposed projects that would occur within OCF cave recharge areas, such as those provided in Construction/Commissioning below, may be used to ensure take will be avoided.
2. If OCF caves are not known to occur on the proposed project area, survey the area for undocumented cave openings and sinkholes.
3. Establish a buffer area of 91.4 m (300 feet) around any caves and sinkholes found during the survey (or during any aspect of project implementation). The Service should be contacted for further evaluation to determine if these sites are used by the OCF. If a cave is used by the OCF, we may recommend modifications of the proposed project to allow additional buffer areas to be established in order to avoid impacts to the cave and take of the OCF.

If an OCF cave will be impacted by the proposed project, incidental take is likely. We recommend development of an HCP for anticipated take of the species. Please note that the Service may require the cave to be mapped to determine if any additional openings or passages may be affected by the proposed project.

**Construction/Commissioning** – In the event that new cave openings or sinkholes are encountered or develop during construction activities, no fill materials should be placed into the opening until Service or Service approved personnel have the opportunity to investigate the site thoroughly. If the cave is used by the OCF, we may recommend modifications of the proposed project to allow buffer areas to be established in order to avoid impacts to the cave and take of the OCF. If the cave will be impacted by the proposed project, incidental take is likely. We recommend development of an HCP for anticipated take of the species.

If oil and gas facilities will be placed within the recharge area of an OCF cave, the implementation of appropriate BMPs, such as those provided below, may be used to ensure take will be avoided. However, additional coordination with the Oklahoma ESFO will be necessary to determine whether the selected BMPs would be adequate for the particular project and location.

1. Implement a sediment and erosion control plan during construction such as a) the installation of sediment fencing and straw hay bales to capture sediment, and b) stock piling any excavated material well away from streams and other karst features such as a cave opening so that the material cannot slough back into these areas.
2. Monitor sediment/erosion control measures after precipitation events. Clean, repair, and replace structures as necessary.
3. Monitor sediment/erosion control measures periodically throughout all phases of construction. Clean, repair, and replace structures as necessary.
4. Establish staging areas for the crew, equipment, hazardous materials, chemicals, fuels, lubricating oils, etc., at least 91.4 m (300 feet) away from a stream bank, sinkhole, spring, or cave entrance.
5. Install sediment and erosion controls around staging areas to prevent discharge from these sites.
6. Store construction waste materials, debris, and excess materials 91.4 m (300 feet) from cave openings, sinkholes, and streams.
7. Refuel construction equipment at least 91.4 m (300 feet) from stream banks, sinkholes, springs, and cave entrances.
8. Develop and implement a spill prevention and response plan to contain fuel and other chemicals on-site.
9. Use the horizontal directional drilling method for proposed pipeline crossings of streams and rivers, or co-locate pipelines with existing structures, such as bridges, that span the water body.
10. If the directional drilling method or co-locating pipelines would not be feasible, we recommend that you:
  - a. Conduct stream crossings during a period of low stream flow
  - b. Limit tree trimming and cutting to only what it is necessary
  - c. Limit access of construction equipment within the stream channel to one confined location, preferably over an existing bridge, equipment pads, clean temporary native rock fill, or over a temporary portable bridge
  - d. Limit in-stream equipment to that needed to construct a crossing
  - e. Do not alter or remove natural stream features such as riffles or pools
  - f. Place trench spoil at least 91.4 m (300 feet) away from stream banks
  - g. Use sediment filter devices to prevent flow of spoil off the right-of-way
  - h. De-water the trench, as necessary, to prevent discharge of silt laden water into any stream during construction and backfilling operations
  - i. Return the substrate and contours of the bank and bottom of the channel to pre-project conditions.
11. Maintain natural stream features such as riffles or pools.
12. Keep all machinery out of streams as much as possible.
13. Limit the removal of riparian vegetation to only what is necessary.

14. Replace any woody riparian vegetation unavoidably lost by planting five trees for every tree lost. Only native riparian plants should be used to help prevent the spread of exotics.
15. Leave a wide natural vegetated buffer area around any sinkholes, springs, and cave openings (minimum of 91.4 m; 300 feet), and along any streams (minimum 30.5 m; 100 feet) located on the project site.
16. Re-vegetate all disturbed areas as soon as possible after construction using only native plants to reduce soil erosion. Annual species, such as rye or wheat, may initially be planted along with native species in areas subject to immediate soil loss, such as a steep slope, to provide rapid erosion control. Final re-vegetation should use native species only.
17. Apply fertilizers, herbicides, pesticides, or other chemicals at least 91.4 m (300 feet) away from sinkholes, streams, rivers, springs, and cave openings.
18. Remove and dispose of all debris and excess construction materials properly upon project completion.
19. Evaluate the establishment of vegetation after project completion and inspect all sediment control structures at one month intervals for at least 3 months. Retain sediment control structures until site stabilization is achieved.
20. Remove temporary sediment/erosion control structures upon final site stabilization.

**Operation** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting and Construction/Commissioning above.

**Decommissioning** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting and Construction/Commissioning above.

### **Literature Cited**

- Miller, R. J. and H. W. Robison. 2004. *Fishes of Oklahoma*. University of Oklahoma Press, Norman, Oklahoma. 450 pp.
- Poulson, T. L. 1963. Cave adaptation in Amblyopsid fishes. *American Midland Naturalist* 70:257–290.
- Robinson, H. W., and T. M. Buchanan. 1988. *Fishes of Arkansas*. University of Arkansas Press, Fayetteville.

### **Piping plover (*Charadrius melodus*) - T**

#### **Life History**

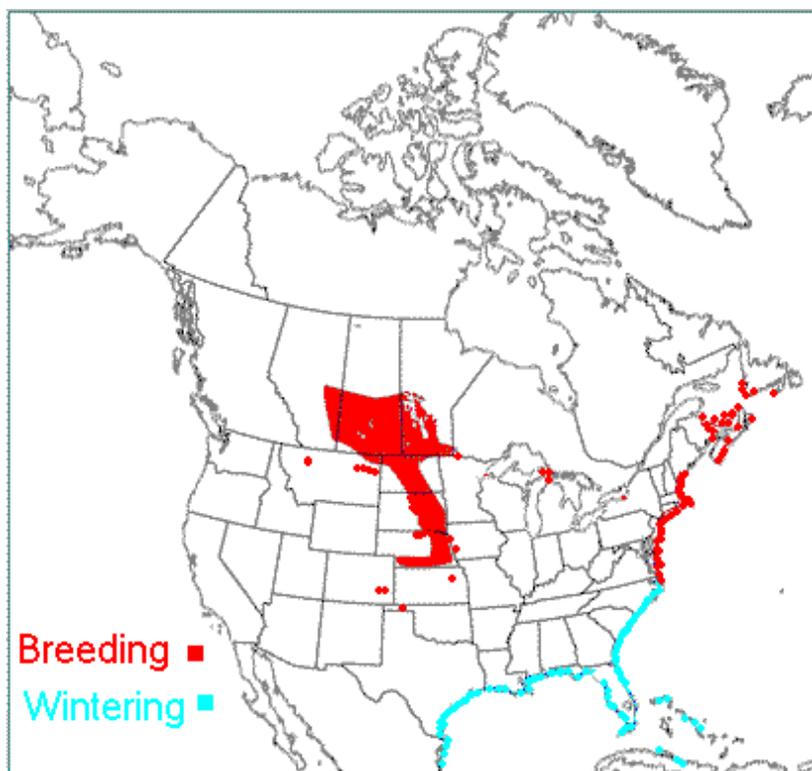
Piping plovers (PPL) are small shorebirds approximately 18 cm (7 inches) long with sand-colored plumage on their backs and crown and white under parts. Breeding birds have a single black breast band, a black bar across the forehead, bright orange legs and bill, and a black tip on the bill. During winter, the birds lose the black bands, the legs fade to pale yellow, and the bill becomes mostly black. Piping plovers in the Northern Great Plains make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars,

and dredged material islands of major river systems. Piping plovers arrive on the breeding grounds during mid-March through mid-May and remain for 3 to 4 months per year. They lay 3 to 4 eggs in shallow scraped depressions lined with light colored pebbles and shell fragments. The eggs are well camouflaged and blend extremely well with their surroundings. Both sexes incubate the eggs which hatch within 30 days, and both sexes feed the young until they can fly, about 30 days after hatching.

Piping plovers begin arriving on the wintering grounds in Texas as early as July with some late nesting birds arriving in September. A few can be found on the wintering grounds throughout the year, but sightings are rare in late May, June, and early July. Knowledge of PPL migration routes, flight altitude, and stopover sites is incomplete. Inland populations appear to migrate nonstop from breeding sites to the Gulf of Mexico. Birds from the Northern Plains are rarely seen at inland stopover locations such as the great Salt Plains National Wildlife Refuge (NWR), OK, and Cheyenne Bottoms NWR, KS (Elliott-Smith and Haig 2004). Spring migration patterns appear to be similar with few inland breeders stopping on the flight north. In late February, PPLs begin leaving the wintering grounds to migrate north to breeding sites. Northward migration peaks in late March, and by late May most birds have left the wintering grounds.

