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**U. S. Department of Energy**
**Idaho Operations Office**

# Idaho National Laboratory Site
# Bat Protection Plan


**September 2018**

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**Prepared for the**
**U.S. Department of Energy**
**Idaho Operations Office**

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# ACRONYMS

| | |
|---|---|
| AI | activity index |
| ATR | Advanced Test Reactor |
| BLM | Bureau of Land Management |
| CCA | Candidate Conservation Agreement |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFA | Central Facilities Area |
| DOE | U.S. Department of Energy |
| DOE-ID | U.S. Department of Energy – Idaho Operations Office |
| ESA | Endangered Species Act |
| ESER | Environmental Surveillance, Education and Research |
| ICDF | Idaho Comprehensive Environmental Response, Compensation, and Liability Act Disposal Facility |
| IDAPA | Idaho Administrative Procedures Act |
| IDFG | Idaho Department of Fish and Game |
| INL | Idaho National Laboratory |
| INTEC | Idaho Nuclear Technology and Engineering Center |
| MFC | Materials and Fuels Complex |
| NABat | North American Bat Monitoring Initiative |
| NRF | Naval Reactors Facility |
| NWHC | National Wildlife Health Center |
| PBF | Power Burst Facility |
| RWMC | Radioactive Waste Management Complex |
| SGCN | Species of Greatest Conservation Need |
| TAN | Test Area North |
| USFS | U.S. Forest Service |
| USFWS | U.S. Fish and Wildlife Service |
| WNS | White-nose syndrome |

# 1.0 INTRODUCTION

## 1.1 Background

The Idaho National Laboratory (INL) Site is a Department of Energy (DOE) reservation encompassing 890 square mi (230,509 ha) of cold desert shrub steppe on the basaltic Eastern Snake River Plain approximately 25 mi (40 km) west of Idaho Falls (Figure 1). Established in the late 1940s by the U. S. Atomic Energy Commission as the National Reactor Testing Station, for many years the INL Site housed the largest concentration of nuclear reactors in the world (Reynolds et al. 1986, DOE-ID 2014). Over four decades, 52 nuclear research reactors were built, including the Experimental Breeder Reactor 1, which produced the first usable amounts of electricity generated by nuclear power in 1951 (DOE-ID 2014). Since 1949, public access to the INL Site has been prohibited except for a few highway rights-of-way (Reynolds et al. 1986). During the 1970s, the mission of the INL Site broadened to include biotechnology, energy and materials research, and renewable energy. Today the INL Site serves as a diverse applied engineering laboratory dedicated to supporting the missions of DOE in nuclear and energy research, science, and national defense (DOE-ID 2014). The INL Site mission is to ensure the energy security of the nation with safe, competitive, and sustainable energy systems and unique national and homeland security capabilities (DOE-ID 2014).

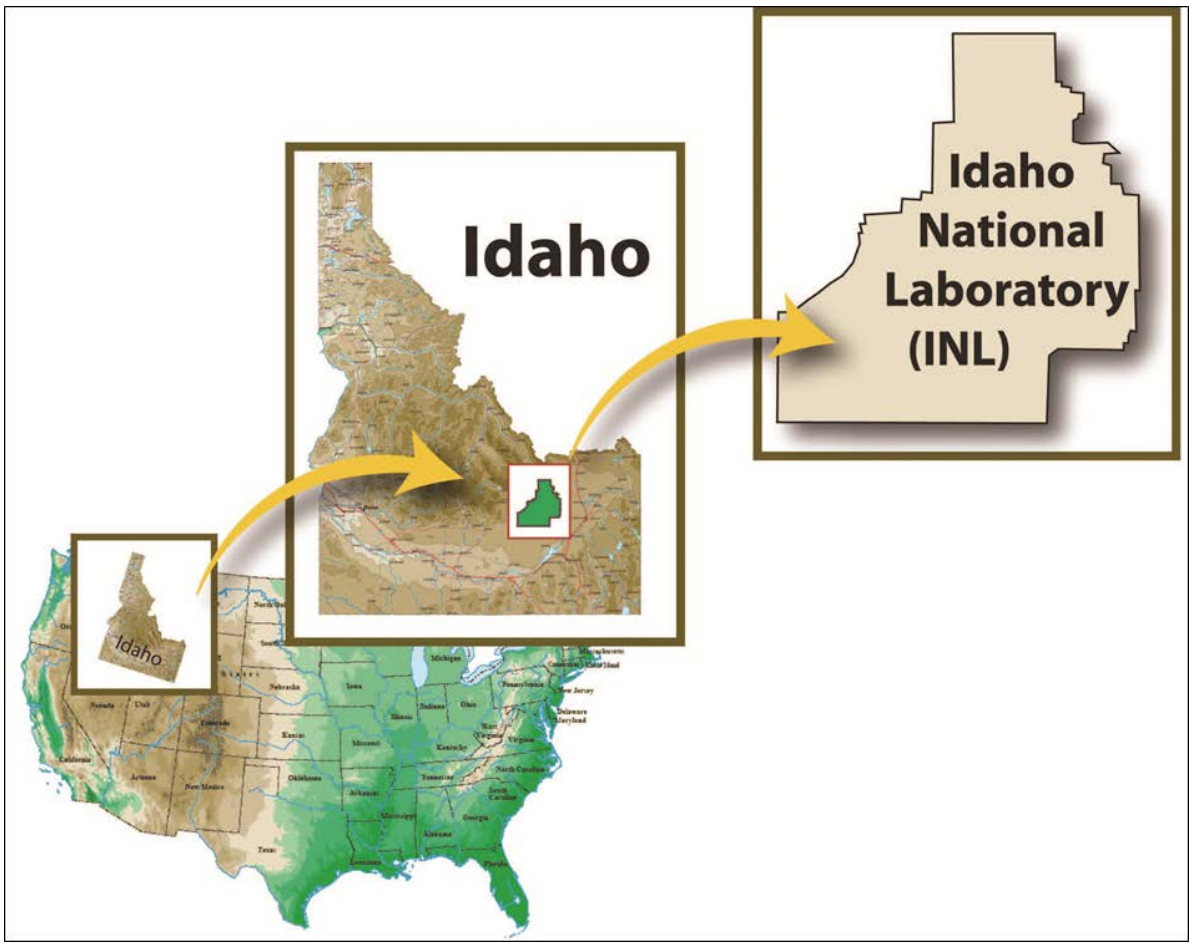


**Figure 1. Regional location of the INL Site (DOE-ID 2014).**

The INL Site is federal property administered by the DOE- Idaho Operations Office (DOE-ID). The DOE-ID oversees operations at the INL Site. In 1975 the INL Site was designated a National Environmental Research Park. Since that time, DOE has made the lands within the INL Site available for outdoor research where complex ecological relationships of the cool desert ecosystem of the Eastern Snake River Plain can be studied along with the effects of energy infrastructure and industrial activities on natural environments (DOE-ID 2010).

Presently, support for land management and natural resources decisions for the INL Site is provided through the Environmental Surveillance, Education, and Research (ESER) Program operating under contract with the DOE-ID. The ESER Program's primary mission is to monitor selected pathways by which radiological pollutants from the INL Site could reach the public. In addition, the ESER Program conducts an array of ecological activities on the INL Site to provide ecological and natural resources support to DOE-ID for land management issues and to supply ecological information and expertise to support activities that affect natural resources. These activities include wildlife and vegetation surveys and monitoring, revegetation, weed management, assessing potential impacts to ecological resources, providing specialized ecological resource training (including bat awareness and safety training) for facility environmental staff, and facilitating ecological research on the Idaho National Environmental Research Park. Implementation and maintenance of this Bat Protection Plan will be conducted chiefly by the ESER program for DOE-ID.

Specific ecological monitoring work at the INL Site involves collecting data related to the abundance and distribution of a variety of wildlife and plant species. For some species or groups of species, historic data span several decades and are among the most comprehensive long-term data sets in the state of Idaho. Monitoring results provide information on ecological conditions and trends at the INL Site that support wise land stewardship, long-range planning, adaptive management, impact analysis and avoidance for specific actions, effective mitigation development, and coordination and collaboration with state and federal resource agencies.

Among the wildlife species recognized as important resources at the INL Site are bats. Bats represent over 30% of mammal species described for the INL Site. A mosaic of high–quality, shrub-steppe habitats overlying near-surface basalt deposits with abundant (and protected) lava tube caves, fractured rock outcrops, talus-flanked buttes, and juniper uplands provide an abundance of high quality foraging and roosting habitat for a variety of resident and transient bat species, including several with heightened conservation concern. In many areas, particularly in the western U.S., important bat habitat is characterized by abundant exposed rocky features (in the form of cliffs, rock outcrops, caves, mines etc.), healthy vegetation dominated by woody species (e.g. trees or shrubs), and available surface water. Since the early 1980s, the INL Site has supported bat research in *ad hoc* fashion; nevertheless, results have supported general bat conservation at the INL Site and provided critical conservation data to state and federal resource agencies. Historical monitoring on the INL Site has included counting hibernating bats in known hibernacula, summer surveying using mist net and radio telemetry, active (attended) monitoring of bat echolocation calls, and collaborating with federal and state agencies. INL Site bat researchers (Dr. Barry Keller and Martha Wackenhut, among others) were instrumental in the development of the first bat conservation assessment and strategy for Townsend's big-eared bat (Pierson et al 1999). This document is widely cited and has become the model for similar documents developed throughout the West, including a Townsend's big-eared bat MOU prepared by the Western Association of Fish and Wildlife Agencies (WAFWA 2002).

Over the past decade, the emergence of newly identified threats to bat populations (e.g. white-nose syndrome [WNS] and large-scale commercial wind energy development) has caused wide-spread multiple mortality events in bats and resulted in precipitous declines of numerous common bat species and elevated conservation concern for bats across the United States (O'Shea et al 2016). (See Section 3

for further descriptions of these and other threats to bats.) Because of these emerging threats, regional agency initiatives to address these threats, and the potential for impacts to INL Site development and operations, DOE-ID and the Naval Reactors Laboratory Field Office/Idaho Branch Office (hereafter collectively referred to as DOE) directed the ESER Program to increase attention given to bat resources and initiate a pilot investigation of INL Site-wide bat monitoring. One expected outcome of this initial work was to allow DOE managers to update and increase their baseline understanding of bats at the INL Site and thus to inform decision making and allow potential mission risks to be evaluated. The initial effort, based on the establishment of long term passive (unattended) acoustic monitor stations at facilities and remote field sites, was refined and improved as data were analyzed. Its results provided the first continuous long-term datasets of bat species and seasonal activity patterns for the INL Site and some of the first bat data ever collected at some facilities. These data, viewed in the context of the unabating trend toward increased concern for bat resources and regulatory protection regionally and nationwide, led DOE managers to see the need for:

- Documentation of efforts undertaken by DOE to enhance bat conservation and avoid or minimize impacts to bats at the INL Site;
- Comprehensive Site wide monitoring of bats of the INL Site (with special emphasis on species likely to be listed under the Endangered Species Act (ESA) in the future and species of greatest conservation need (SGCN) in the state of Idaho) to allow for tracking of trends, detecting the potential effects of INL Site actions on bats, and evaluating the effectiveness of conservation actions;
- Coordination with state and federal resource agencies regarding INL Site compliance with laws and regulations related to bats;
- Developing mechanisms to reduce or eliminate INL Site mission impacts and project delays associated with protracted studies or consultations for future federally-protected bat species;
- Increased regional leadership and state and federal resource agency collaboration on bat issues;
- Participation in new nationwide and continental initiatives (e.g., North American Bat Monitoring Program [NABat]; National White-nose Syndrome Response Plan, North American Bat Conservation Alliance [NABCA]).

This Bat Protection Plan provides procedures and methods to address these needs, track results, evaluate success, and make adaptive modifications, as data or regulatory changes warrant. It also provides a mechanism for collaboration with the Idaho Department of Fish and Game (IDFG) for the conservation of at-risk bat species and their habitats and in this way functions as a conservation plan to implement conservation actions identified in the Idaho State Wildlife Action Plan (IDFG 2017).

## 1.2 Purpose and Importance of this Plan

DOE recognizes the importance of producing a bat protection plan for the INL Site because of recent petitions, and a decision to list bat species under the ESA (Kunz and Reichard 2010, USFWS 2014). Recent activities to list bats under the ESA are associated with current threats, including WNS and wind-energy development (Kunz and Reichard 2010, USFWS 2014). These two threats are recognized as the leading causes of bat mortality globally (O'Shea 2016) and are known to affect several bat species that occupy the INL Site. If a bat species that occupies the INL Site becomes listed under the ESA, DOE construction and operation activities and project schedules may be impacted.

The purpose of the INL Site Bat Protection Plan is to:

1) Document the natural history and ecology of bats on the INL Site to better conserve and manage these mammals and the habitat they use;
2) Provide information on trends of abundance, distribution, and seasonal habitat use by bats, which will allow DOE to make informed decisions for project planning required by the National Environmental Policy Act;
3) Maintain current information on sensitive bat species on the INL Site to facilitate the biological assessment and biological opinion process required by the ESA, if a species becomes listed under the ESA. Such information will allow DOE to continue its mission with minimal delays from an ESA listing;
4) Identify credits to DOE for voluntary prelisting conservation actions as described by the U. S. Fish and Wildlife Service (USFWS) (Appendix A, USFWS final policy regarding prelisting voluntary conservation actions), if that policy is enacted;
5) Share data collected from our monitoring program with biologists from the USFWS, IDFG, the Bureau of Land Management (BLM), and Craters of the Moon National Monument and Preserve to support conservation and management of bats and their habitat in areas adjacent to the INL Site; and
6) Tier bat conservation actions at the INL Site to the Idaho State Wildlife Action Plan.

The INL Site Bat Protection Plan presents important and useful information on the natural history and ecology of bat species occurring on the INL Site, and highlights the little brown myotis (*Myotis lucifugus*) and the Townsend's big-eared bat (*Corynorhinus townsendii townsendii*), two species of critical conservation concern. The little brown myotis occurs throughout the INL Site (including at all facilities) and was once the most common and widespread myotis in North America (Harvey et al, 2011). As a result of precipitous declines caused by emerging threats in the eastern parts of its range, Kunz and Reichard (2010) performed a status review of the little brown myotis and recommended an emergency listing as endangered under ESA. Recently, little brown myotis was identified as a Species of Greatest Conservation Need (SGCN) in the 2016 Idaho State Wildlife Action Plan (2017). Townsend's big-eared bat occupies the INL Site year-round, and two of the largest known hibernacula within the species' range exist on the INL Site. Additionally, Townsend's big-eared bat is classified as an SGCN in all western states, including Idaho, (IDFG 2017, Pierson et al. 1999, Piaggio and Perkins 2005, Gruver and Keinath 2006) and is a candidate for listing under the state of California's ESA. In addition, two eastern subspecies of big-eared bats—the Virginia (*C. t. virginianus*) and the Ozark (*C. t. ingens*) have been listed as endangered under the ESA since 1979 (Piaggio and Perkins 2005, Gruver and Keinath 2006). Our Townsend's big-eared bat was formerly a category 2 candidate for listing under ESA. This category, eliminated in 1996, was reserved for species "for which information now in the possession of the FWS indicates that proposing to list as endangered or threatened is possibly appropriate, but for which persuasive evidence on biological vulnerability and threat are not currently available to support proposed rules" (59 Fed. Reg. 58,982, 58,983 (1994)).

## 1.3 Organization of this Plan

The INL Site Bat Protection Plan is divided into six sections. Section 1 describes the background and purpose of the document, and wildlife laws and guidance documents applicable to bat conservation and management at the INL Site. Section 2 of this plan describes the existing ecological conditions of the INL Site including an overview of general seasonal occurrence and use of habitat by bats. Other sections of this plan describe threats to bats on the INL Site (Section 3), conservation measures and mitigation to address threats to bats and their habitat on the INL Site (Section 4), conservation and management

through the elements of our monitoring program (Section 5), and finally adaptive management and reporting requirements under this plan (Section 6).

## 1.4 Applicable Laws and Guidance Documents

There are federal environmental laws, an executive order, and land management documents that DOE follows to protect natural resources and inform land management decisions on the INL Site. DOE's compliance with these documents can aid in the conservation and management of bats and their habitat on the Site. These documents include the following:

- The National Environmental Policy Act of 1969 as amended (42 U.S.C. § 4321 et seq.)—Establishes a national policy promoting awareness of the consequences of human activities on the environment and consideration of environmental impacts during the planning and decision-making stages of a project. This act requires federal agencies to prepare an environmental impact statement for major federal actions with potentially significant impacts on the environment.
- Executive Order 11514 Protection and Enhancement of Environmental Quality (1970)—In furtherance of the purpose and policy of National Environmental Policy Act, this Order directs federal agencies to monitor, evaluate, and control on a continuing basis their activities to protect and enhance the quality of the environment.
- Endangered Species Act of 1973 as amended (16 U.S.C § 1531 et seq.)—The ESA is intended to prevent the further decline of endangered and threatened species and to restore those species and their critical habitats. Section 7 of the ESA requires federal agencies having reason to believe that a prospective action may affect an endangered or threatened species or its critical habitat to consult with USFWS or the National Marine Fisheries Service to ensure that the action does not jeopardize the species or destroy its habitat (50 C.F.R. § 17). Despite reasonable and prudent measures to avoid or minimize such impacts, if the species or its habitat would be jeopardized by the action, a formal review process is required. The ESA prohibits unauthorized "take" of listed species, with take defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

The following documents are also used by DOE for land-use management and can support conservation and management of bats and their habitat on the INL Site:

- Idaho National Laboratory Comprehensive Land Use and Environmental Stewardship Report (2011)—This report provides guidance on land-use issues in relation to natural resources on the INL Site.
- Candidate Conservation Agreement (CCA) for Greater Sage-grouse (*Centrocercus urophasianus*) on the Idaho National Laboratory Site (2014)—The CCA is a voluntary agreement between the USFWS and DOE wherein DOE commits to implement conservation measures to benefit greater sage-grouse, a former candidate species for listing under the ESA. In 2015, the USFWS determined that listing of Greater Sage-grouse was not warranted under the ESA because voluntary multi-partner conservation efforts by federal, state, and private land owners across the species range successfully ameliorate primary threats to the species' continued existence. The CCA addresses threats to sage-grouse and includes restrictions on activities that degrade sagebrush (*Artemisia* spp.) habitat. Many conservation measures in that document are focused on threat abatement and habitat improvement on the INL Site. Because bats may be impacted by degradation of sagebrush-dominated lands, conservation measures outlined in the CCA that protect sage-grouse and their habitat on the INL Site will likely be positive for bats (DOE and USFWS 2014).