### **Geographic Area of Concern**

The Service has designated certain habitats in Minnesota, Montana, North Dakota, South Dakota, and Nebraska as critical habitat for the Northern Great Plains population of the PPL. This designation included 74,286 hectares (183,422 acres) of habitat and 1942.9 river kilometers (1,207.5 river miles). Designated areas of critical habitat include prairie alkali wetlands and surrounding shoreline; river channels and associated sandbars and islands; and reservoirs and inland lakes and their sparsely vegetated shorelines, peninsulas, and islands. These areas provide primary courtship, nesting, foraging, sheltering, brood-rearing and dispersal habitat for PPLs. For a specific, detailed description of the areas designated as critical habitat, please go to the *Federal Register* notice at: <http://www.fws.gov/mountain-prairie/species/birds/pipingplover/fedreg091102.htm>, page 57649 (67 FR 57649).



**Prospecting** – The PPL is a wide-ranging species and could migrate through, and potentially nest in Oklahoma.

- Within Oklahoma, near the Arkansas, Cimarron, Canadian, and Red Rivers (within one-mile of the mainstems only and all reservoirs or emergent (not forested) wetlands larger than 10 acres in size.
  - Mark new lines that cross or are within 1.6 kilometers (1.0 mile) of potentially suitable habitat (i.e., foraging, stop-over or roosting habitat, primarily large rivers and wetlands) and if possible, an equal amount of existing lines according to the Service recommendations described in APLIC 2012. Consult the Service to determine the most appropriate existing lines to mark.

**Siting/Development** – see **Prospecting** above. Any power lines that would cross large rivers or reservoirs should be buried underground or overhead lines should be marked to avoid potential collisions by PPLs and other migratory birds.

**Construction/Commissioning** – see **Prospecting** above.

**Operation** – see **Prospecting** above.

**Decommissioning** – Restore the affected habitat to pre-construction condition.

## Literature Cited

Elliott-Smith, C., and Haig S.M. 1=20045. Piping Plover (*Charadrius melodusi*) The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/scpies/002>.

## **Rabbitsfoot (*Quadrula cylindrica cylindrica*) - T**

### **Life History**

The rabbitsfoot (RF) is an elongated freshwater mussel that inhabits rocky substrates of medium-sized to large streams. This generally uncommon species depends on high water quality and has been adversely affected by dams, channelization, pollution, and sedimentation within its historic range (USFWS 2012). The life cycle of the RF, like that of most freshwater mussels, is unusual and complex. Its eggs develop into microscopic larvae (glochidia) within the gills of the female. The female discharges its glochidia into the river where they must attach to gills or fins of a fish to continue developing. Each mussel species has specific fish species (host fish) that are needed for development of that species' glochidia; the known fish hosts for the rabbitsfoot include several shiner species. Glochidia continue growing on the host fish and transform into juveniles. After a few weeks, they drop off, settle into the river bottom, and continue maturing. After early development, mussels feed by filtering algae, bacteria, other microorganisms, and detritus from their surroundings.

### **Geographic Area of Concern**

Historically, the RF occurred widely across midwestern and southern states. It remains widely distributed, but has experienced extensive declines in distribution and abundance. Within the Oklahoma, the only known, current habitat for the RF exists in the Little, Verdigris, and Illinois rivers in eastern Oklahoma (Galbraith *et al.* 2008, Service 2012). The current range of the RF may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

Proposed critical habitat for the RF in Oklahoma includes the Verdigris River from Oologah Lake dam downstream to Interstate Highway 44, and the Little River from the confluence with the Glover River downstream to the Oklahoma-Arkansas state line (USFWS 2012). These proposed critical habitat areas appear to support the environmental constituent elements necessary for reproduction and growth, and will be essential for the species' recovery. For more information on designated critical habitat, go to <http://criticalhabitat.fws.gov>

**Prospecting and Siting/Development** – The most effective means of avoiding effects to the RF is to site oil and gas projects outside of the species' current known range, as obtained from IPaC. If an oil and gas project must be located within the RF's current range, site it in an upland area away from stream channel. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so that it does not flow over land into the Illinois, Little, or Verdigris rivers, including their tributaries and drainage ways. Effects that could result in take must be avoided. Examples of such effects include water withdrawals, other

modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that requires in-channel work. If such effects cannot be avoided, incidental take is likely and if the species is listed in the future, development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas facilities will be placed within the RF's known range (obtained from IPaC), where effects to the Illinois, Little, or Verdigris rivers are possible, the following measures are recommended to avoid take of the RF. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to riparian areas. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work would impact apparent mussel concentrations (beds). When placement of pipelines across streams is necessary, directionally bore the stream crossing or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could produce adverse impacts to the RF. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the RF's known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential RF habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within the RF's known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of the RF, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact the RF directly or indirectly by altering stream habitats or the food resources utilized by the RF. Mowing or hand clearing of existing rights-of-way is permissible, provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions outlined above to prevent degradation of streams located within the RF’s known range. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### **Literature Cited**

Galbraith, H.S., D.E. Spooner, and C.C. Vaughn. 2008. Status of rare and endangered freshwater mussels in southeastern Oklahoma. *Southwestern Naturalist* 53(1):45-50.

USFWS (U.S. Fish and Wildlife Service). 2012. Endangered and threatened wildlife and plants; proposed endangered status for the Neosho mucket, threatened status for the rabbitsfoot, and designation of critical habitat for both species; proposed rule. *Federal Register* 77(200):63440-63536.

## **Red-cockaded woodpecker (*Picoides borealis*) - E**

### **Life History**

The red-cockaded woodpecker (RCW) prefers mature, park-like pine forests with an open understory for nesting and foraging. Dense pine stands and mixed stands with thick mid-stories and understories are unsuitable habitat. This is the only species of woodpecker known to excavate cavities in live pine trees. Cavities are usually excavated in 60-80 year old loblolly, shortleaf, and longleaf pines. Red-cockaded woodpecker cavity trees exude large amounts of resin which surrounds the cavity. The resin appears white to yellowish, usually encircling the tree around and below the cavity. These birds are endemic to east Texas, but in Oklahoma are restricted to the far southeast corner of the state at the McCurtain County Wilderness Area. Red-cockaded woodpeckers are found in specific habitat as previously described within east Texas and extreme southeast Oklahoma usually living in cooperative breeding groups comprised of a breeding pair and helpers.

### **Geographic Area of Concern**

The counties of occurrence may be obtained from the Service’s Southwest Region website at: <http://www.fws.gov/southwest/es/EndangeredSpecies>.

**Prospecting and Siting/Development** - The most effective means of avoiding effects to the RCW is to site oil and gas projects outside of the species’ current known range, as obtained from IPaC. If an oil and gas project must be located within the RWC’s current range, the following measures are recommended to avoid impacts to the species:

1. Avoid removing any red-cockaded woodpecker cavity tree, through cutting, bulldozing, or any other activity.
2. Avoid damaging an active cavity tree which results in the death of that tree. Damage includes, but is not limited to, injury to the bole or root system (generally due to heavy equipment use), exposure to herbicides, and fire scorch to the crown due to inadequate protective measures during prescribed burning. Pines are best protected from damage by intense fires through frequent low-intensity prescribed burns (see 8K).
3. Roads and rights-of-way should not be constructed near a known RCW cluster. Use of existing roads, improved or unimproved, generally does not adversely affect red-cockaded woodpeckers.
4. Construction equipment and associated materials should not be stored within 61 m (200 ft) of cavity trees. Landscaping within clusters should be accomplished with hand tools or lightweight power equipment rather than tractor mounted equipment.

**Construction/Commissioning** - Conditions under which incidental take is likely to occur are similar to those stated in Prospecting and Siting/Development above.

**Operation/Maintenance** - Conditions under which incidental take is likely to occur are similar to those stated in Prospecting and Siting/Development above.

**Decommissioning** - Conditions under which incidental take is likely to occur are similar to those stated in Prospecting and Siting/Development above.

### **Scaleshell mussel (*Leptodea leptodon*) – E**

#### **Life History**

The scaleshell mussel (SM) is an elongate, thin-shelled mussel that occurs in certain medium- to large-sized rivers. This generally rare species depends on high water quality and has been adversely affected by dams, pollution, sedimentation, and exotic species within its historic range (USFWS 2010, USFWS 2011). The life cycle of the SM, like that of most freshwater mussels, is unusual and complex. Its eggs develop into microscopic larvae (glochidia) within the gills of the female. The female discharges its glochidia into the river where they must attach to gills or fins of a fish to continue developing. Each mussel species has specific fish species (host fish) that are needed for development of that species' glochidia; the freshwater drum is the only known fish host for the SM. Glochidia continue growing on the host fish and transform into juveniles. After a few weeks, they drop off, settle into the river bottom, and continue maturing. After early development, mussels feed by filtering algae, bacteria, other microorganisms, and detritus from their surroundings.