All Idaho bat species are legally classified as Protected Nongame Species under IDAPA 13.01.06.000, et seq., Rules of the Idaho Fish and Game Commission, IDAPA 13.01.06, "Rules Governing Classification and Protection of Wildlife.". Under this rule:

> No person shall take or possess those species of wildlife classified as Protected Nongame, or Threatened or Endangered at any time or in any manner, except as provided in Sections 36-106(e), 36-401, and 36-1107, Idaho Code, by Commission rule, or IDAPA 13.01.10, "Rules Governing the Importation, Possession, Release, Sale, or Salvage of Wildlife," Subsection 100.06.b. Protected Nongame status is not intended to prevent unintentional take of these species, protection of personal health and/or safety, limit property and building management, or prevent management of animals to address public health concerns or agricultural damage.

In addition, the Idaho State Wildlife Action Plan (IDFG 2016) has identified two bat species occurring at the INL Site as SGCN Tier 2 (hoary bat and silver-haired bat), and three bat species occurring at the INL Site as SGCN Tier 3 (Townsend's big-eared bat, western small-footed myotis, and little brown myotis). Development of the Idaho State Wildlife Action Plan is directed under the federal Wildlife Conservation and Restoration Program, which provides funding to states for strategic programs for the conservation and management of nongame wildlife. The Idaho State Wildlife Action Plan sets forth long range conservation goals and a framework of proactive solutions to conserve and manage wildlife. IDFG is the state's lead wildlife manager and is tasked under Title 36-103 of the Idaho Code to preserve, protect, perpetuate and manage wildlife; however IDFG does not directly manage large land areas in the State of Idaho. Rather through the State Wildlife Action Plan, regional resource management agency stakeholders (e.g., BLM, U.S. Forest Service, USFWS, Indian tribes, National Park Service, Department of Defense, and DOE) administering large land areas within the state serve as key partners working with IDFG in implementing conservation actions and in preparing their own wildlife conservation plans.

Additional documents and organizations provide guidance for conservation and management of bats and their habitat that are applicable to these mammals on the INL Site. These include the North American Bat Monitoring Program (https://www.fort.usgs.gov/science-tasks/2457), the Northern Long-eared Bat Interim Conference and Planning Guidance (USFWS 2014), Western Bat Working Group (http://www.wbwg.org/), and the Idaho State Wildlife Action Plan (IDFG 2017). For Townsend's big-eared bats, no federal regulations currently exist that protect this subspecies in the western USA, although conservation concern exists for this bat (Pierson et al 1999, WAFWA 2002; Piaggio and Perkins 2005, Gruver and Keinath 2006). In 2002, the Western Association of Fish and Wildlife Agencies prepared a West-wide memorandum of understanding setting conservation of Townsend's big-eared bat as a priority and listing specific actions to protect important habitats and maintain viable populations of this species (WAFWA 2002). Two eastern subspecies of big-eared bats—the Virginia and the Ozark—have been listed as endangered under the ESA since 1979 (Piaggio and Perkins 2005, Gruver and Keinath 2006). Conservation measures that have been implemented for the endangered Virginia and Ozark big-eared bats and their habitat have been successful in halting population declines for those subspecies (USFWS 1995, Gruver and Keinath 2006). Incorporating similar conservation measures as for those two big-eared bats and those identified in the WAFWA MOU in this bat protection plan have the potential to benefit Townsend's big-eared bats and other bat species on the INL Site (Section 4).

Additionally, several laws exist that provide protection of cave and archeological resources in and around caves on federal lands—i.e., Federal Cave Resources Protection Act of 1988 (16 U.S.C. 4301-4309: 102 Stat. 4546) and the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa). These laws provide protection of caves and their surrounding habitat on the INL Site, which will benefit bats. As

part of compliance with those laws, however, DOE allows limited routine entry in three caves on the INL Site for cultural resource monitoring.

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# 2.0 EXISTING CONDITIONS

## 2.1 Environmental Setting

As described previously, the INL Site is located on the Eastern Snake River Plain in southeastern Idaho and is characterized as a sagebrush steppe ecosystem in a cold desert environment. Approximately 94% of the land on the INL Site is undeveloped (DOE-ID 2014). Basalt flows cover a large portion of the area, producing rolling topography. This area has an average elevation of 4,920 ft (1,500 m) and is bordered on the north and west by mountain ranges and on the south by volcanic buttes and the Cerra Grande lava flow. Lands immediately adjacent to the INL Site are sagebrush steppe, foothills, and agricultural fields. Agriculture is concentrated in areas northeast and northwest of the INL Site. About 60% of the INL Site is open to livestock grazing, which is managed by the BLM. When adequate amounts of water reach the INL Site; the Little Lost River, Birch Creek, and the Big Lost River flow onto portions of the INL Site (DOE-ID 2014).

The climate of the INL Site is characterized by low precipitation (about 8.5 in/yr [22 cm/yr]), warm summers (average daily temperature of 65°F [18°C]), and cold winters (average daily temperature of 21°F [-6°C]), with all averages based on observations since 1950. The altitude, intermountain setting, and latitude of the INL Site combine to produce a semiarid climate. Prevailing weather patterns are from the southwest, moving up the Snake River Plain. Air masses, which gather moisture over the Pacific Ocean, traverse several hundred miles of mountainous terrain before reaching southeastern Idaho. Frequently, the result is dry air and little cloud cover. Solar heating can be intense, with extreme day-to-night temperature fluctuations (DOE-ID 2014).

Plant communities on much of the INL Site are dominated by Wyoming big sagebrush (*A. tridentata*. ssp. *wyomingensis*), Basin big sagebrush (*A. t*. ssp. *tridentata*), or a combination of both subspecies. Many big sagebrush-dominated shrublands are accompanied by a diverse, native, perennial grass and forb understory. Dominant shrubs in non-big sagebrush communities may include green rabbitbrush (*Chrysothamnus viscidiflorus*), sickle saltbush (*Atriplex falcata*), black sagebrush (*A. nova*), three-tip sagebrush (*A. tripartita*), low sagebrush (*A. arbuscula*), spiny hopsage (*Grayia spinosa*), and shadscale (*Atriplex confertifolia*). Nonnative species tend to occur with high frequency but low relative abundance in plant communities across the INL Site (Forman et al. 2013); however, these species can become locally abundant within native vegetation communities. Important non-native species include crested wheatgrass (*Agropyron cristatum* and *A. desertorum*), cheatgrass (*Bromus techtorum*), tall tumble mustard (*Sisymbrium altissimum*), and halogeton (*Halogeton glomeratus*).

The INL Site provides habitat for a diversity of wildlife. Reynolds et al. (1986) indicated that 219 vertebrate species had been documented on the INL Site, including 164 birds and 39 mammals. Five species of owls, which are the most likely predators of bats, occur on the INL Site. These include great horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), long-eared owl (*Asio otus*), short-eared owl (*A. flammeus*), and barn owl (*Tyto alba*). In one European study, bats made up an average of 26% of prey taken by barn owls at a hibernation fall swarming site (Sommer et al 2009). A diurnal avian predator of note is the black-billed magpie (*Pica pica*) which may take bats roosting in exposed locations such as vegetation and building exteriors (R. Dixon, IDFG, pers. comm.) Mammalian carnivores that may opportunistically prey upon bats include coyote (*Canis latrans*), bobcat (*Lynx rufus*), mountain lion (*Puma concolor*), western spotted skunk (*Spirogale gracilis*), and long-tailed weasel (*Mustela frenata*).

Currently, no plant or wildlife species known to occupy the INL Site is federally listed as threatened or endangered under the ESA. In September 2015, the USFWS determined the candidate greater sage-grouse does not warrant protection under the ESA. The USFWS is currently evaluating the little brown myotis, a species of greatest conservation need that occupies the INL Site, to determine if

protection under the ESA is warranted. This bat was recommended for emergency listing because its eastern populations have been decimated by the fungal disease known as white-nose syndrome, wind-energy development, as well as by other threats (Kunz and Reichard 2010, Verant et al. 2014). The little brown myotis was formerly one of the most common and widespread bats in North America; it may still be detected across the INL Site and appears to be a summer resident at facilities. The USFWS has not made a determination about the status of the little brown myotis. If a bat species is listed under the ESA in the future, the INL Site Bat Protection Plan will serve as a key document supporting and streamlining any formal or informal consultation under Section 7.

The little brown myotis, along with four other bat species occurring on the INL Site are identified as SGCN in the 10-year revision of the Idaho State Wildlife Action Plan (IDFG 2017). Under Idaho Code, IDFG is the chief authority tasked with the management of the state's wildlife. The Idaho State Wildlife Action Plan provides a framework of objectives, strategies, and actions for the protection of species of greatest conservation need, and the habitats they depend on, and a direction for the development of region- or stakeholder-specific conservation plans. The INL Site Bat Protection Plan serves as a conservation plan tying bat protection at the INL Site to the State Wildlife Action Plan in partnership with IDFG.

## 2.2 Description of Current INL Site Facilities

The INL Site consists of several primary facilities located on an expanse of otherwise undeveloped land. Buildings and structures are clustered within these facilities, which are typically less than a few square miles in size and separated from each other by miles of undeveloped areas (DOE-ID 2014) (Figure 2). Major facilities at the INL Site include the Advanced Test Reactor (ATR) Complex, Central Facilities Area (CFA), Idaho Nuclear Technology and Engineering Center (INTEC), Materials and Fuels Complex (MFC), Naval Reactors Facility (NRF), Radioactive Waste Management Complex (RWMC), and Test Area North (TAN), which includes the Specific Manufacturing Capability (Figure 2).

Because INL Site developed areas are widely scattered and surrounded by large expanses of natural habitat, interactions with wildlife, including bats, are inevitable. To improve worker safety, avoid mission-impacting incidents, minimize impacts to wildlife, and keep INL Site operations in compliance with appropriate laws protecting wildlife, wildlife awareness and stewardship are promoted by the DOE-ID through a number of means. The ESER Program has developed specific bat awareness and safety training for facility environmental personnel.

On the INL Site, wastewater is discharged to infiltration and evaporation ponds located in proximity to seven major facilities (Figure 2). One facility, the Critical Infrastructure Test Range Complex, has no wastewater ponds. Ponds at the ATR Complex and the Idaho Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Disposal Facility (ICDF) at INTEC could receive low-level radioactive liquid effluent from facility operations (Figure 2). The remaining ponds at the other five facilities receive nonradioactive service and sanitary wastewater. Wastewater disposal at the INL Site is regulated by the state of Idaho through permits that specify annual discharge volumes and effluent quality limits; results of wastewater monitoring are reported to the state of Idaho annually and are further discussed in the INL Site and NRF Annual Site Environmental Reports (DOE-ID 2017; BMPC 2017). The ICDF evaporation ponds at INTEC are designated as Corrective Action Management Units in the Operable Unit 3-13 Record of Decision. The ICDF evaporation ponds accept CERCLA liquid waste generated within the INL Site. Hazardous, mixed, and low-level liquid waste is acceptable for disposal in these evaporation ponds (DOE-ID 2005).

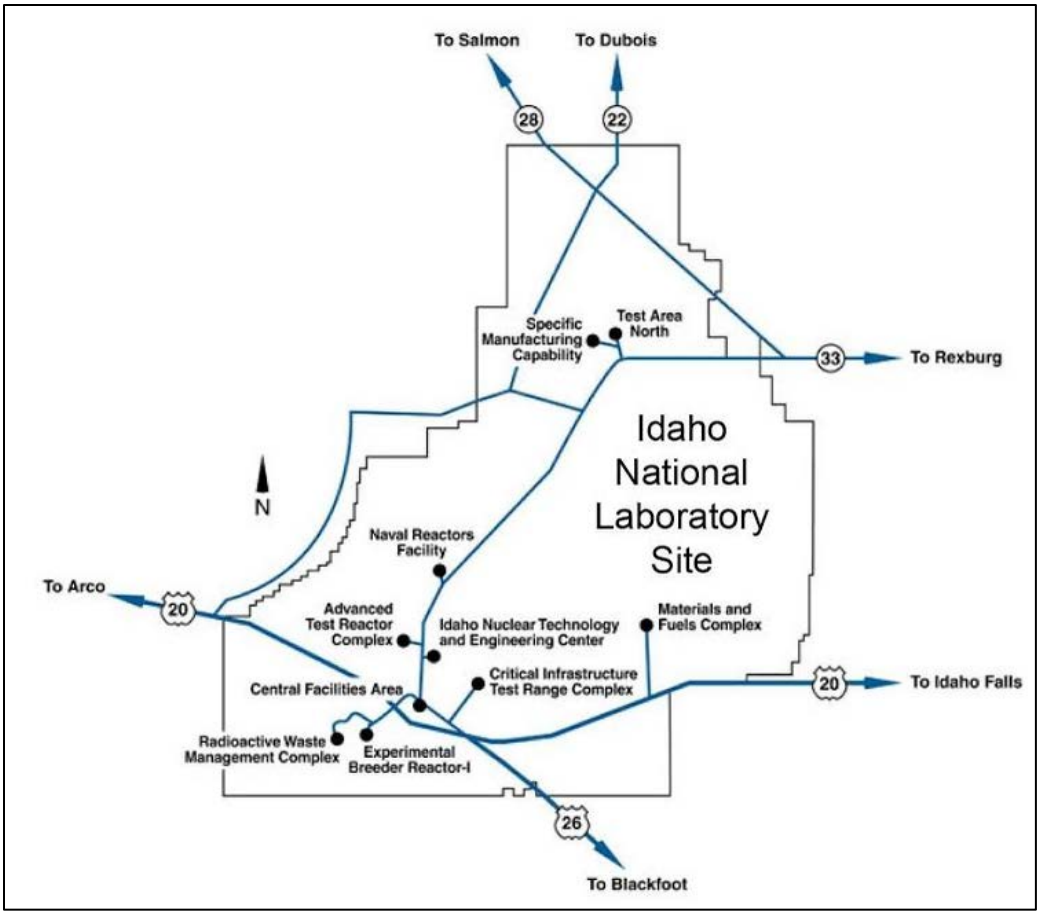


**Figure 2. Location of facilities on the INL Site.**

## 2.3 Bat Species that Occupy the INL Site

Of the 14 recognized species of bats that occur in Idaho (Keller 1985), 12 have been documented to occupy the INL Site during some part of the year (Table 1). This represents nearly a third of the mammalian species diversity at the INL Site. For all resident bats on the INL Site, adults mate in autumn and early winter (Adams 2003). Typically, one young is born in spring and early summer (Adams 2003). Young bats begin to disperse from July through September (Adams 2003). Many species of bats that occupy the INL Site can live greater than 20 years (Adams 2003, Austad 2010). Individual bats banded during an early 1990s behavior study at the INL Site are still occasionally observed in hibernacula during winter counts. Bats hibernating on the INL Site generally begin swarming (gathering at the entrances of hibernation caves to perform courtship and feed heavily to amass winter fat reserves) in September and start forming hibernation colonies within caves in October. Colonies persist in the largest caves well into spring with the last few bats remaining in caves until early May (Keller et al. 1993, Bosworth 1994, Doering 1996).

The general distribution, habitat use, and occurrence of bats on the INL Site differ by species and season; with nine of those species predominantly occurring year-round and three predominantly migrating through the INL Site as transients (Table 1). Species occurrence patterns and seasonality are primarily driven by differences in habitat and resource requirements including foraging habitat, roost habitat,

surface water availability, and insect prey species. Roosts (i.e. areas were bats find concealment and spend most of their non-active time) are critical for bat ecology and may include suitable areas in caves, cliff cracks, rock piles, fissures, tree holes, exfoliating bark, tree foliage, buildings and similar areas occupied by bats. Locations providing appropriate conditions may become established as they are repeatedly occupied daily or seasonally by groups of bats. These areas may be used as maternity (pup rearing) sites, simple day roosts, nighttime digestion sites, or hibernacula. Often a degree of site fidelity is exhibited for these areas with bats persistently returning to the same roosts. Several historical studies have documented use of habitat and foraging areas by bats on the INL Site. For example, Townsend's big-eared bats foraged at the interface of Utah juniper (*Juniperus osteosperma*) and sagebrush habitat (Keller et al. 1993, Haymond 1998). Western small-footed myotis (*M. ciliolabrum*) foraged in juniper woodlands; and big brown bats (*Eptesicus fuscus*) foraged at caves, along the Big Lost River, near facility ponds, and in sagebrush habitat (Haymond 1998). Also, summer roosts for bats appear related to areas near stands of juniper on the INL Site (Bosworth 1996) as well as landscape tree plantings within developed areas (Table 1).

Little information exists regarding availability and selection of prey by bats on the INL Site. Although bat species vary in their degree of prey species specialization, the following insect orders likely predominate prey of bats on the INL Site: Lepidoptera, Coleoptera, Diptera, Neuroptera, Hymenoptera, Hemiptera, and Odonata (Adams 2003, Kunz et al. 2011, Warren et al. 2014). Consumption of insects by free-ranging bats is influenced by bat species and size, reproductive state (e.g., pregnant, lactating, or non-scrotal or scrotal males) (Kurta et al. 1989, Kurta et al. 1990, Encarnacao and Dietz 2006), competition, social behaviors, use of torpor, and switching between foraging styles (e.g., aerial hawking, gleaning, and perch hunting) (Adams 2003, Jones and Rydell 2003). Other factors include prey species and density, distance between prey patches, season, wind speed, temperature, moon phase, and presence of bat predators (Adams 2003, Whitaker 2004, Kunz et al. 2011, Warren et al. 2014). Non-reproductive bats in captivity consume approximately 25% of their body weight each night; this rate is higher for active, free-ranging bats (Kunz et al. 2011). Pregnant and lactating females consume between 36% and 125% of their body weight each evening (Kurta et al. 1989, Kurta et al. 1990, Encarnacao and Dietz 2006).