#### **Geographic Area of Concern**

Historically, the SM occurred widely across the Midwest, but now is limited to a few scattered populations within the Mississippi River basin in Arkansas, Missouri, and Oklahoma. A single

“fresh-dead” shell of the species was found recently at a site on the Missouri River in Nebraska; however, no live individuals have been found there yet. Within Oklahoma, the only known habitat for the SM exists in the Kiamichi and Little rivers in southeast Oklahoma (USFWS 2010, Galbraith *et al.* 2008). The current range of the SM may be obtained from the Service’s IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – The most effective means of avoiding effects to the SM is to site oil and gas projects outside of the species’ current known range, as obtained from IPaC. If an oil and gas project must be located within the SM’s current range, site it in an upland area away from stream channels. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so it does not flow over land into the Kiamichi or Little rivers, including their tributaries and drainage ways. Effects that could result in take must be avoided. Examples of such effects include water withdrawals, other modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that requires in-channel work. If such effects cannot be avoided, incidental take is likely and development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas facilities will be placed within the SM’s known range (obtained from IPaC), where effects to either the Kiamichi or Little rivers are possible, the following measures are recommended to avoid take of the SM. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to riparian areas. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work would impact apparent mussel concentrations (beds). When placement of pipelines across streams is necessary, directionally bore the stream crossing or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could produce adverse impacts to the SM. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the SM’s known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential SM habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation.

Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within the SM's known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of the SM, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact the SM directly or indirectly by altering stream habitats or the food resources utilized by the SM. Mowing or hand clearing of existing rights-of-way is permissible, provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction condition, using precautions outlined above to prevent degradation of streams located within the SM's known range. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### **Literature Cited**

Galbraith, H.S., D.E. Spooner, and C.C. Vaughn. 2008. Status of rare and endangered freshwater mussels in southeastern Oklahoma. *Southwestern Naturalist* 53(1):45-50.

USFWS (U.S. Fish and Wildlife Service). 2010. Scaleshell mussel recovery plan (*Leptodea leptodon*). USFWS, Fort Snelling, Minnesota. 130 p.

USFWS (U.S. Fish and Wildlife Service). 2011. Scaleshell mussel (*Leptodea leptodon*) 5-year review: summary and evaluation. USFWS, Columbia, Missouri. 19 p.

## **Whooping crane (*Grus americana*) - E**

### **Life History**

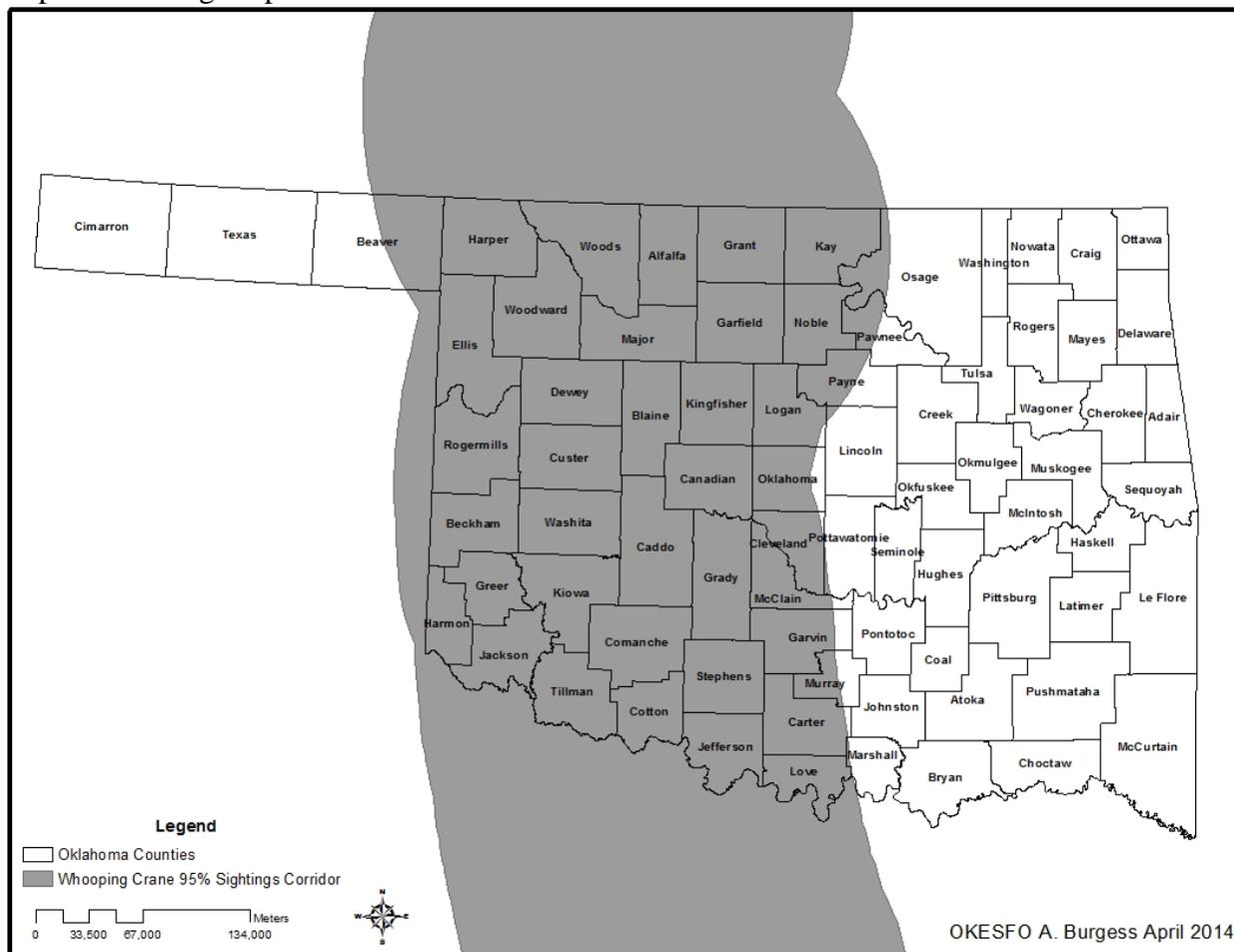
The whooping crane (WC) is a large, mostly white crane. The whooping crane is a bi-annual migrant, traveling between its summer habitat in central Canada, and its wintering grounds on the Texas coast, across the U.S. Great Plains. Autumn migration normally begins in mid-September, with most birds arriving on the Texas wintering grounds between late October and mid-November. Spring migration departure dates are normally between late March and mid-April, with the last birds usually leaving by May 1. Whooping cranes migrate south as singles, pairs, in family groups, or as small flocks of 3 to 5 birds. They are diurnal migrants and stop daily to feed and rest. Whooping cranes eat a variety of things, including insects, frogs, small

birds, rodents, minnows, and waste grains (CWS and USFWS 2007).

### Geographic Area of Concern

Whooping cranes pass through western Oklahoma each spring and fall during migration. During migration, whooping cranes sometimes are sighted elsewhere in Oklahoma along rivers, in grain fields, or in shallow wetlands. Whooping cranes primarily use shallow, seasonally and semi permanently flooded palustrine wetlands and various cropland and emergent wetlands.

The range of the WC may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.



### Prospecting –

- a) We recommend the following conservation measures be implemented within the 95% sighting corridor:
  - i. Mark new lines within 1 mile of important stop-over or roosting habitat (defined below) according to the Service recommendations described in APLIC updated guidance document Reducing Avian Collisions with Power Lines: State of the Art in 2012 available at [www.aplic.org](http://www.aplic.org).
  - ii. Avoid or bury new lines within 200 yards of important stop-over or roosting habitat. Important stop-over or roosting habitat within Oklahoma and 95% sighting corridor

includes the Cimarron, Red, Washita, South Canadian, and Arkansas Rivers, and all reservoirs or emergent (not forested) wetlands larger than 10 acres in size. Lines in forested or wooded habitat can be marked and not buried if the height of the line is equal to or lower than the nearby trees.

The Service considers these measures appropriate to avoid take or reduce the risks of take to insignificant or discountable levels.

**Siting/Development** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

**Construction/Commissioning** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

**Operation** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

**Decommissioning** – Conditions under which incidental take is likely to occur are similar to those stated in Prospecting above.

### **Literature Cited**

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. International recovery plan for the whooping crane. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.

## **Winged mapleleaf (*Quadrula fragosa*) - E**

### **Life History**

The winged mapleleaf (WM) is a freshwater mussel that inhabits rocky stream bottoms of certain medium-sized to large rivers. This rare species depends on high water quality and has been adversely affected by dams, pollution, and sedimentation within its historic range (USFWS 1997, 2009). The life cycle of the winged mapleleaf, like that of most freshwater mussels, is unusual and complex. Its eggs develop into microscopic larvae (glochidia) within the gills of the female. The female discharges its glochidia into the river where they must attach to gills or fins of a fish to continue developing. Each mussel species has specific fish species (host fish) that are needed for development of that species' glochidia; channel and blue catfish are the only known fish hosts for the winged mapleleaf. Glochidia continue growing on the host fish and transform into juveniles. After a few weeks, they drop off, settle into the river bottom, and continue maturing. After early development, mussels feed by filtering algae, bacteria, other microorganisms, and detritus from their surroundings.

### **Geographic Area of Concern**

Historically, the WM appears to have occurred widely across the Midwest, but now is limited to a few scattered populations within the Mississippi River basin in Minnesota, Wisconsin,

Arkansas, Missouri, and Oklahoma. Within Oklahoma, the only known, current habitat for the WM exists in the Little River in southeast Oklahoma (Galbraith *et al.* 2008). The current range of the WM may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – The most effective means of avoiding effects to the WM is to site oil and gas projects outside of the species' current known range, as obtained from IPaC. If an oil and gas project must be located within the WM's current range, site it in an upland area away from stream channels. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so it does not flow over land into the Little River, including its tributaries and drainage ways. Effects that could result in take must be avoided. Examples of such effects include water withdrawals, other modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that requires in-channel work. If such effects cannot be avoided, incidental take is likely and development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas facilities will be placed within the WM's known range (obtained from IPaC), where effects to the Little River are possible, the following measures are recommended to avoid take of the WM. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to riparian areas. Hazardous substances such as fuel, lubricants, and other chemicals cannot be stored within 30.5 m (100 feet) of a stream bank and should be contained in a manner that does not allow stored material to enter waterbodies. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing river crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new river crossing is necessary, construct a span structure with no in-channel work, particularly if such work would impact apparent mussel concentrations (beds). When placement of pipelines across streams is necessary, directionally bore the stream crossing or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could produce adverse impacts to the WM. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the WM's known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential WM habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation.

Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within the WM's known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of the WM, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact the WM directly or indirectly by altering stream habitats or the food resources utilized by the WM. Mowing or hand clearing of existing rights-of-way is permissible, provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions outlined above to prevent degradation of streams located within the WM's known range. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore riparian and stream habitats, even if degradation has been caused by factors other than oil and gas activities. For example, creation of livestock watering sources in upland settings or fencing of the riparian zone (where upland watering sites already exist) can help eliminate an established source of degradation. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### Literature Cited

Galbraith, H.S., D.E. Spooner, and C.C. Vaughn. 2008. Status of rare and endangered freshwater mussels in southeastern Oklahoma. *Southwestern Naturalist* 53(1):45-50.

## PROPOSED (PE/PT) AND CANDIDATE (C) SPECIES

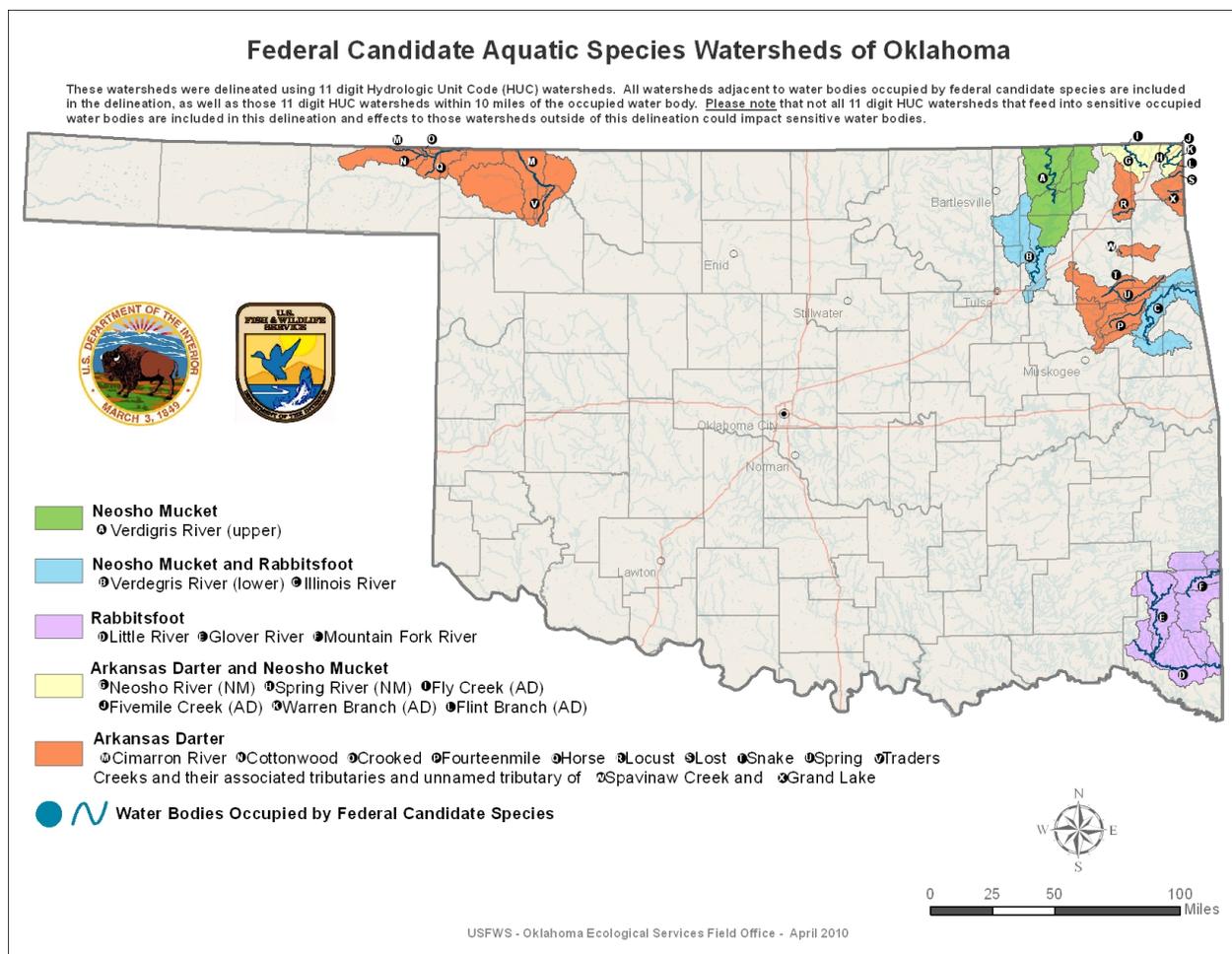
### Arkansas darter (*Etheostoma cragini*) - C

#### Life History

The Arkansas Darter (AD) is a small percid fish endemic to the Arkansas River basin of Colorado, Kansas, Oklahoma, Missouri, and Arkansas. It typically occurs in small tributary streams in the vicinity of springs or groundwater seeps. Preferred habitat is usually found in pools or near-shore areas with low (but not zero) flows. The AD is usually associated with broad-leaved aquatic vegetation. Primary food for this species is aquatic insects and other arthropods. The best current populations are believed to exist in Kansas, Oklahoma, and Missouri.

#### Geographic Area of Concern

The AD occurs widely across the Arkansas River basin between southeastern Colorado and the Illinois River in Arkansas (Krieger et al. 2001, Service 2011). Known habitat for the AD exists in the Cimarron, Neosho, and Spring rivers and tributaries of these rivers across northern Oklahoma. The current range of the AD may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.



**Prospecting and Siting/Development** – The most effective means of avoiding effects to the AD is to site oil and gas projects outside of the species’ current known range, as obtained from IPaC. If an oil and gas project must be located within the AD’s current range, site it in an upland area away from stream channels. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so that it does not flow over land into streams, springs, wetlands, or drainage ways. Effects that could result in take must be avoided. Examples of such effects include water withdrawals, other modifications to hydrology (e.g., increased or decreased runoff due to topographic grade changes), altered channel configurations and alignment (e.g., in riffle-pool-run sequence), altered substrate characteristics (e.g., composition, stability, permeability), increased sedimentation, chemical releases (e.g., fuel spills or herbicides), other water quality degradation, riparian area disturbance, construction or use of low-water crossings, and new bridge construction that requires in-channel work. If such effects cannot be avoided, incidental take is likely and if the species is listed in the future, development of a separate HCP for this species should be considered.