**Table 1. Bat species and the general seasons and areas they occupy on the INL Site, as well as the potential of these species to forage near INL Site wastewater ponds (Genter 1986, Reynolds et al. 1986, Bosworth 1994, Doering 1996, Haymond 1998, Adams 2003, Cryan 2011). Several of these species have only been documented on the INL Site by acoustical detectors.**

| Common and Scientific Name | Species Tetragram Abbreviation | Distribution, Habitat, and Seasonal Occurrence | Potential or Confirmed WNS Susceptible Species | Presence Verified Through Direct Capture | Potential to Forage Near Ponds |
|---|---|---|---|---|---|
| Big Brown Bat (*Eptesicus fuscus*)[1] | EPFU | Sitewide; roosts in cavities in large trees, buildings, and lava tube caves; year round but rarely detected during winter hibernation surveys | Yes | Yes | Yes |
| Hoary Bat (*Lasiurus cinereus*)[1,2] | LACI | Sitewide but appears more common near facilities; roosts in foliage of a variety of trees, landscape trees, riparian, junipers; summer and autumn; considered migrant at INL Site; has been misted netted at caves in the fall. Some summer residency apparent in acoustic data | No | Yes | Yes |
| Little Brown Myotis (*Myotis lucifugus*)[1,2,3] | MYLU | Patchy but sitewide; roosts in buildings, under bark or cracks in trees; apparent summer resident at facilities; | Yes | No | Yes |
| Silver-haired Bat (*Lasionycteris noctivagans*)[1,2] | LANO | Sitewide but appears more common near facilities; roosts in holes and under bark of a variety of trees, landscape trees, riparian, junipers; summer and autumn; considered migrant at INL Site, but some summer residents have been detected acoustically; has been mistnetted at caves in the fall | No | Yes | Yes |
| Townsend's Big-eared Bat (*Corynorhinus townsendii*)[1,2,4] | COTO | Appears absent from deeper soil areas; roosts in lava tubes and rocky areas, seems principally associated with the axial volcanic zone on eastern and southern parts of INL Site; forages on moths over wood vegetation; year round; no maternity roosts identified at INL Site | No | Yes | Yes[4] |
| Western Long-eared Myotis | MYEV | Sitewide; cavities of large trees, caves, rocky areas and junipers; mainly gleans | Yes | No | No |

| Common and Scientific Name | Species Tetragram Abbreviation | Distribution, Habitat, and Seasonal Occurrence | Potential or Confirmed WNS Susceptible Species | Presence Verified Through Direct Capture | Potential to Forage Near Ponds |
|---|---|---|---|---|---|
| (*M. evotis*) [1] | | moths from vegetation surfaces or from rocks; as yet unobserved hibernating at INL Site; presumed year round resident based on acoustic data. (Western ecological analog of northern long-eared myotis listed April 2015 under ESA because of WNS.) | | | |
| Western Small-footed Myotis (*M. ciliolabrum*)[1,2] | MYCI | Sitewide; buildings, caves, and lava tubes; very common year round; INL site provides important habitat for a species somewhat uncommon through most of its range | Yes | Yes | No |
| California Myotis (*M. californicus*)[1] | MYCA | Sitewide; buildings, caves, and lava tubes; year round | Yes | No | No |
| Fringed Myotis (*M. thysanodes*)[1] | MYTH | Sitewide; junipers, lava tube caves; year round; very few acoustic records. Species very difficult to detect. | Yes | No | Yes |
| Long-legged Myotis (*M. volans*)[1] | MYVO | Sitewide; considered forest species but will roost in buildings and rocky areas; year round; tentative acoustic detections only | Yes | No | Yes |
| Yuma Myotis (*M. yumanensis*)[1] | MYYU | Sitewide; buildings, lava tube caves; forages over water; year round; limited baseline acoustic data | Yes | No | Yes |

[1]These bats are designated as Type 2 Idaho Special Status Species by the BLM, http://www.blm.gov/id/st/en/prog/wildlife_and_fisheries/idaho_sss_type_2_wildlife.html.

[2] Idaho SGCN in 2016 State Wildlife Action Plan

[3]Status review resulting in recommendation for listing under the ESA

[4]Detected only in late summer at facility ponds near MFC and RWMC; all other detections in remote undeveloped areas

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# 3.0 THREATS TO BATS ON THE INL SITE

An integral step to creating a successful bat protection plan is to identify threats that directly impact, or could impact, bats or their habitat. We searched the following documents to identify the most pertinent threats to bats on the INL Site, as well as to identify recommended conservation measures to reduce those threats:

- Guidelines for the Protection of Bat Roosts (Sheffield et al. 1992)
- Ozark Big-eared Bat Revised Recovery Plan (USFWS 1995)
- Species Conservation Assessment and Strategy for Townsend's Big-eared Bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*) (Pierson et al. 1999)
- Bats of the Rocky Mountain West: Natural History, Ecology, and Conservation (Adams 2003)
- Townsend's Big-eared Bat (*Corynorhinus townsendii*): a Technical Conservation Assessment (Gruver and Keinath 2006)
- Status Review of the Little Brown Myotis (*Myotis lucifugus*) and Determination that Immediate Listing Under the Endangered Species Act is Scientifically and Legally Warranted (Kunz and Reichard 2010)
- Northern Long-eared Bat Interim Conference and Planning Guidance (USFWS 2014)
- Idaho State Wildlife Action Plan (IDFG 2017).

Many threats to bats are not applicable on the INL Site, because such activities do not occur or will not occur in the foreseeable future in this area. Some of these threats include abandoned mine land closures, renewed mining operations, large-scale pesticide spraying, habitat destruction due to urban and agricultural expansion, and timber harvest; as well as extensive livestock grazing, logging, mining, and road construction near perennial riparian areas (Sheffield et al. 1992, Pierson et al. 1999, Adams 2003, Gruver and Keinath 2006, USFWS 2014). Public ignorance about the risks bats pose to humans and the importance of bats to the environment has often led to willful destruction of individual bats and vandalism of roosts. Below, we describe the potential major threats to bats on the INL Site; such as disturbing hibernating bats, destruction/modification of hibernacula and roosts, white-nose syndrome, loss or modification of habitat around caves, environmental contaminants, and wind-energy development.

## 3.1 Disturbing hibernating bats and destruction/modification of hibernacula and roosts

Disturbing hibernating bats has long been a management concern for populations of these mammals (Humphrey and Kunz 1976, Sheffield et al. 1992, Pierson et al. 1999, Adams 2003). Large numbers of bats often concentrate in a few hibernation sites resulting in a high potential impact if those animals are disturbed (Sheffield et al. 1992, Adams 2003). Hibernating bats can be affected by humans entering caves to recreate or to conduct research and monitoring activities (Wackenhut 1990, Haymond 1998, Adams 2003). These disturbances may include lights, noise, and an increase in the ambient temperature (Humphrey and Kunz 1976, Bosworth 1994, Haymond 1998). These disturbances can potentially cause bats to alter arousal patterns, elevate body temperatures, and utilize stored energy reserves; thus reducing winter survival (Sheffield et al. 1992, Adams 2003). On the INL Site, bats became more active when researchers were in hibernacula for longer than 5 hours each visit (Bosworth 1994); these results indicate that caution must be used when researchers enter caves and visits limited in duration and frequency. Additionally, loud noises (e.g., loud machinery) near caves can disturb hibernating bats (Luo et al. 2014, USFWS 2014).

The destruction and modification of hibernacula and roosts are conservation and management concerns for bats (Sheffield et al. 1992, Adams 2003, Gruver and Keinath 2006). Suitable natural roost sites include rock piles, caves, crevices, cliffs, animal burrows, tree holes or cracks, and under exfoliating bark on tree trunks and branches. Additionally, for some species, suitable roost sites may include buildings, mines, bridges, culverts, overpasses, and other anthropogenic structures (Adams 2003, Hayes 2003, Kunz and Lumsden 2003). These locations can provide important sites for mating and rearing young. Roost sites can also provide protection from inclement weather, promote energy conservation, and minimize risk of predation (Hayes 2003, Kunz and Lumsden 2003). Caves are used consistently as roost sites for many species, because these features are relatively permanent, thermally stable, and offer protection from climatic extremes (Sherwin et al. 2000, Kunz and Lumsden 2003). Modifying the opening of caves or natural structures in caves can change the cave microclimate (i.e., humidity and temperature) and thus affect the suitability of such features for hibernating bats (Sheffield et al. 1992, Pierson et al. 1999). Additionally, the destruction and modification of other roost sites (i.e., buildings, trees, and bridges), or the disturbance of bats at these sites, render many of these features uninhabitable by bats (Sheffield et al. 1992, Adams 2003, Gruver and Keinath 2006).

Roost disturbance or destruction are important issues for all bats but particularly so for more specialized or sensitive species. Townsend's big-eared bat is particularly sensitive to roost disturbance both at hibernation sites and maternity roosts. This threat is viewed as the primary driver of population declines in many areas and has resulted in its high protection status throughout its range in the West. The INL Site supports several significant hibernacula for Townsend's big-eared bat (see section 5.1). No Townsend's big-eared bat maternity roosts are known; however, a pregnant female was recently netted during a 2016 spring WNS surveillance swabbing effort. Suitable maternity roost habitat in basalt outcrops, talus slopes, and small shelter caves occur in many areas on the INL Site. Townsend's big-eared bat is an SGCN identified in the State Wildlife Action Plan (IDFG 2016). A significant co-hibernator with Townsend's big-eared bat is the western small-footed myotis, also an SGCN. Historically, little brown myotis populations have been able to sustain human impacts to its roosts; however with the advent of WNS and potential for listing under ESA, these impacts will become important for this species as well.

## 3.2 White-nose syndrome

WNS is a recent, major threat to hibernating bats (Blehert et al. 2009, Cryan and Barclay 2009, Foley et al. 2011). WNS is a disease caused by the cold-adapted soil fungus *Psuedogymnoascus destructans* (*Pd*). This organism invades the integumentary system of infected bats causing catastrophic tissue damage, metabolic stress, and water loss (Blehert et al. 2009, Verant et al. 2014). This disease manifests itself most obviously as white mold-like patches on the nose and other exposed skin surfaces (Blehert et al. 2009). Since its discovery in 2006, transmission of WNS has expanded rapidly westward in the USA. This disease has killed at least 5.5 to 6.7 million bats in seven species (Blehert et al. 2009, Foley et al. 2011), and many species of bats could be at risk of significant declines or extinction due to this disease (Kunz and Reichard 2010, Ingersoll et al. 2013, Verant et al. 2014). Although WNS is not currently documented in Idaho, the potential exists for this disease to spread here (Knudsen et al. 2013). Indeed, many Idaho caves have hibernating bat populations and environmental conditions that may support the WNS pathogen (Hayman et al 2016, Verant et al. 2012). WNS may affect nearly all cavernicolous bat species; big brown bats, little brown myotis, long-eared myotis, and western small-footed myotis are the species that are expected to be most susceptible to this disease in Idaho (Knudsen et al. 2013). The disease seems to spread mainly through bat-to-bat contact with co-hibernating species passing fungal spores through physical contact. Non-hibernating, long distance migrants (e.g., silver-haired bats and hoary bats) are known to visit caves during fall swarming and although apparently not susceptible to the disease have the potential to carry the disease from infected to non-infected populations. Both of these species have been detected acoustically and captured at INL Site caves during fall.

On the INL Site, nine caves are used mostly by Townsend's big-eared bats and western small-footed myotis for hibernation (Figures 3 and 4). Authorized or unauthorized cave entries are the two general modes for humans to possibly introduce *P. destructans* into those nine caves. The risk of introducing the fungus from authorized cave entry is relatively low, because under current DOE policy all authorized individuals must apply for a cave entry permit and follow decontamination protocols to minimize the risk of spreading *P. destructans* (DOE-ID 2016). The greater danger of inadvertently introducing the fungus into INL Site hibernacula comes from unauthorized cave entry, because trespassing individuals may not be aware that their actions could potentially introduce *P. destructans* into a cave. Although unauthorized cave entry has occurred on the INL Site, the level of visitation to these features is certainly much lower than off-Site caves on surrounding public lands.

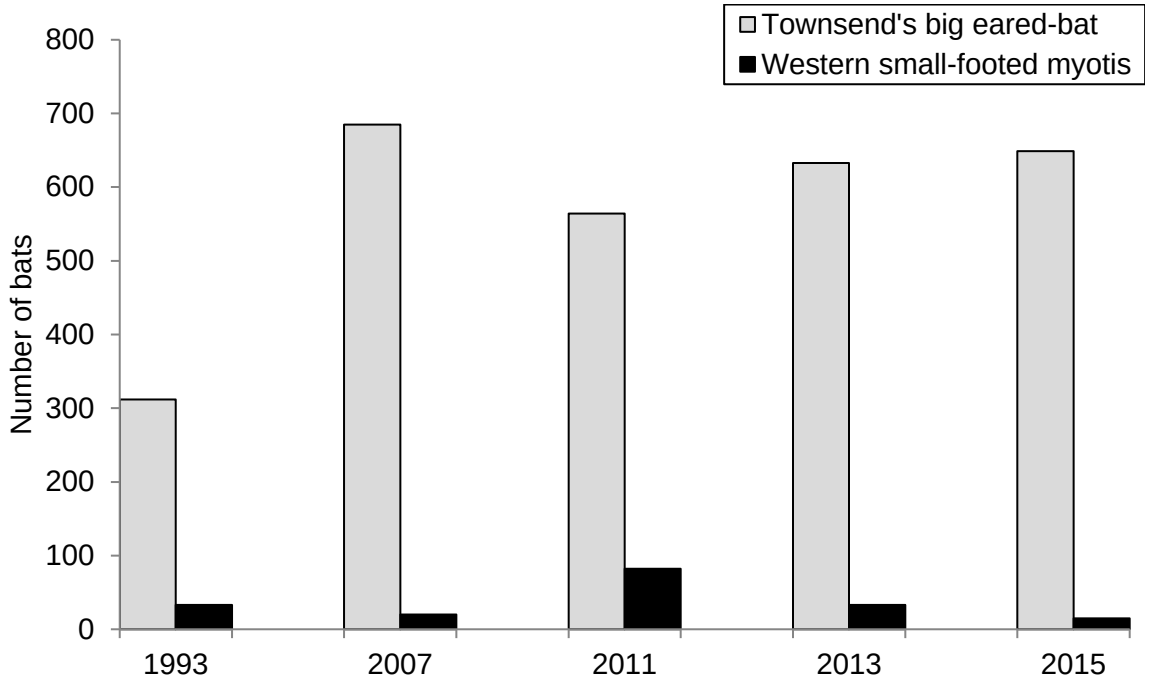


Figure 3. Number of two bat species counted at the three largest known hibernacula (Middle Butte, Rattlesnake, and Aviator caves) on the INL Site in each year when consistent methods were used to survey for those mammals.

In March 2016, the disease was detected in Washington State when a downed little brown bat was found near Seattle and submitted to the U.S. Geological Service National Wildlife Health Center (NWHC) for testing. Based on the results of molecular and histological testing, the NWHC confirmed that the bat was positive for the white-nose pathogen. This represents a 1,300-mile westward leap in the disease's impact area. Later in 2016 a silver-haired bat in Washington tested positive for *Pd*, the fungus that causes WNS. Consequently, the 3 northwest states, Idaho, Washington, and Oregon have been elevated nationally to the Intermediate Management Zone for WNS.

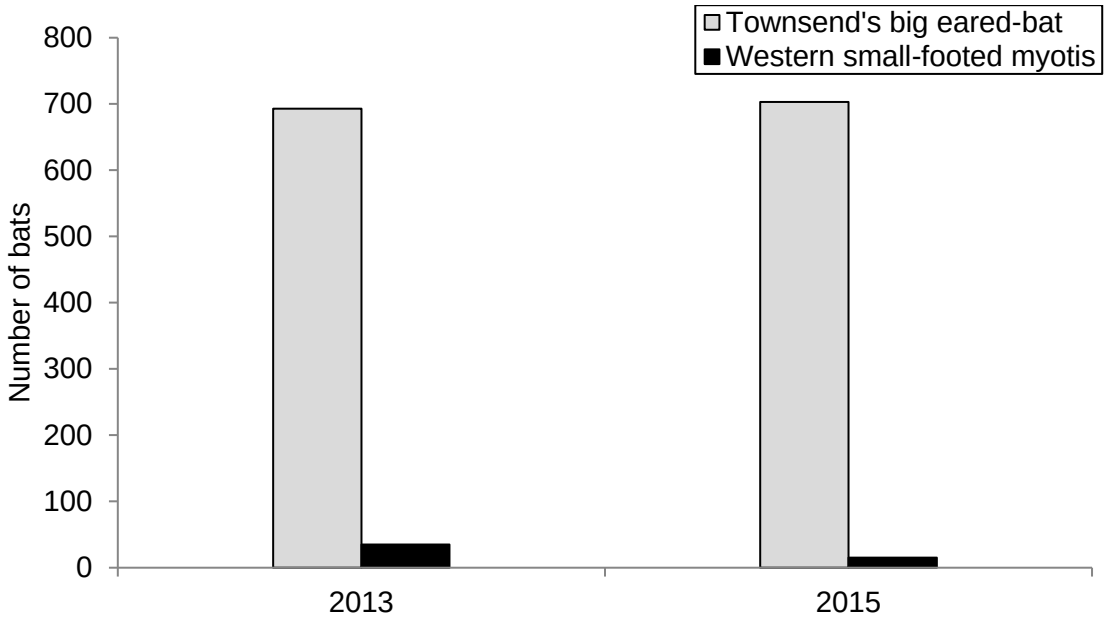


**Figure 4. Number of two bat species counted at all nine known hibernacula on the INL Site each year when consistent methods were used to survey for those mammals. Link Sausage Cave was not surveyed in 2015. Historically, we have only counted 6 (*SD* ± 4 bats) Townsend's big-eared bats in that cave.**

So far the disease has not been detected in Idaho. Nevertheless, an apparent 1,300-mile leap in the progression of the disease is without precedent and state and federal resource managers are concerned that unknown intermediate infected sites may exist. To address this concern, IDFG is leading a statewide coordinated interagency effort to try to detect the white-nose organism and improve our ability to detect potential white-nose susceptible species at their hibernation sites. A collaborating team has been assembled to prepare a coordinated interagency response plan.