**Construction/Commissioning** – If oil and gas facilities will be placed within the AD’s known range (obtained from IPaC), where effects to surface waters are possible, the following measures

are recommended to avoid take of the AD. Install and maintain adequate erosion control measures to minimize movement of sediment into streams. Avoid impacts to springs, riparian areas and wetlands. On-site hazardous substances such as fuel, lubricants, and other chemicals should be contained in a manner that does not allow stored material to enter waterbodies. Hazardous materials cannot be stored within 30.5 m (100 feet) of a stream bank. Refueling should not occur in areas where accidental spills could enter subject waterbodies. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Utilize existing stream crossings and do not construct new stream crossings, including any temporary placement of low-water crossings. If a new stream crossing is necessary, construct as a span structure with no in-channel work, particularly if such work would impact springs, spring runs, or wetlands. When placement of pipelines across streams is necessary, directionally bore the stream crossing or co-locate pipelines with bridges or similar existing structures that span the stream. Trenching for pipeline placement would impact channel configuration, increase sedimentation, likely require some dewatering of the stream channel, and cause other effects that could produce adverse impacts to the AD. Any gravel or water (e.g., water withdrawals) needed during construction of the project should not be obtained from streams within the AD's known range. Placement of riprap and similar erosion control measures below the mean high water line would alter the stream channel and impact potential AD habitat. Following construction, all bare soil should be revegetated as soon as feasible, using native plants whenever possible.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact water quality within the AD's known range (obtained from IPaC). A spill prevention and response plan should be developed that includes frequent inspection of ongoing operations and contingencies for rescue of the AD, as necessary, subject to approval by the Service. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Application of pesticides and herbicides should not occur within the riparian zone to ensure that such chemicals do not reach adjacent waterbodies. These chemicals can impact the AD directly or indirectly by altering stream habitats or the food resources utilized by the AD. Mowing or hand clearing of existing rights-of-way is permissible, provided stability of stream banks is not compromised.

**Decommissioning** – Restore the affected habitat to pre-construction condition, using precautions outlined above to prevent degradation of streams located within the AD's known range. Measures to restore riparian habitat and stabilize stream banks can be beneficial as mitigation. In areas where the riparian zone has been degraded by heavy livestock use, creating watering sources in upland settings may help reduce livestock use in streamside areas. If suitable upland watering sites are available, fencing of the riparian zone also may help reduce or eliminate degradation by livestock in that zone.

## Literature Cited

Krieger, D., T. Nessler, C. Bennett, G. Dowler, and J. Melby. 2001. Arkansas darter (*Etheostoma cragini*) recovery plan. Colorado Division of Wildlife. 23 p.

USFWS (U.S. Fish and Wildlife Service). 2011. U.S. Fish and Wildlife Service species assessment and listing priority assignment form. *Etheostoma cragini*, Arkansas darter. USFWS. Available at [http://ecos.fws.gov/docs/candidate/assessments/2012/r6/E06H\\_V01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2012/r6/E06H_V01.pdf)

## **Northern long-eared bat (*Myotis septentrionalis*; NLEB) - PE**

The NLEB was proposed for federal listing under the ESA on October 2, 2013. While the ESA prohibits take of federally-listed species, proposed species such as the NLEB are not afforded this protection. However, ESA take prohibitions become effective 30 days after publishing a final listing rule. The Service anticipates that a final listing rule, if warranted, will be published by October 2014. We recommend that all project proponents implement measures to avoid and minimize impacts to the NLEB, whether proposed or listed. For projects that would be ongoing after the final listing rule, we recommend that project proponents coordinate with the Service now to ensure that potential project delays could be avoided as much as possible.

The Service recently developed the Northern Long-Eared Bat Interim Conference and Planning Guidance document to address immediate information needs for the NLEB should it be listed: <http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>. This document provides the most recent information on the species. It is important to note that, due to the preliminary nature of the state of knowledge of the NLEB, the approaches and information contained within this guidance and appendices may change as we gain additional information on the NLEB and its habitat.

### **Life History**

The northern long-eared bat (NLEB) is a migratory bat that spends the spring, summer, and fall in wooded areas and hibernates in cool caves and mines in winter. While the NLEB is not considered a long distance migratory species, short migratory movements between summer roost and winter hibernacula covering between to 56 km (34.8 mi) and 88.5 km (55 mi) have been documented (Nagorsen and Brigham 1993; Griffith 1945). However, movements from hibernacula to summer colonies may range from 8 to 270 km (5 to 168 mi) (Griffin 1945).

Suitable summer habitat for NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel. Habitat during the summer may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live, dying trees and/or snags  $\geq 3$  inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1000 feet of other forested/wooded habitat.

NLEB has also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat.

NLEBs hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources. In general, NLEBs arrive at hibernation sites (hibernacula) in August or September, enter hibernation in October and November, and leave the hibernacula in March or April (Caire et al. 1979; Whitaker and Hamilton 1998; Amelon and Burhans 2006). Suitable (hibernacula) for the NLEB includes underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). These hibernacula typically have large passages with significant cracks and crevices for roosting; relatively constant, cool temperatures (0-9 degrees Celsius) and with high humidity and minimal air currents.

Although usually found in small numbers, the species typically inhabits the same hibernacula with large numbers of other bat species, and occasionally are found in clusters with these other bat species. NLEBs often move between hibernacula throughout the winter. (Griffin 1940; Whitaker and Rissler 1992; Caceres and Barclay).

The NLEB has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Nagorsen and Brigham 1993; Brack and Whitaker 2001; Griffith and Gates 1985). Emerging at dusk, most hunting occurs above the understory, 1 to 3 m (3.3 to 9.8 ft) above the ground, but under the canopy (Nagorsen and Brigham 1993) on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001; LaVal et al. 1977). Occasional foraging also takes place over forest clearings and water, and along roads (Van Zyl de Jong 1985).

#### **Geographic Area of Concern**

The current range of the NLEB in Oklahoma may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** - The Service recommends following the Northern Long-Eared Bat Interim Conference and Planning Guidance document:

*<http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>*

Appendix F provides specific guidance for non-federal landowners and project proponents during the proposed listing of the NLEB. Appendix B of this document provides NLEB Interim Presence/Absence Survey Guidance for 2014. We recommend following this guidance to determine presence or probable absence of the NLEB within the proposed project area. Please also see Appendix C for guidance on delineating a NLEB Home Range ("Known Habitat").

If it is determined that the NLEB may be present in the proposed project area, the Service recommends following conservation/avoidance measures for the NLEB provided in Appendix D (that are applicable to the specific project). Please note that if the species becomes federally-listed and impacts to the species cannot be avoided, a Habitat Conservation Plan (HCP) for the proposed project would need to be developed.

**Construction/Commissioning** - In the event that new cave openings or sinkholes are encountered or develop during construction activities, no fill materials should be placed into the opening until Service or Service approved personnel have the opportunity to investigate the site thoroughly. If the cave is used by the NLEB, we may recommend modifications of the proposed project to allow buffer areas to be established in order to avoid impacts to the cave and take of the NLEB. If the cave will be impacted by the proposed project, incidental take may be likely, for which an HCP would be needed. Additional conditions under which impacts may occur are similar to those stated in Prospecting above.

**Operation** – Conditions under which impacts may occur are similar to those stated in Prospecting and Construction/Commissioning above.

**Decommissioning** - Conditions under which impacts may occur are similar to those stated in Prospecting and Construction/Commissioning above.

### Literature Cited

Amelon, S., and D. Burhans. 2006. Conservation Assessment: *Myotis septentrionalis* (Northern long-eared bat) in the Eastern United States. In USDA Forest Service General Technical Report NC-260

Brack Jr., V. and J. O. Whitaker Jr. 2001. Foods of the northern myotis, *Myotis septentrionalis*, from Missouri and Indiana, with notes on foraging. *Acta Chirop.* 3:203–21

Caceres, M.C., and R.M.R. Barclay. 2000. *Myotis septentrionalis*. Mammalian Species 634. American Society of Mammalogists. 4 pp.

CAIRE, W., R. K. LAVAL, M. L. LAVAL, AND R. CLAWSON. 1979. Notes on the ecology of *Myotis keenii* (Chiroptera, Vespertilionidae) in eastern Missouri. *The American Midland Naturalist*, 102:404–407.

Griffin, D.R. 1940. Notes on the life-histories of New England cave bats. *Journal of Mammology* 21:181-187.

Griffin, D. R. 1945. Travels of banded cave bats. *Journal of Mammalogy* 26(1): 15-23.

Laval, R. K., R. L. Clawson, . L. Laval, A Nd W. Caire. 1977. Foraging behavior and nocturnal activity patterns of Missouri bats, with emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis*. *J. Mamm.*, 58:592-599

Nagorsen, D.W., and R.M. Brigham. 1993. *Bats of British Columbia: Royal British Columbia museum handbook*. University of British Columbia Press, Vancouver, Canada.

U.S. Fish and Wildlife Service. 2014. Recovery Outline for the Northern Long-Eared Bat. <http://www.fws.gov/midwest/angered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>

Van Zyll de Jong, C. G. 1985. Handbook of Canadian mammals. National Museums of Canada, Ottawa, Canada. pp. 116-120.

Whitaker, J.O., Jr., and L.J., Rissler. 1992. Seasonal activity of bats at Copperhead Cave. Proceedings of the Indiana Academy of Science 101:127-135.

Whitaker, J.O., Jr., and W.J. Hamilton, Jr. 1998. Mammals of the Eastern United States. Cornell University Press, Ithica, NY.