WNS is a potential threat to all myotis species (including little brown myotis and western small-footed myotis) at the INL Site as well as big brown bats. Eastern populations of Townsend's big-eared bats appear unsusceptible to WNS infection and it is presumed this would be true for our Townsend's as well.

## 3.3 Loss or modification of habitat around caves

The loss or modification of vegetation around caves can impact hibernacula and roost sites (USFWS 1995, Pierson et al. 1999, Gruver and Keinath 2006). When vegetation around the entrance of a cave is removed, modified, or degraded the internal cave microclimate (i.e., humidity and temperature) can be altered (Sheffield et al. 1992, Kunz and Lumsden 2003). For example, clearing trees around the entrance of a cave may increase summer temperatures and decrease winter temperatures in the cave (Sheffield et al. 1992). Decreases in the amount of vegetative cover in areas surrounding winter roosts can negatively affect hibernating bats (Lesinski 2009). Such clearing of vegetation can change surface wind patterns, affecting air flow in and out of the cave and thus altering the amount of suitable habitat in the cave or rendering the cave uninhabitable altogether (Sheffield et al. 1992, Hayes 2003, Kunz and Lumsden 2003). In addition, hibernating bat species typically gather at hibernation sites in the fall and feed heavily in the habitats immediately surrounding caves. Here is where the bulk of the accumulation of

winter fat reserves occurs. Loss of foraging habitat around caves can lead to reduced winter survival for these bats.

Large-scale fires on the INL Site are the most likely threat to cause large-scale modification of habitat near caves. Historically, wildland fires in the upper Snake River Plain have been associated with extended periods without precipitation during summer. Those conditions were almost always followed by high winds, dry thunderstorms, and lightning associated with the eventual passage of a cold front. Climate change has the potential to alter weather patterns and fire regimes in the western USA (IPCC 2007). The Snake River Plain is expected to become hotter over the next century, and most climate models predict higher winter precipitation and lower summer precipitation relative to current levels (Karl et al. 2009). In the future, the number of wildland fires may increase due to more frequent and extended summer dry periods. This potential increase in wildland fire could accelerate the loss of big sagebrush, reduce the likelihood of sagebrush recovery, and modify habitat near caves; which may affect the use of hibernacula and roost sites by many bats on the INL Site (Sheffield et al. 1992, Bosworth 1996, Adams 2003). This is particularly true for hover-gleaning bat species, such as Townsend's big-eared bat, which depend on the physical structure of woody species vegetation for foraging.

This threat affects all of the INL Site's cave bats and transient seasonal migrants (hoary bat and silver-haired bat) that visit caves in the fall. All five SGCN bats occurring at the INL Site are potentially impacted by habitat loss around caves.

## 3.4 Environmental contaminants and wind-energy development

Historically, DOE investigated potential radionuclide uptake and dose assessment for wildlife that used wastewater ponds on the INL Site. Some of those wildlife species included small mammals (Halford and Markham 1978, Markham and Halford 1985, Arthur et al. 1986), pronghorn antelope (*Antilocapra americana*) (Markham et al. 1980, Markham et al. 1982), as well as waterfowl and mourning doves (*Zenaida macroura*) (Halford et al. 1981, Halford et al. 1982, Markham and Halford 1982, Halford et al. 1983). Those evaluations determined that radionuclide uptake from wastewater ponds at INL Site facilities did not pose a discernable threat to those wildlife. None of the wildlife species assessed in those studies, however, have the physiology and long lifespan of bats (e.g., > 20 years old). Additionally, assessment of radionuclide uptake by invertebrates, the primary food source for bats on the INL Site, determined that insects may concentrate radionuclides from water by a factor of 10 to 1,000 times depending upon the isotope (ICRP 2009, IAEA 2014, Warren et al. 2014). That uptake results primarily from adsorption and absorption of radionuclides from the water (Whicker and Shultz 1982).

More recently, an ecological risk assessment for the INL CERCLA Disposal Facility Complex at INTEC evaluated hazard indices for bats (DOE-ID 2010). (Hazard indices are the summation of the hazard quotients for all radionuclides/chemicals to which an organism is exposed. A hazard index value of 1.0 or less than 1.0 indicates that no adverse effects are expected to occur.) That assessment used the Townsend's big-eared bat to represent all bat species that could occur at that facility. To determine the hazard indices for radionuclide and chemical contaminants; soil and water concentrations were used along with bioconcentration, biotransfer factors, and exposure modeling developed by the Environmental Protection Agency (EPA 1993, 1999). Based on those evaluations, the total hazard indices for chemical components was 1.8 E-2 (hazard indices are unitless), for internal radionuclides that value was 1.5 E-3, and for external radionuclides that value was 5.0 E-4 (DOE-ID 2010). Since all the hazard indices were well below 1, DOE determined that both chemical and radionuclide constituents posed limited risks to bats.

In that ecological risk assessment the deer mouse (*Peromyscus maniculatus*), meadow vole (*Microtus* spp.), mouse (*Mus* spp.), and rat (*Rattus* spp.) were used as surrogates for bat food habits

(DOE-ID 2010) and were sufficient to evaluate available data for the EPA ecological risk assessment process. Although some of those mammals eat insects, they are mainly omnivores and opportunistic foragers and thus a relatively small portion of their diets include insects (Martin et al. 1951). Because INL bat species are exclusively insectivorous (Martin et al. 1951), insects have relatively high concentration ratios for radionuclides (Whicker and Shultz 1982, ICRP 2009, IAEA 2014, Warren et al. 2014), and bats are much longer-lived than any of the surrogate species (1 to 5 years for surrogate and > 20 years for some bats) additional radiological assessments may be warranted for bats that drink water, and feed on insects, from the radiologically contaminated ponds.

Wind-energy development is expanding rapidly across the western USA, and researchers have been surprised at the unprecedented mortality rate of bats at many of these facilities (Arnett et al. 2008, Cryan 2011, Smallwood 2013). Estimates of bat mortality from wind energy facilities vary, but fatality estimates for the U.S. suggest over 600,000 bats were killed by wind turbines during 2012 (Hayes 2013). Migratory tree-roosting species (e.g. hoary bats and silver-haired bats) make up a large portion of bats killed by wind turbines and both of these species are identified as SGCN and occur at the INL Site. Some little brown myotis (Idaho SGCN and petitioned for ESA listing) mortality has been recorded at wind energy plants as well. Part of DOE's core mission is the development of renewable clean energy sources, including wind power. DOE recognizes the negative impacts wind power has on bats and advocates developing strategies to minimize and mitigate these impacts, including funding research and development in this area. DOE has evaluated the INL Site's wind energy generating potential but there are currently no wind energy facilities on the Site or substantive plans for any in the future.

# 4.0 CONSERVATION MEASURES AND MITIGATION FOR BATS ON THE INL SITE

Conservation measures for bats are any actions that contribute to the conservation of these mammals or their habitat (USFWS 2014). These actions can include avoidance, minimization, mitigation, and proactive measures for bats and their habitat (USFWS 2014). Overarching and reinforcing all efforts to conserve and protect bat species at the INL Site is restriction of public access to all lands within the boundaries of the INL Site, including all facilities and natural areas, including all caves. Historically, disturbance or indiscriminate killing of bats in hibernation caves and destruction of occupied maternity roosts were probably the two greatest impacts to bat species and were the cause of ESA listing in most cases. On the INL Site, the prohibition of public access not only secures valuable shrub steppe habitats from degradation but also protects all cave features from recreational intrusion and vandalism. The protective force in place at the INL Site since 1949 for national security and public safety has done a great deal to conserve bat populations in eastern Idaho. With the added concern of WNS introduction and spread, further cave access restrictions have been applied and even DOE personnel and environmental contractors are required to submit a cave entry proposal that must be approved prior to any cave entry is permitted (DOE-ID 2016). Authorized cave entries must be limited in the number of participants, the duration of each visit, and the number of visits to the fewest required to collect necessary data supporting bat conservation at the INL Site.

Public outreach is an important conservation measure for bats as these mammals are most often presented negatively in the media and our culture (Sheffield et al. 1992, Adams 2003, Gruver and Keinath 2006). Through the ESER program, DOE has worked extensively to provide public outreach regarding bats and their habitat. Since 2011, the ESER Program has given 18 presentations to children ages five to 13 regarding the biology, ecology, and misconceptions about bats. Those presentations have reached over 1,600 students in 18 schools in southeastern Idaho. In addition, the ESER Program has taught over 100 elementary, junior high, high school, and university teachers in six teacher workshops regarding bat ecology and research on the INL Site. Additionally, the ESER Program has teamed with Craters of the Moon National Monument and Preserve, Idaho Department of Environmental Quality, IDFG, and Portage, Inc. to develop a webcast series that will provide students an understanding of the work that scientists are doing in southeastern Idaho. Several of these webcasts will discuss local bat ecology and research. All the previously listed presentations will be given to similar audiences each year in the foreseeable future. The ESER Program has also produced two articles for local newspapers and has given over 15 presentations and posters at scientific (The Wildlife Society) and local meetings (Master Naturalists) about bat ecology, conservation, and monitoring in southeastern Idaho and on the INL Site. In 2015 DOE produced a brief educational video vignette titled, “Bat Monitoring at the Idaho National Laboratory.” The video, posted on YouTube, describes bats and their habitat at the INL Site as well as presenting information on threats to bats and the INL Site bat monitoring program (https://www.youtube.com/watch?v=TiMZWnqGZlw).

Establishing interagency groups to facilitate inventory, monitoring, and to coordinate surveys is another important conservation measure for bats (Sheffield et al. 1992, Pierson et al. 1999, Gruver and Keinath 2006, USFWS 2014). ESER bat biologists have participated in the Western Bat Working Group since 1998. One ESER Bat Biologist (Doering) is co-chair of the Idaho Bat Working Group. Since 2011, DOE and the ESER Program have been active participants in the Eastern Idaho Bat Collaborative; which includes biologists from the Department of Defense, U.S. Forest Service (USFS), IDFG, USFWS, BLM, and Craters of the Moon National Monument and Preserve. Additionally, general guidelines for bat conservation indicate that large landholders (i.e., USFS, Department of Defense, etc.) should perform baseline surveys for bats across seasons (USFWS 2014). DOE has been doing such in conjunction with the Eastern Idaho Bat Collaborative since 2011 with passive and active acoustical detectors deployed across the INL Site (at caves and facilities) and by conducting surveys in nine hibernacula (Section 5).

For the past two years, ESER biologists have also helped the BLM, IDFG, and Craters of the Moon National Monument and Preserve biologists deploy, service, and interpret data from acoustical detectors set at caves, as well as data from hibernacula surveys. DOE and the ESER Program plan to continue these collaborations.

Table 2 summarizes threats to bats and their habitat that are most relevant to the INL Site, as well as conservation measures and implementation of these measures by DOE to minimize threats to bats on the INL Site.

**Table 2. Threats affecting bats and their habitat (Sheffield et al. 1992, USFWS 1995, Pierson et al. 1999, Adams 2003, Gruver and Keinath 2006, USFWS 2014) that are most likely to occur on the INL Site, as well as recommended conservation measures and the implementation of these measures on the INL Site.**

| | Threats | Recommended Conservation Measures | Implementation of Conservation Measures by DOE |
|---|---|---|---|
| ***Disturbing hibernating bats and destruction/modification of hibernacula and summer roosts*** | | | |
| 1 | Recreational caving/unlawful entry into caves | • Identify hibernacula and restrict access to these features. | • DOE has identified hibernacula and implemented a Cave Resource Management Policy and Protocol (DOE-ID 2016), which limits entry into caves.<br>• Security officers patrol areas of the INL Site for trespass.<br>• Cave locations are not distributed. |
| 2 | Research, monitoring, and inventory | • Establish a permit process for research required cave entry and bat handling activity.<br>• Hibernacula surveys should be conducted every other year; surveys should be conducted with caution, quickly, and quietly. | • DOE has a Cave Resource Management Policy and Protocol (DOE-ID 2016) and the ESER Program has a Cave Protection and Access Procedure (OP-8 2012). These documents indicate that investigators who enter a cave must write a cave entry plan and receive a permit for such entry.<br>The ESER Program operates under a bat monitoring procedure (RP-8 2014)<br>• The ESER Program conducts hibernacula surveys every other year, and investigators use caution when conducting surveys and perform counts quickly and quietly. |
| 3 | Activities that produce loud noises near hibernacula and important summer roosts | • Limit activities that produce continuous noise ≥ 75 decibels within a 1 mile (1.6 km) radius of hibernacula and important summer roosts. | • No current INL Site facilities are within 1 mile of any known hibernacula. DOE would avoid planning any future facilities within 1 mile of any known hibernacula. DOE would not conduct loud noise producing activities near known hibernacula. |
| 4 | Explosives near hibernacula and important summer roosts | • Avoid blasting within a 0.75 mile* (1.2 km) radius of hibernacula and important summer roosts. | • DOE would not conduct such activities within 0.75 miles of known hibernacula and important summer roosts. |
| 5 | Facility construction activities | • Avoid construction activities near summer roosts. | • Identify occupied roost trees inside facility boundaries. Establish work limits to avoid |

| | Threats | Recommended Conservation Measures | Implementation of Conservation Measures by DOE |
|---|---|---|---|
| | | | construction activities within tree drip lines and prevent direct disturbance to occupied roosts. Restrict activities that may damage known roost trees to outside the summer season (May 15 to August 15). |
| 6 | Removing roost trees | • Avoid removing living or dead trees. | • DOE would not remove roost trees near facilities unless they are safety hazards, overlap with construction activities, or if they are interfering with the operation of a facility.<br>• DOE would not remove trees (alive or dead) outside of facilities (e.g., in fire scars). |
| 7 | Removing anthropogenic roosting structures | • If bats are using buildings, sheds, or storage facilities that are proposed to be removed, do such outside of the maternity and hibernation season. | • DOE would search structures to be demolished to ensure that no maternity colonies or hibernating bats are present. If maternity colonies or hibernating bats are present, DOE would ensure that such work occurs outside of the presumed pup season (June 1 to July 31) and hibernacula season (November 1 to March 31) (WNS Conservation and Recovery Working Group 2015).** |
| 8 | Removing or modifying bridges, culverts, and underpasses | • Examine if bats are roosting on these features prior to construction activities. | • DOE would determine if bats are using these features prior to construction activities. If bats are observed, DOE would minimize impacts to roosting bats. |
| 9 | Pesticides, herbicides and vegetation removal | • Avoid or minimize pesticide use and vegetation removal near roosts and important foraging or other bat activity areas | • DOE would perform bat surveys along with existing biological resources surveys in areas where pesticide use, fertilizer application, herbicides and mechanical vegetation removal is planned within 150 feet of caves. |
| **WNS** | | | |
| 9 | Recreational caving/unlawful entry into caves | • Identify hibernacula and restrict access to these features. | • DOE has identified hibernacula and implemented a Cave Resource Management Policy and Protocol (DOE-ID 2012), which limits entry into caves.<br>• Security officers patrol areas of the INL Site for trespass. |

| | Threats | Recommended Conservation Measures | Implementation of Conservation Measures by DOE |
|---|---|---|---|
| | | | • Cave locations are not distributed. |
| 10 | Research, monitoring, and inventory | • Minimize the potential spread of WNS. | • DOE has a Cave Resource Management Policy and Protocol (DOE-ID 2016) and the ESER Program has a Cave Protection and Access Procedure (OP-8 2012). These documents indicate that investigators who enter a cave must write a cave entry plan and receive a permit for such entry.<br>• All personnel will follow the most recent USFWS WNS protocols when entering caves and when decontaminating equipment after exiting caves. |
| **Loss or modification of habitat around caves** | | | |
| 11 | Conversion or destruction of vegetation | • Limit wildland fires near caves.<br>• No prescribed burning of native vegetation within a 5 mile (8 km) radius of hibernacula.<br>• No large scale (> 10 acres [4 ha]) modification of native vegetation in undisturbed areas within a 1.5 mile (2.4 km) radius of hibernacula. | • The Candidate Conservation Agreement for Sage-grouse lists many conservation measures that DOE currently implements to prevent and suppress wildland fire on the INL Site (DOE and USFWS 2014). In addition, DOE committed in the Candidate Conservation Agreement to prepare a restoration assessment of vegetation following any fire that burns > 99 acres (40 ha) (DOE and USFWS 2014).<br>• DOE does not perform prescribed burns on the INL Site.<br>• DOE would not modify native vegetation near hibernacula. |
| 12 | Disposing of vegetation or soil near caves | • Avoid disposing of vegetation or soil within a 33 yard (30 m) radius of a cave. | • DOE would not designate disposal areas near caves. |
| **Environmental contaminants and wind-energy development** | | | |
| 13 | Environmental radionuclides | • Assess radionuclide levels in dead bats. | • DOE will send bat carcasses to a qualified laboratory to assess their levels of radionuclides. |
| 14 | Pesticide, herbicides and vegetation removal | • Avoid or minimize pesticide use and vegetation removal near roosts and important foraging or other bat activity areas | • DOE would consider effects of pesticide use on bats and judiciously use pesticides around buildings and wastewater ponds.<br>• DOE would perform bat surveys along with existing biological resources surveys in areas where pesticide |

| | Threats | Recommended Conservation Measures | Implementation of Conservation Measures by DOE |
|---|---|---|---|
| | | | use, fertilizer application, herbicides and mechanical vegetation removal is planned within 150 feet of caves. |
| 15 | Wind-energy development | • Follow the USFWS Land-Based Wind Energy Guidelines | • DOE has no current plans to construct wind-energy facilities on the INL Site. If plans for construction are initiated, DOE will follow the USFWS Guidelines. |

*Middle Butte, the longest cave on the INL Site, is 673 yards (615 m).