## **Rattlesnake-master borer moth (*Papaipema eryngii*) - C**

### **Life History**

The rattlesnake-master borer moth (RMBM) is a rare owlet moth (family Noctuidae) closely associated with the rattlesnake-master (*Eryngium yuccifolium*), a perennial forb that is the only food plant used by the moth's larvae. The RMBM occurs in prairies and woodland openings that contain the rattlesnake-master and are relatively undisturbed (Schweitzer et al. 2011, USFWS 2013). Larvae emerge from duff materials between mid-May and early June and climb the host plant where they begin feeding on leaves (LaGesse et al. 2009). Second instars bore into and through stems of the plant, eventually reaching the roots, where they pupate in mid- to late August. Adults emerge from mid-September to mid-October and remain active until late October or whenever the weather becomes too cold. They are active nocturnally. Females drop their eggs near the food plant, usually in mid-October. The species is univoltine (produces one brood of eggs per year). RMBMs are thought to move little from their host plant; however, if the number of host plants is limiting, they may disperse up to 3.2 km (2 miles) (LaGesse et al. 2009).

The RMBM is threatened by factors that eliminate or degrade native prairies, including land conversion to developed uses; broad, frequent, or poorly-timed fires; overgrazing; succession to woody vegetation; invasive species encroachment; flooding; and herbicide application (Panzer 2003, LaGesse et al. 2009, USFWS 2013). The species also has been impacted at certain sites by recreational collecting, and such activity remains a possible threat (USFWS 2013). Habitat loss and fragmentation have left most populations small and isolated. This, along with other factors (e.g., short life span, high host specificity, low mobility, and climate change) make remaining populations very vulnerable to ongoing threats.

### **Geographic Area of Concern**

Despite the rattlesnake-master occurring widely throughout eastern and central states, the RMBM is known to persist in only 5 states, including Oklahoma. Within Oklahoma, the host plant is recorded from at least 20 eastern counties (USDA 2014), but the RMBM is currently known only from Osage County, and specifically The Nature Conservancy's Tallgrass Prairie Preserve. Given limited historical and recent surveying for the moth, and the wider range of the

food plant, the RMBM may occur undetected in other portions of Osage County, as well as other Oklahoma counties. The current range of the RMBM may be obtained from the Service's IPaC website at: <http://ecos.fws.gov/ipac>.

**Prospecting and Siting/Development** – The most effective means of avoiding effects to the RMBM is to site oil and gas projects outside of the species' current known range, as obtained from IPaC. If an oil and gas project must be located within the RMBM's current range, site it in an area away from high quality prairie habitat. Co-locate projects in areas where previous disturbance exists, and use existing roads and bridges for access. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Contain all surface runoff from construction areas so it does not flow offsite into adjacent high quality prairie areas.

If all or portions of an oil and gas project will affect high quality prairie habitat within the range of the RMBM, survey such habitat for the presence of the rattlesnake-master (*Eryngium yuccifolium*), also known as the button eryngo. Rattlesnake-master generally blooms between June and September, but can be recognized by vegetative characteristics outside of the blooming period. The plant occurs naturally at low densities, often attaining a relative frequency of less than 1 percent, even on high quality sites (Danderson and Molano-Flores 2010). Prairie areas within the range, which contain any rattlesnake-master, indicate potential habitat for the RMBM, and must not be used as sites for oil and gas development.

Oil and gas operators may wish to consider the potential presence of the RMBM in other Oklahoma counties where the rattlesnake master is known to occur (USDA 2014). At present, there are 19 such counties: Atoka, Bryan, Cherokee, Choctaw, Coal, Craig, Johnston, Latimer, Logan, Marshall, McCurtain, Murray, Muskogee, Ottawa, Pittsburg, Pontotoc, Pushmataha, Sequoyah, and Tulsa. If all or portions of an oil and gas project will affect high quality prairie habitat in one or more of these counties, operators may choose to survey such habitat for the presence of the rattlesnake-master. Prairie areas that contain rattlesnake-master may offer potential habitat for the RMBM, and could be protected from oil and gas development on a voluntary basis. If new data add any counties to the known current range of the RMBM, habitat protection in such counties will become required.

**Construction/Commissioning** – If oil and gas facilities will be placed within the RMBM's known range (obtained from IPaC), where effects to high quality prairie habitat are possible, the following measures are recommended to avoid impacts to the RMBM. Identify all stands of the rattlesnake master and maintain a minimum buffer of 30.5 m (100 feet) around such stands. Exclude all oil and gas development from such buffers and stand locations. Do not apply insecticides or herbicides. Install and maintain adequate erosion control measures to minimize movement of sediment off of development sites into buffers and stand locations. On-site hazardous substances such as fuel, lubricants, and other chemicals must be contained in a manner that does not allow stored material to enter buffer areas or stand locations. Develop and implement a spill prevention and rapid response plan to ensure that fuel and other chemicals are contained on-site. Following construction, all bare soil must be revegetated as soon as feasible, using native plants whenever possible.

If burning of a high quality prairie area is desired, burn no more than 25% of the area in any single year, and follow with a year of no burning. Burn in late summer only. If mowing of the high quality prairie area is desired, mow between November 1 and April 15.

**Operation/Maintenance** – If all appropriate measures previously stated under the development and construction phases have been implemented, monitoring of the project during operation is recommended to ensure that such measures remain effective during project operation. Monitoring is particularly important to ensure that surface runoff and chemical spills do not adversely impact stands of rattlesnake master and surrounding buffers.

**Decommissioning** – Restore the affected habitat to pre-construction conditions, using precautions outlined above to prevent degradation of protected stands and surrounding buffers. Project participants may wish to consider that decommissioning actions can offer effective opportunities to restore prairie habitats, even if degradation has been caused by factors other than oil and gas activities. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

### Literature Cited

Danderson, C.A. and B. Molano-Flores. 2010. Effects of herbivory and inflorescence size on insect visitation to *Eryngium yuccifolium* (Apiaceae) a prairie plant. Amer. Midl. Nat. 163(1):234-246.

LaGessee, V.L., T.L. Esker, and J.W. Walk. 2009. 2009 monitoring of *Papaipema eryngii*, the rattlesnake master borer moth at Prairie Ridge State Natural Area and Twelve Mile Prairie. Survey report to Illinois Department of Natural Resources, Springfield, IL. 23 p.

Panzer, R.J. 2003. Importance of in situ survival, recolonization, and habitat gaps in the postfire recovery of fire-sensitive prairie insect species. Natural Areas Journal 23(1):14-23.

Schweitzer, D.F., M.C. Minno, and D.L. Wagner. 2011. Rare, declining, and poorly known butterflies and moths (Lepidoptera) of forests and woodlands in the eastern United States. U.S. Forest Service Technology Enterprise Team, Morgantown, WV, FHTET-2011-1. vi, 517 p.

USDA (U.S. Department of Agriculture). 2014. Plant profile for *Eryngium yuccifolium* Michx., button eryngo [Internet]. PLANTS Database, USDA, Natural Resources Conservation Service, Washington, DC [cited 2014 Feb 28]. Available from: <http://plants.usda.gov/core/profile?symbol=ERYU>

USFWS (U.S. Fish and Wildlife Service). 2013. Endangered and threatened wildlife and plants; 12-month finding on a petition to list the rattlesnake-master borer moth (*Papaipema eryngii*) as an endangered or threatened species. Federal Register 78(157):49422-49440.

## **Rufa red knot (*Calidris canutus rufa*) - PT**

### **Life History**

The red knot is a migratory shorebird that breeds in the Canadian Arctic and winters in parts of the United States, the Caribbean, and South America. Wintering areas for the red knot include the Atlantic coasts of Argentina and Chile (particularly the island of Tierra del Fuego that spans both countries), the north coast of Brazil (particularly in the State of Maranhão), the Northwest Gulf of Mexico (discussed below) from the Mexican State of Tamaulipas through Texas (particularly at Laguna Madre) to Louisiana, and the Southeast United States from Florida (particularly the central Gulf coast) to North Carolina. Smaller numbers of knots winter in the Caribbean, and along the central Gulf coast (Alabama, Mississippi), the mid-Atlantic, and the Northeast United States.

Major spring stopover areas along the Atlantic coast include Río Gallegos, Península Valdés, and San Antonio Oeste (Patagonia, Argentina); Lagoa do Peixe (eastern Brazil, State of Rio Grande do Sul); Maranhão (northern Brazil); the Virginia barrier islands (United States); and Delaware Bay (Delaware and New Jersey, United States). Important fall stopover sites include southwest Hudson Bay (including the Nelson River delta), James Bay, the north shore of the St. Lawrence River, the Mingan Archipelago, and the Bay of Fundy in Canada; the coasts of Massachusetts and New Jersey and the mouth of the Altamaha River in Georgia, United States; the Caribbean (especially Puerto Rico and the Lesser Antilles); and the northern coast of South America from Brazil to Guyana. However, red knots can be found in suitable habitat throughout the Atlantic and Gulf coasts during both spring and fall migration, and have been sighted in inland (greater than 25 miles from the coast) areas of United States within the Atlantic and central flyways. Red knots have been documented in Oklahoma during migration, but do not nest in the state.