** Exceptions permitted under IDAPA 13.01.06 which states:

> "No person shall take or possess those species of wildlife classified as Protected Nongame, or Threatened or Endangered at any time or in any manner, except as provided in Sections 36-106(e), 36-401, and 36-1107, Idaho Code, by Commission rule, or IDAPA 13.01.10, "Rules Governing the Importation, Possession, Release, Sale, or Salvage of Wildlife," Subsection 100.06.b. Protected Nongame status is not intended to prevent unintentional take of these species, protection of personal health and/or safety, limit property and building management, or prevent management of animals to address public health concerns or agricultural damage."

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# 5.0 MONITORING AND SURVEYING

Monitoring and surveying are important components of management and conservation plans for bats (Pierson et al. 1999, Ingersoll et al. 2013, Wainwright and Reynolds 2013) and are integral to this Bat Protection Plan. These approaches can help with understanding trends in numbers of hibernating bats, identifying important seasonal habitat used by bats (Hendricks 2012, Ingersoll et al. 2013), and documenting the response of bats to threats. Monitoring and surveying are key to informing adaptive management (Section 6) as well as keeping DOE apprised of the effectiveness of conservation efforts. Limited monitoring and surveying of bats were conducted on the INL Site by contractors of the DOE during the past several decades. During that time several theses, reports, and publications have been produced by contractors, university researchers, and graduate students (Genter 1986, Wackenhut 1990, Bosworth 1994, Doering 1996, Haymond 1998). The majority of that monitoring and surveying, however, occurred in the late 1980s and 1990s. Since 2011, the scope, consistency, and intensity of monitoring of bats and their habitats have increased on the INL Site. In this section, we document the methods and results for baseline monitoring and surveying bats and their habitat including the number of bats observed hibernating in caves, monthly bat abundance and diversity at caves and Site facilities from acoustical monitoring, and efforts to support WNS monitoring on the INL Site. Methods developed through this work are implemented as part of this Bat Protection Plan.

In this section we also outline approaches for reporting multiple bat mortality events, as well as recovering carcasses and relocating live bats found in buildings to areas outside of buildings.

## 5.1 Hibernacula counts

Information documenting use of caves during hibernation by bat colonies is useful to assess population trends of these mammals (Adams 2003, O'Shea et al. 2003, Hendricks 2012, Ingersoll et al. 2013). The two most commonly observed bat species in INL Site caves are Townsend's big-eared bats and western small-footed myotis. Directly counting Townsend's big-eared bats can be a reliable way to estimate the number of individuals in a hibernaculum because these bats often roost in open, exposed areas of the cave during hibernation (Alcorn 1944, Genter 1986, Wackenhut 1990, Bosworth 1994). These mammals also have long ears that are curled like the horn of a ram, or sometimes ears are unfurled, which facilitates distinguishing species during hibernation (Humphrey and Kunz 1976, Genter 1986, Jagnow 1998). In contrast, western small-footed myotis often positions itself deep in cracks or crevices when hibernating and may not be as easily visible to researchers (Genter 1986, Perkins et al. 1990, Nagorsen et al. 1993, Holloway and Barclay 2001). We recognize that the number of western small-footed myotis was underestimated more so than the number of Townsend's big-eared bats (Safford 1989). Additional species may exhibit similar cryptic hibernation behavior and may have gone unobserved to date.

For establishing a baseline description of hibernating bat populations at the INL Site, we compiled and vetted records of counts of hibernating colonies of bats from surveys that were conducted by various DOE contractors, researchers, and the ESER Program over the survey period from 1984 to 2015. Only midwinter counts of hibernating colonies that were conducted between November 1 and March 31 were considered reliable (Perkins et al. 1990, Nagorsen et al. 1993, Szewczak et al. 1998) and were used. During counts, investigators visually identified and counted bats (Szewczak et al. 1998, Kuenzi et al. 1999, Wainwright and Reynolds 2013), and used care to minimize disturbance of hibernating bats when conducting surveys (Sheffield et al. 1992, Sikes et al. 2011, Wainwright and Reynolds 2013). The fewest personnel needed to conduct the work and maintain safety were used. Time in the hibernaculum, use of lights and talking were minimized as well. For our baseline estimate surveys (number of counts = 34), the mean (± *SD*) number of investigators that entered caves and counted bats in hibernacula was 3 ± 1.2 (range = 1 to 6 investigators).

Of nine known bat hibernacula on the INL Site; Middle Butte, Rattlesnake, and Aviator caves have been surveyed most frequently and consistently (Table 3). Investigators surveyed the nine caves for hibernating bats on 44 occasions from 1984 to 2015 (Table 3). The mean (± *SD*) number of times that investigators surveyed each cave was 5 (± 3, range = 2 to 9 surveys). Townsend's big-eared bats were observed in all nine caves; whereas, western small-footed myotis were only observed in four caves (Table 3). Middle Butte and Rattlesnake caves were the only caves in which biologists observed big brown bats hibernating. Those bats were observed in those two caves during the winter of 1992 and 1993 (Table 3). The largest hibernating colony of Townsend's big-eared bats occupied Middle Butte Cave (Table 3). The largest hibernating colony of western small-footed myotis occupied Rattlesnake Cave (Table 3). Trends in the abundance of Townsend's big-eared bats and western small-footed myotis in the three largest hibernacula on the INL Site have remained relatively stable over almost the last decade (Figure 3), and trends of those species have remained similar over the past two counts in all nine hibernacula on the INL Site (Figure 4).

Under this Bat Protection Plan, all internal surveys will be conducted consistent with OP-8, ESER Cave Protection and Access and an approved INL Site cave entry permit. Hibernating bats will be counted in caves every other year beginning in the winter of 2016.

## 5.2 Passive Acoustic Monitoring

Quantifying the relative abundance and distribution of nocturnal and solitary species, such as bats, presents challenges (Miller 2001); however, recent advances in acoustic sampling have allowed investigators to quantify and compare bat diversity and activity across sites, seasons, and species using the recording and analysis of bat echolocation search calls (Britzke et al. 1999, Britzke and Murray 2000, Miller 2001). We deployed AnaBat Detectors at eight INL Site facilities and the four largest hibernacula from 2012 to 2015 (Table 4). Each detector was mounted on a stand or placed on an existing chain-link fence (at facilities). Microphones were placed at an average (± SD) height of 3.1 m (± 0.07 m, range = 3.0 to 3.2 m) above the ground. At large entrance caves with collapse craters, we placed AnaBat units at the lip of the crater so that we sampled the area of the crater. At caves with smaller openings, we set the detector near the opening of the cave. At facilities, we placed AnaBat units at a location between the facility and near the wastewater ponds so we could detect bats transiting between ponds and potential roosting areas (trees and buildings at facilities). We oriented microphones to maximize detection near the area of interest (e.g., cave crater, pond etc.) at each site while trying to avoid recording near-surface noise and confounding echoes (Clifford et al. 2009).

**Table 3. Hibernacula, years of surveys, as well as species and number of individuals counted during winter surveys on the INL Site.**

| Cave | Survey years | Species | Mean (± *SD*) | Range |
|---|---|---|---|---|
| Aviator[a] | 1990, 1993, 2007, 2011, 2013, 2015 | Townsend's big-eared bat | 71 (24) | 44 to 112 |
| | | Western small-footed myotis | < 1 | 0 to 1 |
| College[b] | 1992, 2013, 2015 | Townsend's big-eared bat | 2 (1.5) | 0 to 3 |
| East Boundary[c] | 2013 and 2015 | Townsend's big-eared bat | 24 | 23 to 25 |
| | | Western small-footed myotis | 1 | 0 to 2 |
| Link Sausage | 1984/1985, 1989, 1992, 2013 | Townsend's big-eared bat | 6 (3.8) | 3 to 11 |
| Middle Butte[a] | 1984/1985, 1988, 1989, 1993, 2007, 2011, 2012, 2013, 2015 | Townsend's big-eared bat | 241 (193) | 15 to 464 |
| | | Western small-footed myotis | 10 (10) | 1 to 35 |
| | | Big brown bat | < 1 | 0 to 2 |
| Moonshiner[c] | 1984/1985, 1992, 2013, 2015 | Townsend's big-eared bat | 4 (5) | 1 to 12 |
| North Tower Earl[c] | 1993, 2013, 2015 | Townsend's big-eared bat | 3 (< 1) | 0 |
| North Tower Wackenhut[c] | 1988, 2010, 2013, 2015 | Townsend's big-eared bat | 20 (7) | 10 to 25 |
| Rattlesnake[a] | 1984/1985, 1988, 1989, 1992/1993, 2004, 2007, 2011, 2013, 2015 | Townsend's big-eared bat | 140 (15) | 127 to 175 |
| | | Western small-footed myotis | 27 (14) | 6 to 47 |
| | | Big brown bat | < 1 | 0 to 2 |

[a]Hibernacula in which we deployed three temperature and humidity loggers.

[b]Hibernacula in which we deployed one temperature and humidity logger.

[c]Hibernaculum in which we deployed two temperature and humidity loggers.

**Table 4. Number of nights during the non-hibernation season (April 1 to October 31) that AnaBat Detectors functioned at the four largest hibernacula and INL Site facilities from 2012 to 2015.**

| Feature | April | May | June | July | August | September | October |
|---|---|---|---|---|---|---|---|
| ***Hibernacula*** | | | | | | | |
| Middle Butte | 51 | 38 | 16 | 35 | 39 | 51 | 34 |
| Rattlesnake | 22 | 46 | 42 | 55 | 61 | 56 | 47 |
| Aviator | 34 | 34 | 49 | 55 | 66 | 49 | 50 |
| East Boundary | 44 | 60 | 45 | 72 | 75 | 52 | 53 |
| ***Facilities*** | | | | | | | |
| Advanced Test Reactor Complex | 0 | 17 | 2 | 19 | 39 | 59 | 32 |
| Central Facilities Area | 25 | 15 | 2 | 15 | 56 | 34 | 58 |
| Idaho Nuclear Technology and Engineering Center | 10 | 29 | 17 | 28 | 50 | 56 | 57 |
| Materials and Fuels Complex | 34 | 12 | 1 | 23 | 42 | 46 | 41 |
| Naval Reactors Facility | 36 | 5 | 41 | 63 | 58 | 56 | 36 |
| Power Burst Facility | 8 | 5 | 8 | 22 | 50 | 58 | 36 |
| Radioactive Waste Management Complex | 18 | 0 | 5 | 21 | 59 | 58 | 41 |
| Test Area North | 45 | 17 | 21 | 24 | 55 | 60 | 46 |

Detectors were programmed to monitor at least from sunset to sunrise each evening (Miller 2001). During operation, detectors monitor for ultrasound events meeting preset criteria and begin recording when triggered. Recording continues for up to 15 seconds or until either a five second gap in ultrasound is detected or 19 kilobytes of data are collected. Each recorded event is ultimately saved as a unique file (presumably a recording of one or more passes of one or more bats.) On average, we changed batteries and compact flash cards every 3-4 weeks. Our detectors were set in a variety of locations in the field (i.e., shrubby remote areas, near operating facilities and power lines) with a variety of noise environments; therefore, when powering on the detector, we would adjust the sensitivity of the AnaBat detector to exclude the ambient noise floor by turning the sensitivity knob on each AnaBat unit to a point just below continuous ambient noise detection (Britzke et al. 2013). Of 224 resets of all units from 2012 to 2014, when such data were available, the mean (± *SD*) level of the sensitivity after adjustment was 5.8 (± 0.24, range = 4.4 to 7.0). Adjusting the sensitivity ensured that detectors did not record excessive amounts of unusable ambient noises (i.e., sounds from wind, facility equipment, or power lines) and prematurely fill memory cards and drain batteries. AnaBat systems record efficiently using a combination of zero crossing and “divide by” (frequency division) analysis. The division ratio of all detectors was set at eight.

In general, bat search calls produce consistent repeating patterns of pulses and have species-specific characteristics (parameters) that aid in the identification of species (Britzke and Murray 2000, Miller 2001). However, search calls are primarily sensory, not communicative, and exhibit a degree of plasticity, varying based on behavior and the acoustic environment within the echo range of the bat’s calls. Thus, calls are slightly but continually modified, in order to optimize information content as a bat moves through its surroundings. Consideration should be given, therefore, to calls recorded in areas of different environmental clutter, even for the same species (Rodriguez-San Pedro and Simonetti 2014).

Recording bats in areas of high clutter may complicate identification for some species, especially between species that have similar calls in high-clutter areas (Gorresen et al. 2008, Rodriguez-San Pedro and Simonetti 2014). Because of specific locality information required for this BPP, our detectors were necessarily set in areas of differing environmental clutter, sometimes in areas prone to high clutter and multiple bat species active in close proximity to each other. Therefore, we categorized our sampling areas based on the amount of surrounding environmental clutter as follows:

- Low—open environments with little or low vegetation and few bats flying in close proximity to each other (e.g., East Boundary Cave and INL Site facilities except Power Burst Facility (PBF)).
- High—nearby complex vertical structure (deep cave craters, such as Middle Butte and Rattlesnake caves) and potential for bats foraging in close proximity to each other.
- Mixed—small areas of vertical structure (trees and small cave craters) in otherwise open environment (e.g., PBF and Aviator Cave).

Bat calls were processed and analyzed using AnaLookW software (version 4.1C). In AnaLookW, we screened and analyzed recorded call sequences (bat call files) using filtering tools that identify user-directed call characteristics and can also be used to removed noise and unusable pulses. (Britzke and Murray 2000, Clifford et al. 2009, Britzke et al. 2010). Scanning call files with filters in AnaLookW is a powerful, objective, and consistent way to process large datasets. Investigators can modify the filter parameters to select pulse sequences for local bat communities (Britzke and Murray 2000). Filters may be further modified to search for any specific calls meeting desired criteria. For our analyses, basic bat filters were developed based on a call library of approximately 2,000 calls of known species previously recorded at the INL Site or in similar habitats on the Snake River Plain. Filter parameters used for this analysis are presented in Table 5. We produced INL Site-specific filters for common species and groups of species with consideration of the clutter environments listed above. Using our filters, AnaLookW then assigned bat call sequences to species or groups of species within call files and automatically labeled files by species or group for sorting and further analyses (Table 5).

For data analyses, we calculated an activity index (AI) for bats by summing the number of 1-minute intervals with at least 1 bat pass (i.e., a train of pulses recorded when a bat passed through microphone's detection zone) in each month, and then dividing that number by the number of nights the detector functioned (from at least sunset to sunrise) in each month (Miller 2001). We then multiplied that value by 100, so that values were represented as whole numbers. Using the occurrence of a species in a 1-minute time interval as an activity index can reduce the potential bias associated with varying sensitivity of detectors, a single bat persistently flying near detectors, variation between calls of different species (Miller 2001), and variation within a bat call (i.e., a search phase, an approach phase, and when flying in high clutter) (Rodriguez-San Pedro and Simonetti 2014).

It should be noted that the atmosphere is an imperfect medium for the transmission of ultrasound within the frequency range of bat species occurring at the INL Site (Wiley and Richards 1978). The atmosphere acts as a variable low pass filter at ultrasonic frequencies, with inhibition of the transmission of ultrasound increasing with bat call frequency (Lawrence and Simmons 1982). This attenuation of ultrasonic signals is affected by the original amplitude and frequencies of bat call pulses generated and temperature, relative humidity, barometric pressure, and micro-heterogeneity of the atmosphere (Griffin 1971, Wiley and Richards 1978). The practical result of this is detectors are effectively sampling larger volumes of air to detect low frequency species than they are higher frequency and soft calling species. Although we cannot determine, with any precision, the effects of varying temperature, humidity and barometric pressure on call detection distance, we can assume unequal detectability among species. With these limitations, our method of calculating activity indices allows for some generalizations to be made regarding temporal and special variation in bat activity within species, less so among species.

From April 2012 to October 2014, AnaBat detectors functioned for a combined total of 3,102 nights at 12 locations (Table 4). Detectors recorded 1.55 million files, 1.18 million of which contained bat calls that passed our initial noise filters. Table 6 presents a compilation of AIs for all bats combined, target species, and species groups organized by month and feature (monitor location). Figures 5A through 5L present bar graph summaries of these data organized by feature. Figures were organized to allow for general patterns at each feature (facility or cave) to be readily apparent.

**Table 5. Parameters of bat call pulses used to create basic filters for our analyses. Initial filters were based on published parameters and a limited regional call library for each species (indicated by abbreviations of scientific names) and species groups. See Table 1 for four letter species abbreviations.**

| Filters | # of call pulses in X sec | Fc | | Slope of call body | | $F_{min}$ | | $F_{max}$ | | Sweep | | $F_{mean}$ | | Duration | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max |
| Bat[a] | 1 in 15 | 16 | 220 | - | - | 14 | 60 | 17 | 120 | 0.5 | 70 | - | - | 1.0 | 20 |
| EPFU | 2 in 1 | 24 | 32 | 12.5 | 150 | 22 | 32 | 56 | 80 | 11 | 45 | 28 | 39.8 | 5 | 25 |
| LANO | 1 in 15 | 24.5 | 27 | -2 | 12.5 | - | - | - | - | 1.2 | 45 | - | - | 4.7 | 25 |
| LACI | 1 in 15 | 15 | 22 | -2 | 77 | - | - | - | - | 2 | 45 | - | - | 4.7 | 25 |
| COTO | 2 in 1 | 23 | 41 | 60 | 650 | 22 | 35 | 34 | 47 | 5 | 20 | - | - | 0.9 | 4.2 |
| MYEV | 2 in 1 | 31 | 41 | 196 | 9,999 | 28 | 35 | - | - | 30 | 80 | - | - | 2.0 | 4.5 |
| MYLU | 1 in 15 | 35 | 45 | 15 | 53 | - | - | 50.5 | 95 | - | - | - | - | 5.8 | 10 |
| Q25[b] | 1 in 15 | 15 | 31 | -2 | 77 | - | - | - | - | 1.2 | 45 | 4 | 35 | 4.7 | 25 |
| 40 kHz Myotis[c] | 3 in 15 | 36 | 45 | 20 | 186 | 35 | 45 | - | - | - | - | - | - | 0.9 | 7.5 |
| 50 kHz Myotis[d] | 3 in 15 | 47 | 60 | 20 | 200 | 40 | 56 | - | - | - | - | - | - | 1.4 | 7.5 |

[a]This anti-noise filter was derived from filters published in Clement et al. (2014) and modified for this analysis. Our filter was applied to a test set of 13,390 mixed noise files from regional areas and incorrectly identified 24 noise files as bat calls (0.18% error rate). Commission error rates were not calculated for each hibernacula, but filter performance was checked by visual inspection of extracted "noise" files and considered sufficient for basic summaries presented here. Environmental noise varies among locations, and all noise filters should be tailored for site conditions and error estimates determined.

[b]This species group included big brown bats, silver-haired bats, and hoary bats. These species can produce calls with considerable overlap, especially in high clutter environments. The species-specific filters EPFU, LANO and LACI were derived from this filter and intended to identify diagnostic call types rather than identify all calls for these species.

[c]This species group included western small-footed myotis, little brown myotis, and long-legged myotis. A small number of western long-eared myotis call variants passed this filter. Abbreviated as MY40 in Table 6, Baseline Activity Indices.

[d]This species group included California myotis and Yuma myotis. Abbreviated as MY50 in Table 6, Baseline Activity Indices.

**Table 6. Baseline activity Index (AI) summary tables for all features (facility or cave). Calculations are based on bat call files collected from April 2012 to October 2014. For this analysis AI is defined as the number on one minute intervals containing at least one call sequence passing our filters divided by the number of full nights (at least sunset to sunrise) that a detector operated during each month. This value was then multiplied by 100. A value of zero indicated an AI of zero (i.e. no activity); n/a indicates no data met our analysis criteria for that month. See Tables 1 and 5 for abbreviations.**

**FACILITIES**

**ADVANCED TEST REACTOR COMPLEX**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| MAY | 18235.3 | 0.0 | 88.2 | 11.8 | 164.7 | 47.1 | 1200.0 | 400.0 | 15823.4 | 47.1 |
| JUNE | 1641.2 | 0.0 | 0 | 5.9 | 0 | 5.9 | 258.8 | 23.5 | 1476.5 | 0.0 |
| JULY | 37429.4 | 0.0 | 152.9 | 164.7 | 58.8 | 470.6 | 6494.1 | 505.9 | 34747.1 | 482.4 |
| AUGUST | 45841.2 | 0.0 | 811.8 | 1252.9 | 511.8 | 429.4 | 5976.5 | 2729.4 | 40529.4 | 170.6 |
| SEPT | 20947.1 | 0.0 | 2252.9 | 741.2 | 3147.1 | 23.5 | 1276.5 | 6182.4 | 12588.2 | 47.1 |
| OCT | 5541.2 | 0.0 | 658.8 | 88.2 | 1152.9 | 0.0 | 252.9 | 1735.3 | 2882.4 | 0.0 |
| Average | 21605.9 | 0.0 | 660.8 | 377.5 | 839.2 | 162.7 | 2576.5 | 1929.4 | 18008.8 | 124.5 |

**CENTRAL FACILITIES AREA**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 684.0 | 0.0 | 16.0 | 4.0 | 8.0 | 0.0 | 0.0 | 32.0 | 300.0 | 0.0 |
| MAY | 14333.3 | 0.0 | 346.7 | 13.3 | 433.3 | 0.0 | 540.0 | 373.3 | 9713.3 | 66.7 |
| JUNE | 12950.0 | 0.0 | 100.0 | 0.0 | 50.0 | 0.0 | 450.0 | 200.0 | 7800.0 | 50.0 |
| JULY | 18046.7 | 0.0 | 380.0 | 40.0 | 180.0 | 53.3 | 2286.7 | 1046.7 | 14493.3 | 126.7 |
| AUGUST | 21521.4 | 0.0 | 473.2 | 408.9 | 403.6 | 87.5 | 2269.6 | 1437.5 | 17834.6 | 180.4 |
| SEPT | 9467.6 | 0.0 | 361.8 | 102.9 | 464.7 | 26.5 | 761.8 | 982.4 | 7423.5 | 100.0 |
| OCT | 3086.2 | 0.0 | 34.5 | 8.6 | 141.4 | 0.0 | 43.1 | 215.5 | 1825.9 | 27.6 |
| Average | 11441.3 | 0.0 | 244.6 | 82.5 | 240.1 | 23.9 | 907.3 | 698.2 | 8493.0 | 78.8 |

**IDAHO NUCLEAR TECHNOLOGY AND ENGINEERING CENTER**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 240.0 | 0.0 | 0.0 | 10.0 | 0.0 | 0.0 | 0.0 | 10.0 | 60.0 | 0.0 |
| MAY | 40365.5 | 0.0 | 255.2 | 20.7 | 206.9 | 351.7 | 2613.8 | 455.2 | 37851.7 | 1365.5 |
| JUNE | 29382.4 | 0.0 | 188.2 | 29.4 | 164.7 | 458.8 | 1082.4 | 300.0 | 25058.8 | 323.5 |
| JULY | 34732.1 | 0.0 | 207.1 | 21.4 | 128.6 | 675.0 | 8333.3 | 314.3 | 31896.4 | 1264.3 |
| AUGUST | 45346.0 | 0.0 | 240.0 | 208.0 | 148.0 | 1060.0 | 8030.0 | 634.0 | 41796.0 | 1838.0 |
| SEPT | 20351.8 | 0.0 | 389.3 | 123.2 | 632.1 | 121.4 | 4012.5 | 1094.6 | 17271.4 | 153.6 |
| OCT | 6791.2 | 0.0 | 52.6 | 3.5 | 128.1 | 19.3 | 173.7 | 171.9 | 5786.0 | 14.0 |
| Average | 25401.3 | 0.0 | 190.4 | 59.5 | 201.2 | 383.8 | 3464.5 | 425.7 | 22817.2 | 717.0 |

**MATERIALS AND FUELS COMPLEX**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 158.8 | 0.0 | 2.9 | 0.0 | 29.4 | 0.0 | 0.0 | 35.3 | 32.4 | 0.0 |
| MAY | 1075.0 | 0.0 | 41.7 | 0.0 | 125.0 | 0.0 | 16.7 | 175.0 | 700.0 | 0.0 |
| JUNE | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| JULY | 7400.0 | 0.0 | 560.9 | 208.7 | 1308.7 | 13.0 | 60.9 | 2108.7 | 5387.0 | 21.7 |
| AUGUST | 6888.1 | 7.1 | 295.2 | 790.5 | 854.8 | 33.3 | 97.6 | 2283.3 | 4092.9 | 2.4 |
| SEPT | 2602.2 | 2.2 | 82.6 | 30.4 | 450.0 | 0.0 | 32.6 | 684.8 | 1526.1 | 0.0 |
| OCT | 348.8 | 0.0 | 7.3 | 9.8 | 92.7 | 0.0 | 0.0 | 146.3 | 70.7 | 0.0 |
| Average | 2653.3 | 1.3 | 141.5 | 148.5 | 408.7 | 6.6 | 29.7 | 776.2 | 1687.0 | 3.4 |

**NAVAL REACTORS FACILITY**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 622.2 | 0.0 | 36.1 | 2.8 | 34.4 | 0.0 | 0.0 | 133.3 | 30.6 | 0.0 |
| MAY | 1540.0 | 0.0 | 100.0 | 40.0 | 240.0 | 20.0 | 60.0 | 340.0 | 320.0 | 0.0 |
| JUNE | 2451.2 | 0.0 | 48.8 | 46.3 | 63.4 | 2.4 | 68.3 | 182.9 | 1565.9 | 4.9 |
| JULY | 5874.6 | 0.0 | 63.5 | 134.9 | 71.4 | 9.5 | 261.9 | 317.5 | 4709.5 | 7.9 |
| AUGUST | 16413.8 | 0.0 | 244.8 | 2158.6 | 934.5 | 82.8 | 536.2 | 3189.7 | 10932.8 | 24.1 |
| SEPT | 4680.4 | 0.0 | 216.1 | 541.1 | 639.3 | 5.4 | 167.9 | 1521.4 | 2444.6 | 8.9 |
| OCT | 3666.7 | 0.0 | 119.4 | 208.3 | 419.4 | 2.8 | 63.9 | 819.4 | 1866.7 | 0.0 |
| Average | 5035.6 | 0.0 | 118.4 | 447.4 | 351.8 | 17.6 | 165.5 | 929.2 | 3210.0 | 6.6 |

**POWER BURST FACILITY**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 712.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 38.0 | 0.0 |
| MAY | 1740.0 | 0.0 | 260.0 | 0.0 | 200.0 | 40.0 | 0.0 | 440.0 | 1000 | 0.0 |
| JUNE | 2012.5 | 0.0 | 125.0 | 12.5 | 100.0 | 12.5 | 0.0 | 262.5 | 1012.5 | 0.0 |
| JULY | 11559.1 | 0.0 | 27.3 | 50.0 | 4.5 | 40.9 | 109.1 | 95.5 | 10568.2 | 4.5 |
| AUGUST | 7822.0 | 0.0 | 232.0 | 292.0 | 120.0 | 32.0 | 86.0 | 684.0 | 6546.0 | 6.0 |
| SEPT | 6410.3 | 0.0 | 441.4 | 58.6 | 377.6 | 36.2 | 44.8 | 900.0 | 5196.6 | 32.8 |
| OCT | 308.3 | 0.0 | 69.4 | 5.6 | 83.3 | 0.0 | 0.0 | 172.2 | 61.1 | 0.0 |
| Average | 4366.4 | 0.0 | 165.0 | 59.8 | 126.5 | 23.1 | 34.3 | 364.9 | 3488.9 | 6.2 |

**RADIOACTIVE WASTE MANAGEMENT COMPLEX**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 538.9 | 0.0 | 16.7 | 55.6 | 44.4 | 0.0 | 0.0 | 138.9 | 155.6 | 16.7 |
| MAY | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| JUNE | 11440.0 | 0.0 | 20.0 | 20.0 | 20.0 | 0.0 | 140.0 | 100.0 | 6460.0 | 20.0 |
| JULY | 21285.7 | 0.0 | 66.7 | 200.0 | 95.2 | 9.5 | 1704.8 | 471.4 | 13766.7 | 14.3 |
| AUGUST | 27013.6 | 1.7 | 298.3 | 662.7 | 584.7 | 22.0 | 1654.2 | 1663.5 | 20423.7 | 237.3 |
| SEPT | 21513.0 | 0.0 | 431.0 | 293.1 | 1056.9 | 15.5 | 1312.1 | 1812.1 | 14443.1 | 62.1 |
| OCT | 5124.4 | 0.0 | 34.1 | 14.6 | 234.1 | 0.0 | 29.3 | 329.3 | 3058.5 | 2.4 |
| Average | 14486.9 | 0.3 | 144.5 | 207.7 | 333.2 | 7.8 | 806.7 | 753.5 | 9717.3 | 58.8 |

**TEST AREA NORTH**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 3966.7 | 0.0 | 88.9 | 6.7 | 188.9 | 2.2 | 35.6 | 251.1 | 1617.8 | 8.9 |
| MAY | 14082.4 | 0.0 | 300.0 | 23.5 | 417.6 | 17.6 | 76.5 | 688.2 | 11258.8 | 5.9 |
| JUNE | 27547.6 | 0.0 | 438.1 | 123.8 | 352.4 | 42.9 | 842.9 | 766.7 | 25138.1 | 9.5 |
| JULY | 39433.3 | 0.0 | 783.3 | 423.2 | 273.2 | 250.0 | 5291.7 | 1416.7 | 37679.2 | 691.7 |
| AUGUST | 34085.5 | 0.0 | 1021.8 | 1460.0 | 532.7 | 165.5 | 5296.4 | 2936.4 | 29614.5 | 147.3 |
| SEPT | 22893.3 | 0.0 | 466.7 | 448.3 | 738.3 | 73.3 | 2863.3 | 1645.0 | 19225.0 | 191.7 |
| OCT | 8163.6 | 0.0 | 221.7 | 41.3 | 410.9 | 2.2 | 206.5 | 621.7 | 6115.2 | 6.5 |
| Average | 21454.0 | 0.0 | 474.4 | 361.8 | 425.7 | 79.1 | 2087.5 | 1189.4 | 18664.1 | 151.6 |

**CAVES**

**AVIATORS CAVE**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 2217.6 | 61.8 | 0.0 | 20.6 | 0.0 | 8.8 | 0.0 | 23.5 | 1729.4 | 14.7 |
| MAY | 3602.9 | 44.1 | 5.9 | 14.7 | 26.5 | 44.1 | 0.0 | 61.8 | 2941.2 | 20.6 |
| JUNE | 1614.3 | 120.4 | 0.0 | 14.3 | 4.1 | 0.0 | 2.0 | 30.6 | 802.0 | 59.2 |
| JULY | 5385.5 | 230.9 | 5.5 | 20.0 | 5.5 | 61.8 | 232.7 | 40.0 | 4398.2 | 170.9 |
| AUGUST | 7053.1 | 1253.1 | 13.6 | 74.2 | 42.4 | 39.4 | 89.4 | 153.0 | 4153.1 | 32.4 |
| SEPT | 8824.5 | 4193.9 | 26.5 | 144.9 | 118.4 | 0.0 | 2.0 | 320.4 | 1561.2 | 34.7 |
| OCT | 1798.0 | 340.0 | 16.0 | 2.0 | 32.0 | 2.0 | 2.0 | 68.0 | 198.0 | 0.0 |
| Average | 4357.4 | 378.6 | 9.6 | 41.5 | 32.7 | 22.3 | 46.9 | 99.6 | 2255.6 | 56.1 |

**EAST BOUNDARY CAVE**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 2231.8 | 37.7 | 0 | 22.7 | 2.3 | 6.8 | 0.0 | 47.7 | 1431.8 | 4.5 |
| MAY | 4206.7 | 633.3 | 3.3 | 15.0 | 51.7 | 20.0 | 1.7 | 121.7 | 2576.7 | 26.7 |
| JUNE | 5691.1 | 842.2 | 4.4 | 8.9 | 68.9 | 8.9 | 0.0 | 97.8 | 3204.4 | 22.2 |
| JULY | 20312.5 | 1227.8 | 9.7 | 13.9 | 5.6 | 300.0 | 137.5 | 56.9 | 16094.4 | 279.2 |
| AUGUST | 18308.0 | 1837.3 | 32.0 | 38.7 | 22.7 | 217.3 | 69.3 | 128.0 | 12016.0 | 216.0 |
| SEPT | 7119.2 | 3028.8 | 19.2 | 7.7 | 40.4 | 46.2 | 3.8 | 80.8 | 2613.5 | 15.4 |
| OCT | 1230.2 | 430.2 | 5.7 | 3.8 | 18.9 | 1.9 | 3.8 | 35.8 | 411.3 | 0.0 |
| Average | 8528.5 | 1156.8 | 10.6 | 15.8 | 30.0 | 85.9 | 30.9 | 81.2 | 5478.3 | 80.6 |

**MIDDLE BUTTE CAVE**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 12935.3 | 2949.0 | 133.3 | 190.2 | 115.7 | 1178.4 | 21.6 | 570.6 | 9407.8 | 247.1 |
| MAY | 15168.4 | 2707.9 | 284.2 | 44.7 | 71.1 | 1868.4 | 76.3 | 418.4 | 13105.3 | 618.4 |
| JUNE | 22362.5 | 5193.8 | 381.3 | 18.8 | 175.0 | 2956.3 | 250.0 | 687.5 | 19437.5 | 743.8 |
| JULY | 43828.6 | 8831.4 | 791.4 | 71.4 | 134.3 | 11637.1 | 962.9 | 1048.6 | 42211.4 | 3145.7 |
| AUGUST | 41961.5 | 11987.2 | 1466.7 | 112.8 | 192.3 | 7294.9 | 773.5 | 1705.1 | 38815.4 | 2671.8 |
| SEPT | 33474.5 | 31462.7 | 786.3 | 145.1 | 184.3 | 2313.7 | 229.4 | 1233.3 | 17262.7 | 564.7 |
| OCT | 9235.3 | 6073.5 | 70.6 | 0.0 | 14.7 | 235.3 | 8.8 | 100.0 | 2305.9 | 11.8 |
| Average | 26423.7 | 9886.5 | 553.1 | 83.3 | 126.8 | 3926.3 | 332.6 | 823.4 | 20363.7 | 1143.3 |

**RATTLESNAKE CAVE**

| | BAT | COTO | EPFU | LACI | LANO | MYEV | MYLU | Q25 | MY40 | MY50 |
|---|---|---|---|---|---|---|---|---|---|---|
| APRIL | 15713.6 | 1072.7 | 53.1 | 36.4 | 13.6 | 1153.1 | 95.5 | 168.2 | 12922.7 | 340.9 |
| MAY | 16460.9 | 2221.7 | 178.3 | 21.7 | 63.0 | 1441.3 | 115.2 | 321.7 | 14752.2 | 1391.3 |
| JUNE | 22181.0 | 3166.7 | 102.4 | 26.2 | 14.3 | 1216.7 | 107.1 | 228.6 | 20253.5 | 2888.1 |
| JULY | 34158.2 | 3463.1 | 363.1 | 45.5 | 78.2 | 3656.4 | 1610.9 | 560.0 | 32214.5 | 6843.1 |
| AUGUST | 36060.7 | 7029.5 | 796.7 | 127.9 | 150.8 | 2893.4 | 1544.3 | 1139.3 | 32739.3 | 6285.2 |
| SEPT | 31667.9 | 16321.4 | 632.1 | 51.8 | 233.9 | 1426.8 | 201.8 | 1039.3 | 21157.1 | 2696.4 |
| OCT | 7125.5 | 2976.6 | 134.0 | 0.0 | 19.1 | 242.6 | 6.4 | 178.7 | 3974.5 | 57.4 |
| Average | 23338.2 | 5173.7 | 324.5 | 44.2 | 81.9 | 1713.5 | 525.9 | 519.4 | 19717.1 | 2929.8 |

With the exception of Townsend's big-eared bat (a species of greatest conservation need), all target bat species were detected at all monitored features. Townsend's big-eared bats were detected at all caves but only at two facilities. The two facilities (MFC and RWMC) where Townsend's big-eared bats were detected are nearer to areas of the INL Site were exposed rock outcrops, caves and cave-like features are most common. Tree bats (hoary bats and silver-haired bats) were detected more frequently at facilities than at caves. Patterns reflect both resident and migrant tree bats.