**Prospecting** – The red knot is a wide-ranging species and could migrate through (but not nest in) Oklahoma.

- Within Oklahoma, near the Arkansas, Cimarron, Canadian, and Red Rivers (within one-mile of the mainstems only and all reservoirs or emergent (not forested) wetlands larger than 10 acres in size.
  - Mark new lines that cross or are within 1.0 mile of potentially suitable habitat (i.e., foraging, stop-over or roosting habitat, primarily large rivers and wetlands) and if possible, an equal amount of existing lines according to the Service recommendations described in APLIC 2012. Consult the Service to determine the most appropriate existing lines to mark.

**Siting/Development** – see Prospecting above. Any power lines that would cross large rivers or reservoirs should be buried underground or overhead lines should be marked to avoid potential collisions.

**Construction/Commissioning** – see **Prospecting** above.

**Operation** – see **Prospecting** above.

**Decommissioning** – Restore the affected habitat to pre-construction condition.

## Literature Cited

USFWS (U.S. Fish and Wildlife Service). 2013. Proposed rule  
<http://www.gpo.gov/fdsys/pkg/FR-2013-09-30/pdf/2013-22700.pdf>.

## Sprague's pipit (*Anthus spragueii*) - C

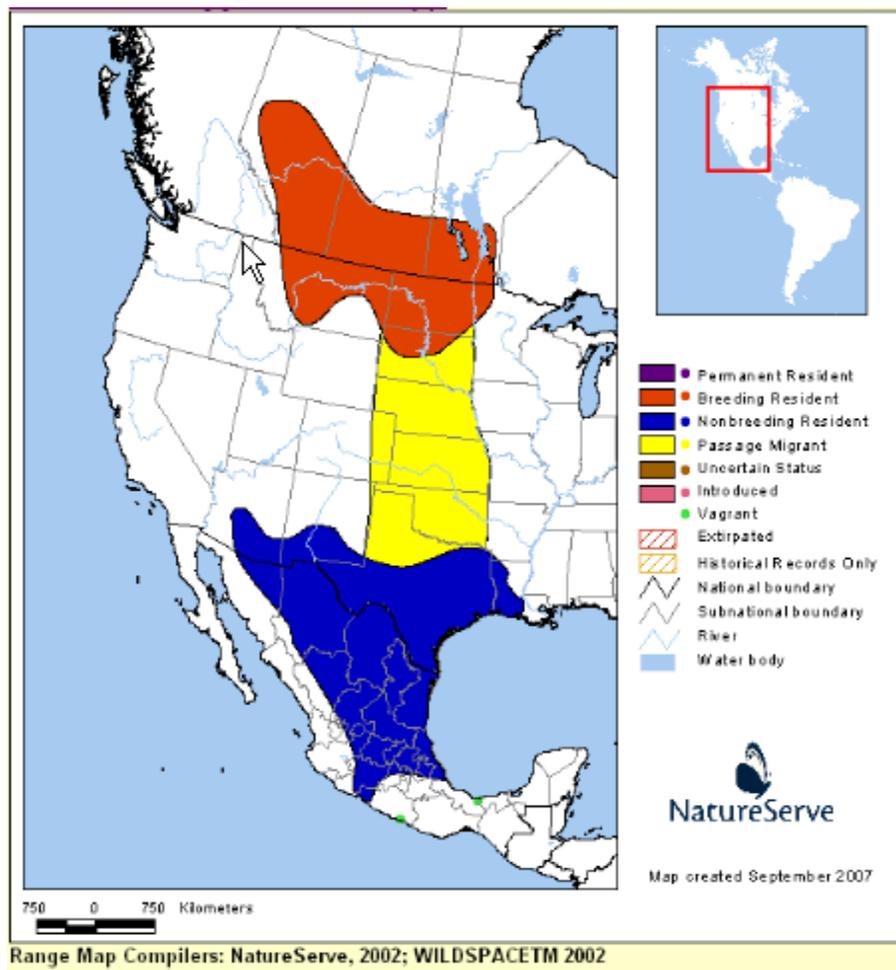
### Life History

The Sprague's pipit (SP) is a small, insectivorous bird about 10 to 15 centimeters (cm) (3.9 to 5.9 inches) in length, with buff and blackish streaking on the crown, nape, and under parts (Robbins and Dale 1999). The SP is a grassland-obligate species, using native, untilled prairie almost exclusively throughout its life cycle (Owens and Myres 1973, Davis 2004, Dechant *et al.* 1998, Dieni *et al.* 2003, McMaster *et al.* 2005). Male SPs have a territorial flight display that takes place high in the air and that can last up to 3 hours, with most individual displays lasting from 15 to 35 minutes in length (Robbins 1998). The flight display has been estimated to take place between 50 and 100 m (164 to 328 feet) above the ground. The SP is known to be very secretive around the nest, often refusing to flush until a searcher or similar disturbance is extremely close to the nest (Jones and Dieni 2007). The SP is thought to be an area sensitive species, preferring relatively large areas of native prairie to establish breeding territories. Although the SP has been documented to nest in planted, non-native grasslands, fledging success may be lower in these habitats (Higgins *et al.* 2002, Dechant *et al.* 1998, Dohms 2009, Fisher and Davis 2011). The SP prefers larger grassland patches (preferred range 69 to 314 ha [170 to 776 acres]), with a low edge-to-area ratio (Davis 2004, Koper *et al.* 2009). However, smaller patches occasionally may be utilized during the breeding season (Davis 2004). Migration and wintering ecology are poorly known. Typically SPs are solitary during migration but occasionally may occur in loosely associated groups. Migration occurs primarily during the day. Occurrence and abundance of SPs during migration likely is largely influenced by local habitat conditions, with rainfall during the previous year being a particularly important factor influencing vegetation conditions in these grasslands.

### Geographic Area of Concern

The breeding range of the SP includes parts of North Dakota, South Dakota, Montana, and Minnesota in the U.S. In Canada, SPs breed in parts of Alberta, Saskatchewan, and Manitoba (Robbins and Dale 1999). The SP's wintering range in the U.S. includes portions of Arkansas, Arizona, Louisiana, Mississippi, New Mexico, Oklahoma, and Texas, with most of the wintering concentrated in Texas and Louisiana (Robbins and Dale 1999). The wintering range also includes portions of northern and central Mexico. The migration corridor likely includes Texas, Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota (see Fig. 1). In Oklahoma, specimen records are known from 11 counties: Canadian, Cleveland, Grady, Jefferson, Kiowa, Latimer, Mayes, McClain, Murray, Payne, and Pittsburg (Wood and Schnell 1984). Sight or photographic records exist for another 13 counties: Alfalfa, Beaver, Beckham, Cimarron, Custer, Greer, Marshall, Noble, Oklahoma, Osage, Sequoyah, Tulsa, and Washington (Wood and Schnell 1984). Consequently, the SP likely occurs throughout Oklahoma during both spring and fall migration. In Oklahoma, the wintering range is largely confined to the southern half of the State. The migration corridor and wintering range overlaps all of Texas, including Lamar and

Red River counties. However, we have no documented occurrence records for SP in either county.



**Prospecting and Siting/Development** – Oil and gas development is known to cause fragmentation of SP habitat and the Service’s 12-month finding (75 FR 56028) identifies habitat fragmentation as a major cause for the species’ current and continued decline (USFWS 2010). Fragmentation can be particularly detrimental in nesting areas as fragmentation facilitates nest parasitism by brown-headed cowbirds (*Molothrus ater*). Preferentially, projects should be sited in areas that lack suitable habitat and that are rarely, if ever, used by SPs such as heavily grazed pastures, agricultural fields, and forested areas, provided other species would not be impacted. Pastures comprised predominantly of exotic, non-native grasses may be used by SPs, but their densities in these pastures are much lower than those observed in native prairies. Consequently, siting projects in non-native grasslands is preferred over areas having predominantly native vegetation. Project sites should be co-located in areas where previous disturbance exists to minimize fragmentation and reduce edge effects. For example, existing road, pipeline and electrical transmission corridors should be used whenever possible. Placement of oil and gas facilities and related developments in suitable stopover or wintering habitat could prevent SPs from using these areas. Similarly oil and gas development projects that further divide (i.e.,

fragment) native grassland habitat into smaller and more isolated parcels may reduce or eliminate the suitability of these sites as stopover or wintering habitat.

**Construction** – See Siting/Development above. Proper siting of proposed developments is one of the most effective means of avoiding construction related impacts to SPs during migration and while over-wintering. Additionally, reducing the size of the construction area helps to minimize the overall footprint of the development. Co-locating features within the development footprint is another means of reducing the overall scope of project impacts. For example, locate any new distribution lines within or immediately adjacent to existing road, transmission/distribution line, or pipeline corridors. Use existing roads to access construction sites and where new roads are recommended, the use the minimum width necessary to safely access sites. Following completion of construction, all bare soil should be re-vegetated as soon as feasible with native plants, whenever possible. As soon as roads and other features (e.g., pipe storage yards) are no longer needed, reseed them to native vegetation. Develop and implement a spill prevention and rapid response to ensure fuel and other chemicals are safely contained on-site. Any spill of fuel, oil or other hazardous chemicals should be addressed quickly to ensure impacts are confined to construction site.