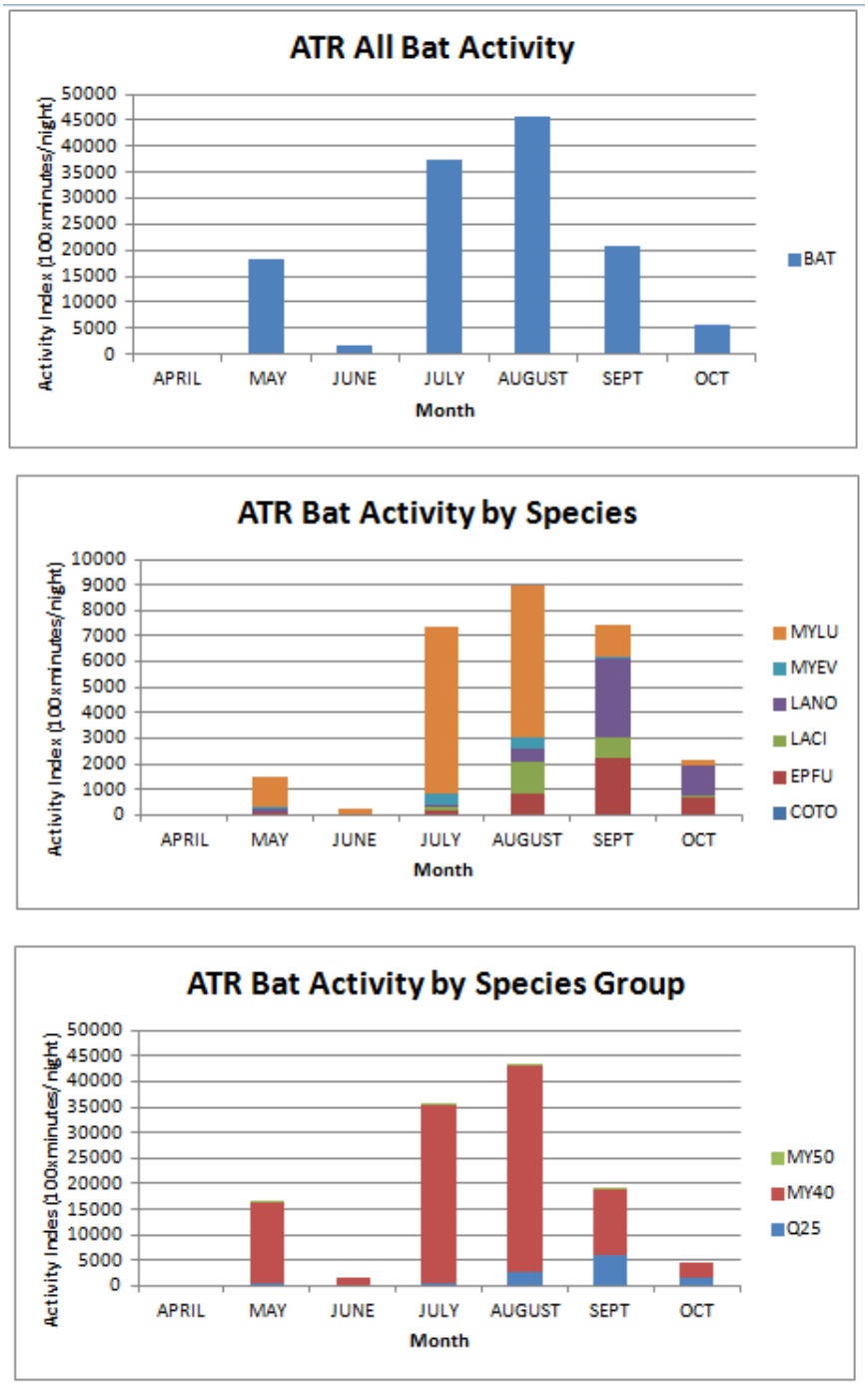


**Figure 5A. Activity Indices for all bats, target bat species, and bat species groups by month at ATR on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

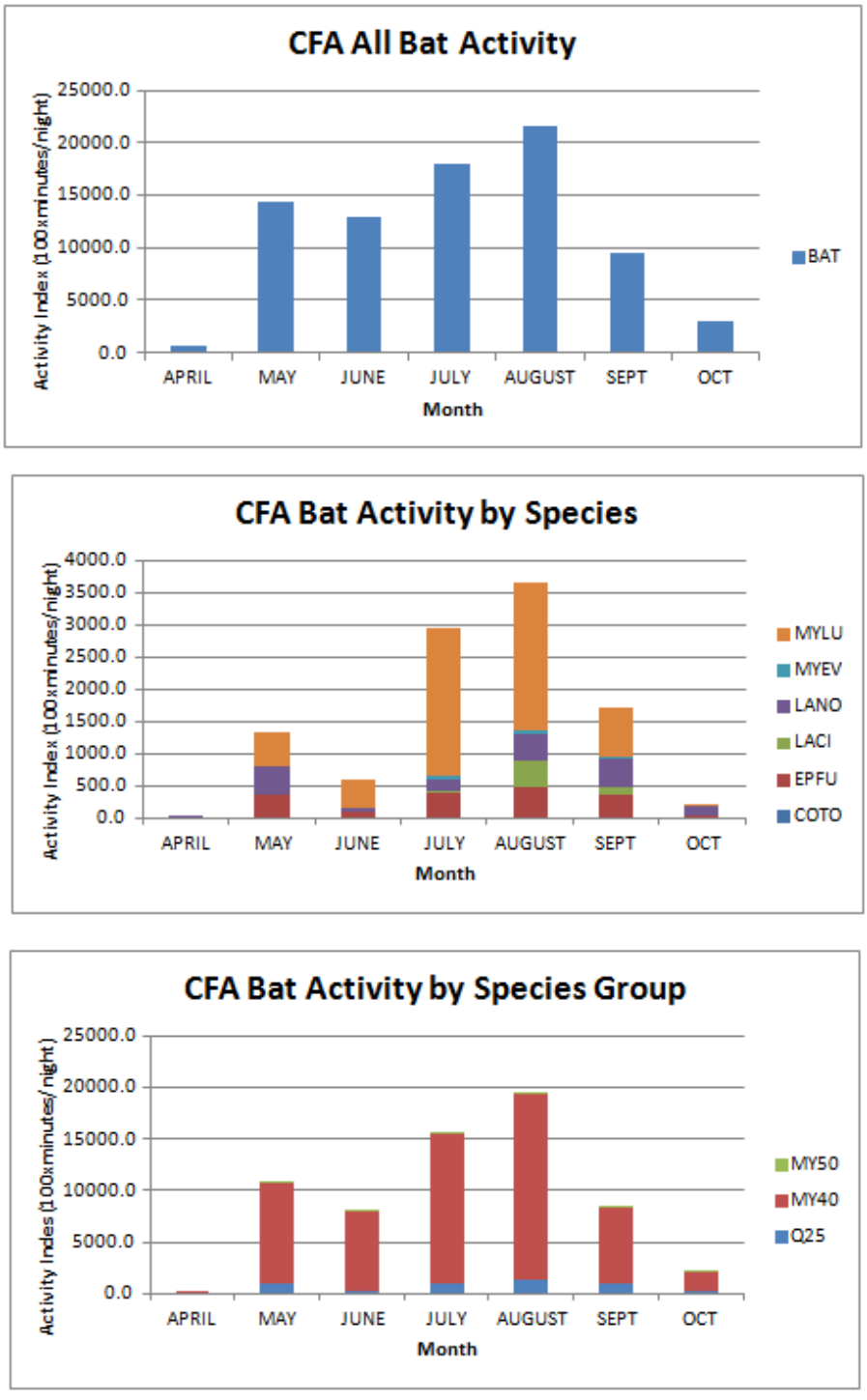


**Figure 5B. Activity Indices for all bats, target bat species, and bat species groups by month at CFA on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

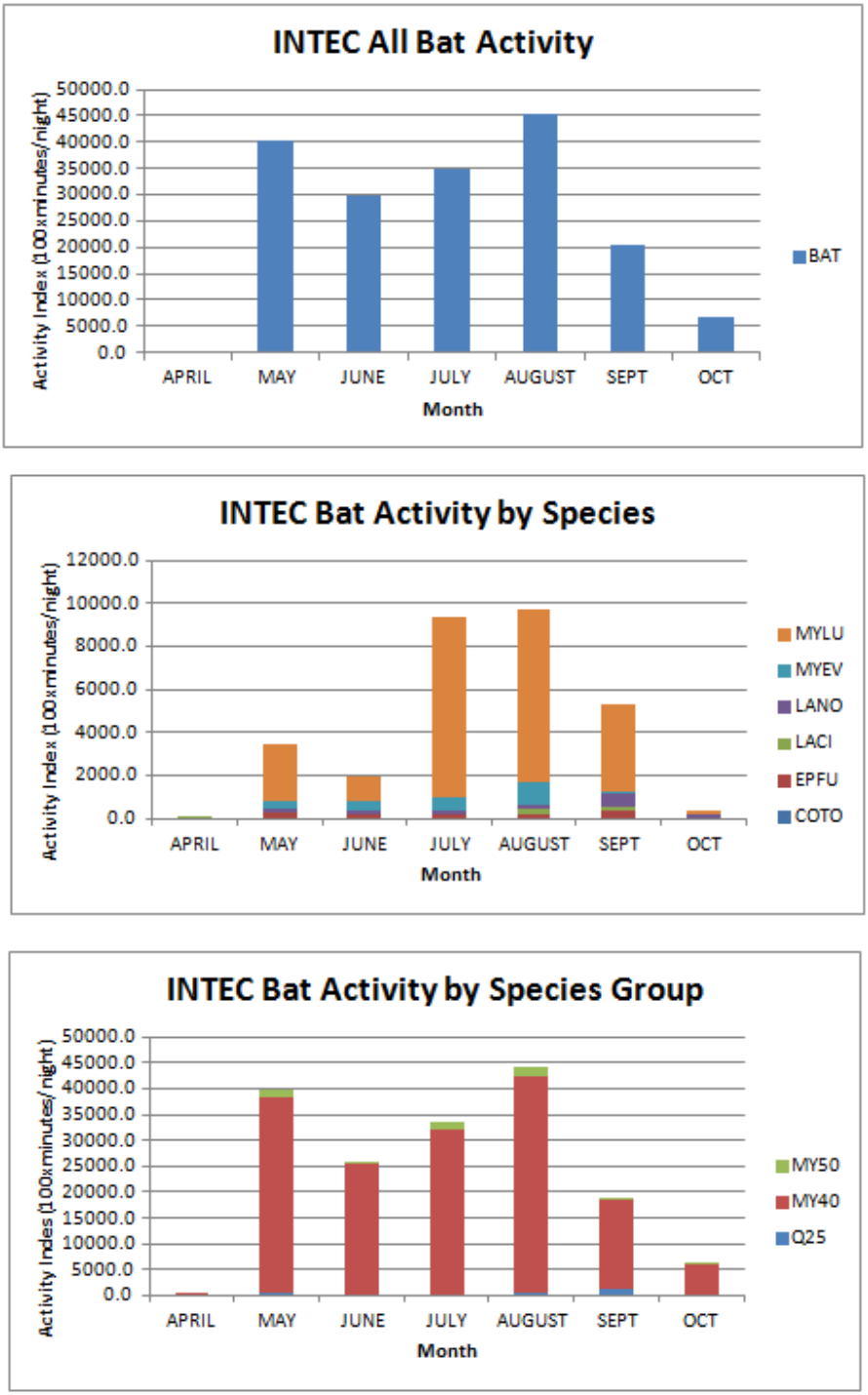


**Figure 5C. Activity Indices for all bats, target bat species, and bat species groups by month at INTEC on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU=*Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

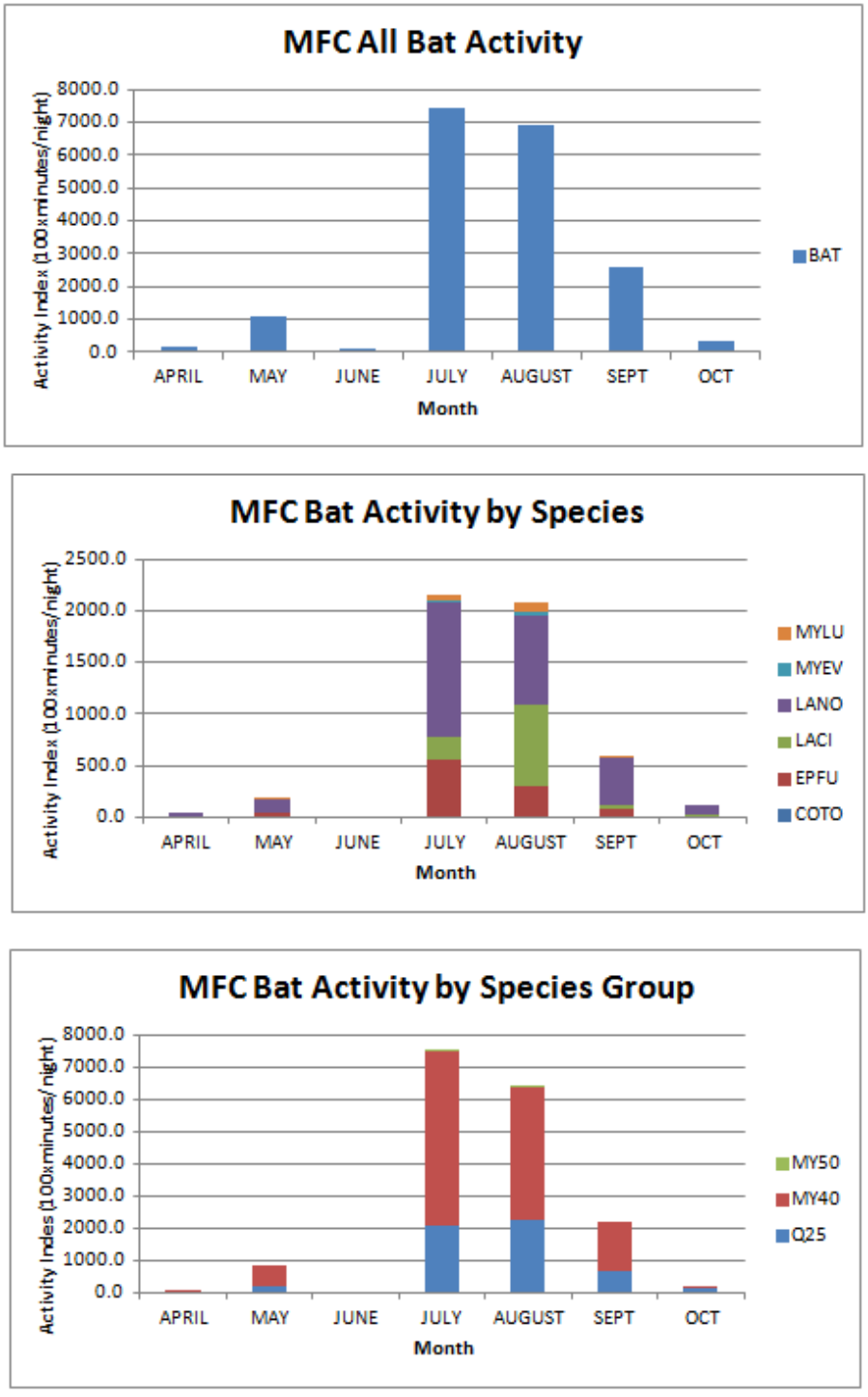


**Figure 5D. Activity Indices for all bats, target bat species, and bat species groups by month at MFC on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