**Operation** – Proper siting of developments is the primary means of avoiding impacts to the SP during the project's operation. Any application of pesticides and herbicides should occur sparingly as they can reduce the value of foraging areas by altering vegetative conditions and reducing food availability. Monitoring of the project during operation is recommended to ensure that identified avoidance measures remain effective during project operation. Monitoring is particularly important to ensure that any chemical spills or pipeline breaks are treated promptly. Develop and implement a spill prevention and response plan that includes frequent inspection of ongoing operation. Spill prevention and response teams will be trained at least annually in the implementation of the spill prevention plan for the facility. Mowing or hand clearing of existing right-of-ways is permissible provided residual stubble height is between 13 and 28 cm (5 to 10 in.) in length and maintain similar vegetative heights in new right-of-ways. Do not mow prior to early August to allow most grassland nesting birds to fledge at least one clutch of eggs prior to initiation of right-of-way maintenance. Mowing should be completed prior to the middle of September to allow some regrowth to occur prior to the end of the growing season, enhancing the value of these areas as wintering habitat.

Generally, studies have shown that birds can collide with transmission lines during local and seasonal migration, and that oil and gas facilities can disrupt their normal breeding, foraging, and sheltering behavior (Langston and Pullan 2003). However, very little is known about SP behavior during migration and we are not aware of any studies evaluating the specific response of SPs to oil and gas facilities or power lines. Due to their smaller stature, we do not anticipate that distribution lines would pose the same collision hazard as transmission lines, which normally occur much higher above ground level and have a greater potential of overlapping the altitude at which SPs migrate. However, low light and certain weather conditions, such as fog, could hamper the ability of SPs to detect such objects while landing or taking off during migration or at breeding and wintering grounds. Thus construction of distribution lines has the potential to result in some take should collisions with these lines occur.

While breeding, SPs have been documented to avoid nesting near non-native and artificial features in the prairie landscape, including areas having trees, or high shrub densities, oil pads, as well as roads and even trails (Desmond *et al.* 2005, Dale *et al.* 2009, Grant *et al.* 2004, Linnen 2008, Sutter 1997, Sutter *et al.* 2000, but see Koper *et al.* 2009 regarding roads). Thus, we assume that SPs may avoid nesting near power lines, other oil and gas facilities, and associated features if they are constructed in breeding habitat. However, we know very little regarding avoidance of such features during migration or over-wintering periods. We suspect observed avoidance behaviors may help minimize risk of collision with power lines and other oil and gas facilities. However, until more definitive information is available on how SPs behave around power lines and other oil and gas facilities, we cannot assume a risk of collision does not exist. Burial of new distribution lines would considerably reduce the likelihood of SP collisions with such features. Marking these lines to enhance their visibility to SPs during flight should be used when burial of the lines is not possible. Construction and operation of meteorological and communication towers also has the potential to cause collisions if those structures are supported by guy wires. Any towers that are constructed and operated as a part of the proposed development should be placed on self-support, lattice style towers and be the lowest height possible.

**Post-operation** – Restore site to pre-project conditions. Areas previously supporting non-native grasses should be reseeded to native species. All vertical features should be removed as visual obstructions are known to reduce suitability of available habitat.

**Restoration opportunities** – Invasion of native prairies by woody species, such as eastern red cedar, is a common problem throughout much of Oklahoma and Texas. Efforts to remove invasive woody species, either by prescribed fire or mechanical methods, is one means of improving grasslands used by SPs. Project participants may wish to consider opportunities to restore any areas of unsuitable habitat to native prairie, where soil conditions are favorable. The Service will work with companies interested in such opportunities to plan and implement habitat restoration as a part of decommissioning actions.

## Literature Cited

- Dale, B.C., T.S. Wiens, and L.E. Hamilton. 2009. Abundance of three grassland songbirds in an area of natural gas infill drilling in Alberta, Canada. Pp. 194-204 in Rich, T.D., C. Arizmendi, D. Demarest and C. Thompson [eds.]. 2009. Tundra to Tropics: Connecting Birds, Habitats and People. Proceedings of the 4th International Partners in Flight Conference, 13-16 February 2008. McAllen, TX. Partners in Flight.
- Davis, S.K. 2004. Area sensitivity in grassland passerines: effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. *The Auk* 121(4):1130-1145.
- Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, M.P. Nenneman, and B.R. Euliss. 1998 (revised 2001). Effects of management practices on grassland birds: Sprague's Pipit. Northern Prairie Wildlife Research Center, Jamestown, ND. Northern Prairie Wildlife Research Center Online. Available at

<http://www.npwrc.usgs.gov/resource/literatr/grasbird/sppi/sppi.htm> (Version 28 MAY2004) (Accessed 25 February 2009).

- Desmond, M. J., K. E. Young, B. C. Thompson, R. Valdez, and A. Lafon-Terrazas. 2005. Habitat associations and conservation of grassland birds in the Chihuahuan desert region: two case studies in Chihuahua. Pages 439-451 in J.E. Cartron, G. Ceballos, and R. S. Felger, editors. Biodiversity, ecosystems and conservation in Northern Mexico. Oxford University Press, New York, New York.
- Dieni, J. S., W. H. Howe, S. L. Jones, P. Manzano-Fischer, and C. P. Melcher. 2003. New information on wintering birds of Northwestern Chihuahua. *American Birds* 103:26-31.
- Dohms, K.M. 2009. Sprague's pipit (*Anthus spragueii*) nestling provisioning and growth rates in native and planted grasslands. Master's Thesis. University of Regina, Saskatchewan. 94 pp.
- Fisher, R.J. and S.K. Davis. 2011. Post-fledging dispersal, habitat use, and survival of Sprague's pipits: are planted grasslands a good substitute for native? *Biological Conservation* 144: 263-271
- Grant, T.S., E. Madden, and G.B. Berkey. 2004. Tree and shrub invasion in northern mixed-grass prairie: implications for breeding grassland birds. *Wildlife Society Bulletin*. 32(3): 807-818.
- Higgins, K.F., D.E. Naugle, and K.J. Forman. 2002. A case study of changing land use practices in the northern great Plains, USA: An uncertain future for waterbird conservation. *Waterbirds*. pp. 42-50.
- Jones, S. L., and J. S. Dieni. 2007. The relationship between predation and nest concealment in mixed-grass prairie passerines: an analysis using program MARK. *Studies in Avian Biology* 34: 117-123.
- Koper, N., D.J. Walker, and J. Champagne. 2009. Nonlinear effects of distance to habitat edge on Sprague's pipits in southern Alberta, Canada. *Landscape Ecology* 24(10): 1287-1297.
- Langston, R.H. and J.D. Pullan. 2003. Windfarms and birds: An analysis of the effects of windfarms on birds and guidance on environmental assessment criteria and site selection issues. Report from RSPB/Birdlife International to the Convention on the Conservation of European Wildlife and Natural Habitats.
- Linnen, C.G. 2008. Effects of oil and gas development on grassland birds. Prepared for Petroleum Technology Alliance Canada. Prepared by Northern EnviroSearch Ltd. Saskatchewan. Unpublished Document. 24 pp.
- McMaster, D.G., J.H. Devries, and S.K. Davis. 2005. Grassland birds nesting in haylands of southern Saskatchewan: landscape influences and conservation priorities. *Journal of Wildlife Management* 69(1): 211-221.

- Owens, R.A., and M.T. Myres. 1973. Effects of agriculture upon populations of native passerine birds of an Alberta fescue grassland. *Canadian Journal of Zoology* 51:697-713.
- Robbins, M.B. 1998. Display behavior of male Sprague's pipits. *Wilson Bulletin* 110(3): 435-438.
- Robbins, M.B., and B.C. Dale. 1999. Sprague's Pipit (*Anthus spragueii*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available at <http://bna.birds.cornell.edu/bna/>. (Accessed June 19, 2009).
- USFWS (U.S. Fish and Wildlife Service). 2010. 12-Month Finding on a Petition to List Sprague's Pipit as Endangered or Threatened Throughout Its Range. *Federal Register* 75: 56028-56050.
- Sutter, G.C. 1997. Nest-site selection and nest-entrance orientation in Sprague's Pipit. *Wilson Bull.* 109: 462-469.
- Sutter, G.C., S.K. Davis, and D.C. Duncan. 2000. Grassland songbird abundance along roads and trails in southern Saskatchewan. *Journal of Field Ornithology*. 71(1): 110-116.
- Wood, D.S. and G.D. Schnell. 1984. *Distributions of Oklahoma Birds*. University of Oklahoma Press, Norman. 209 pp.