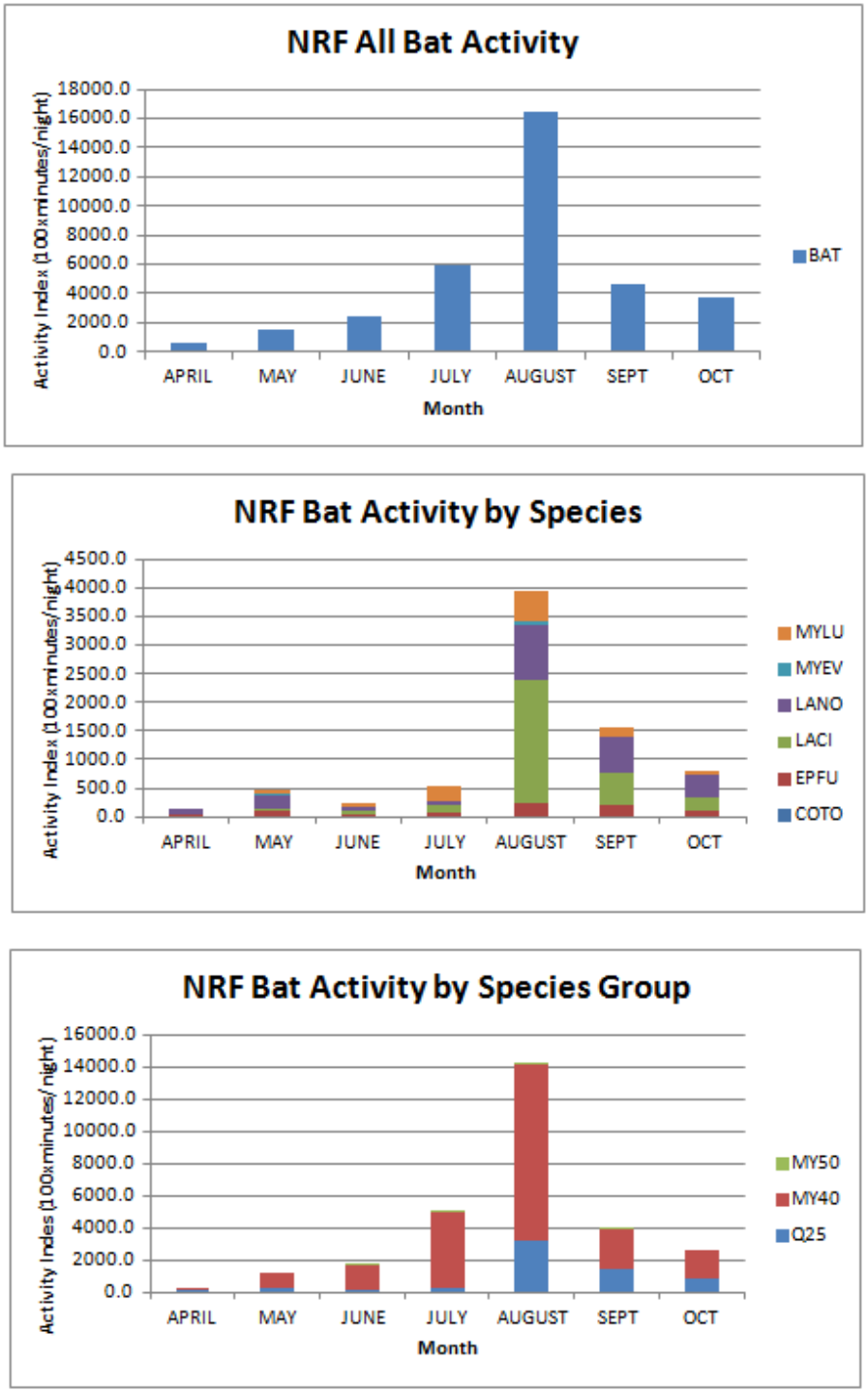


**Figure 5E. Activity Indices for all bats, target bat species, and bat species groups by month at NRF on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

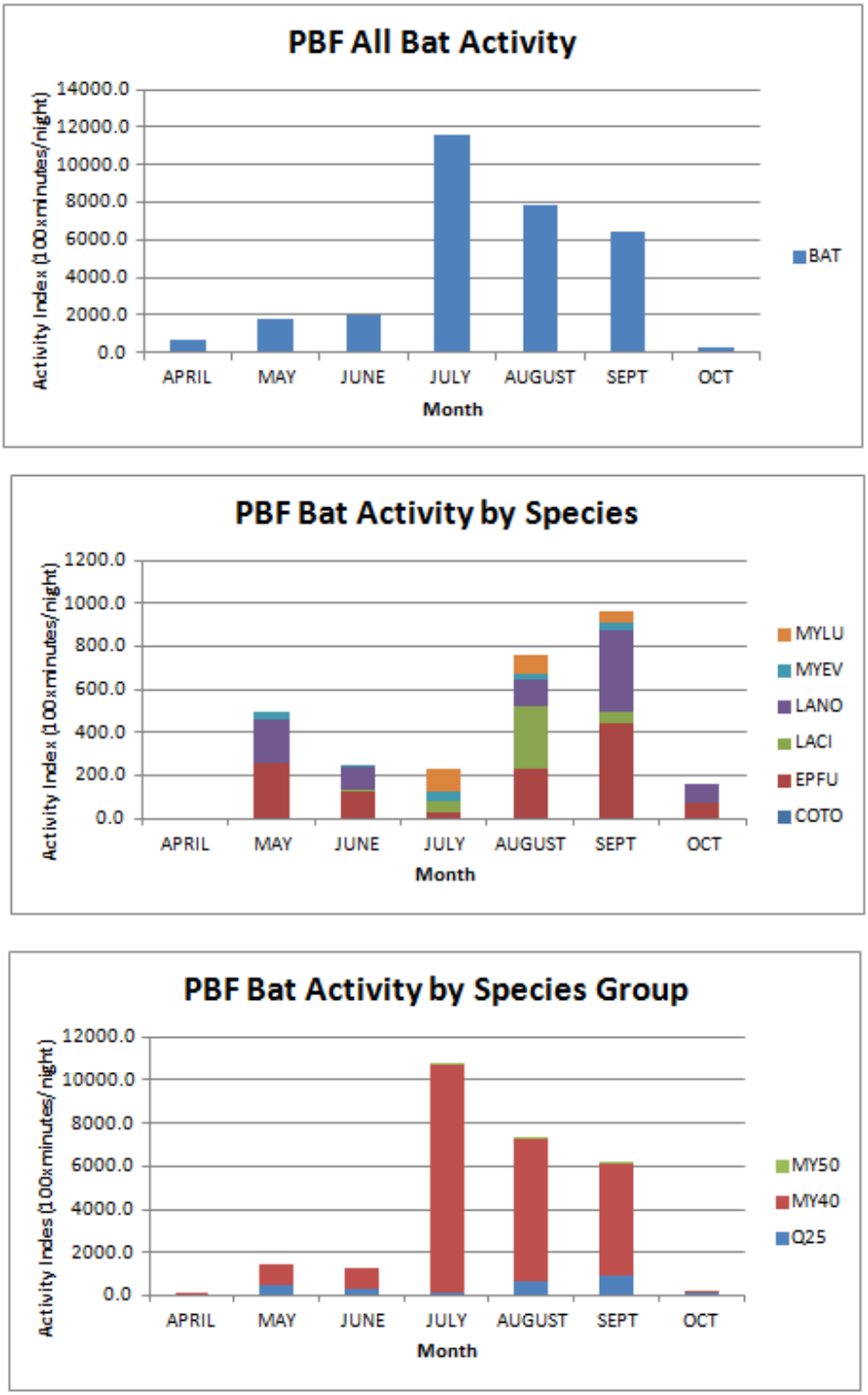


**Figure 5F. Activity Indices for all bats, target bat species, and bat species groups by month at PBF on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

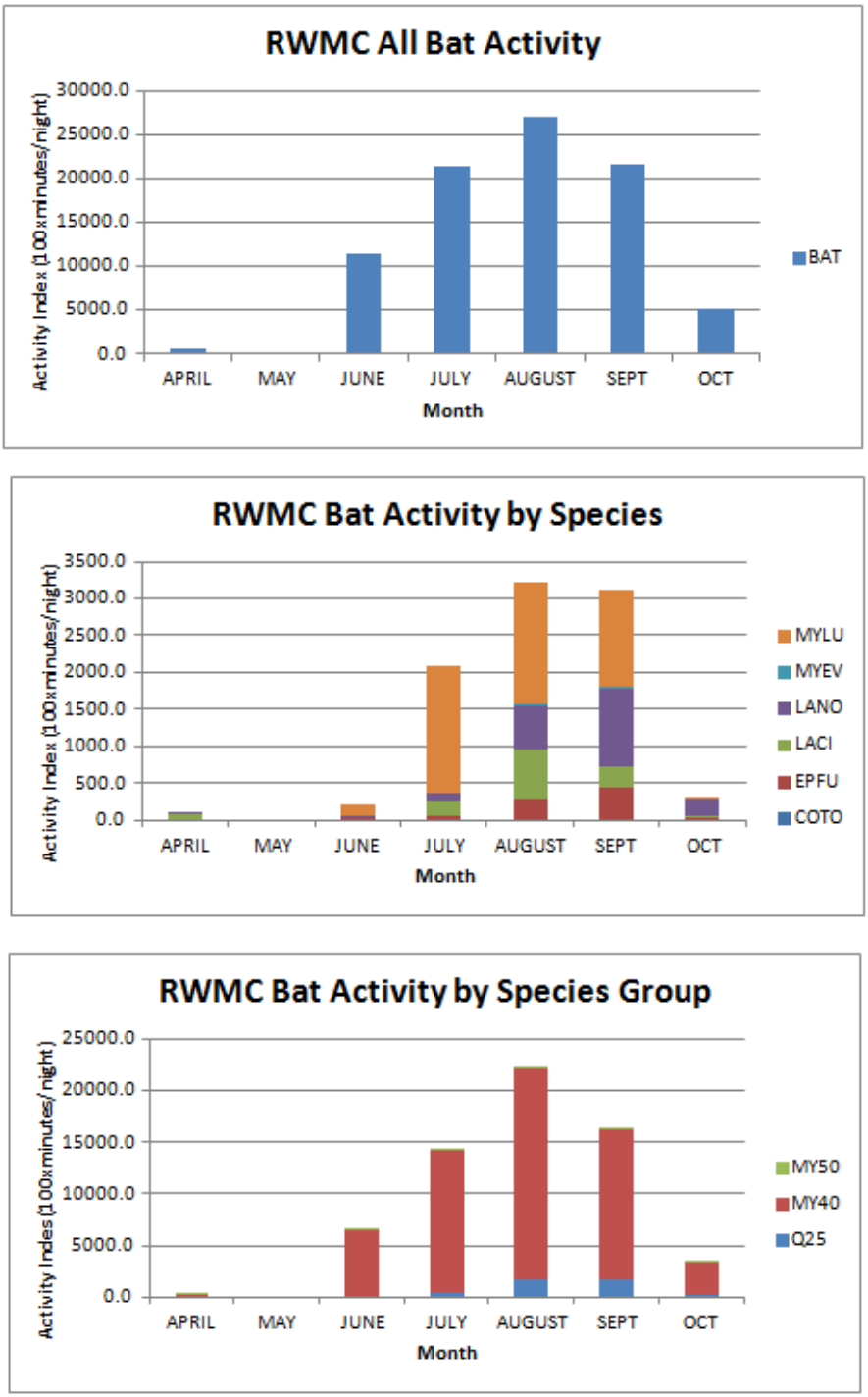


**Figure 5G. Activity Indices for all bats, target bat species, and bat species groups by month at RWMC on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU=*Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

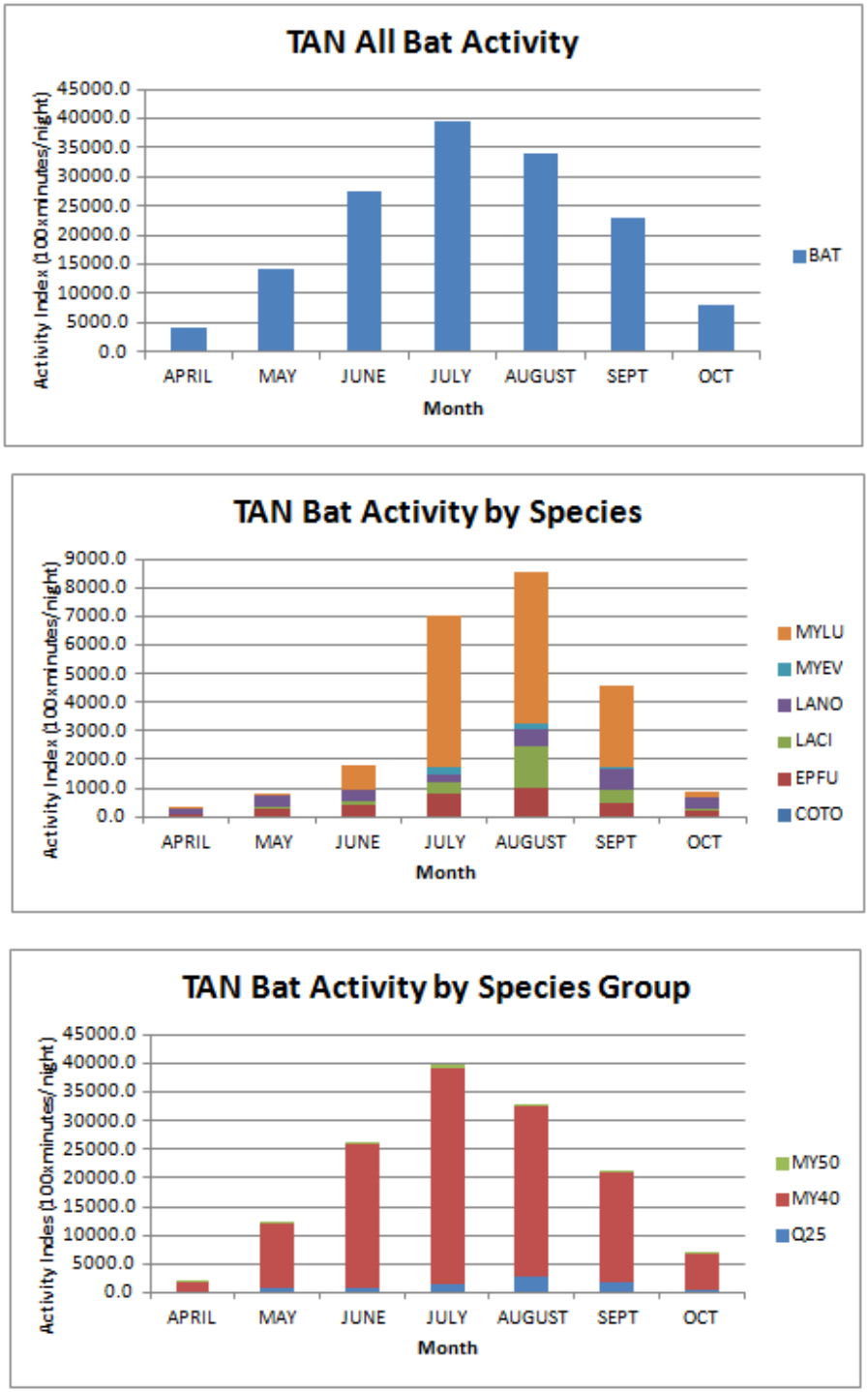


**Figure 5H. Activity Indices for all bats, target bat species, and bat species groups by month at TAN on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

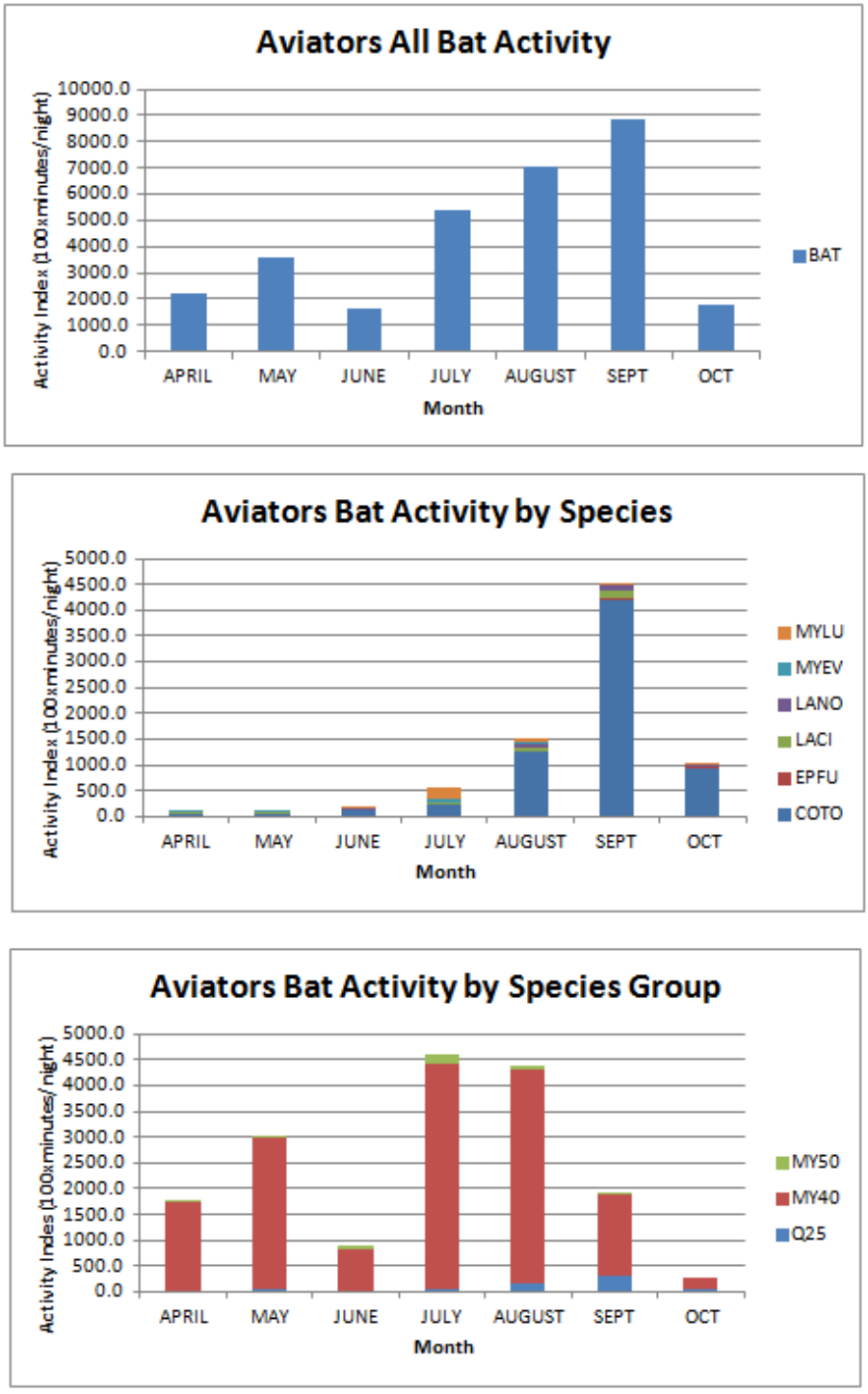


**Figure 5I. Activity Indices for all bats, target bat species, and bat species groups by month at Aviators Cave on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

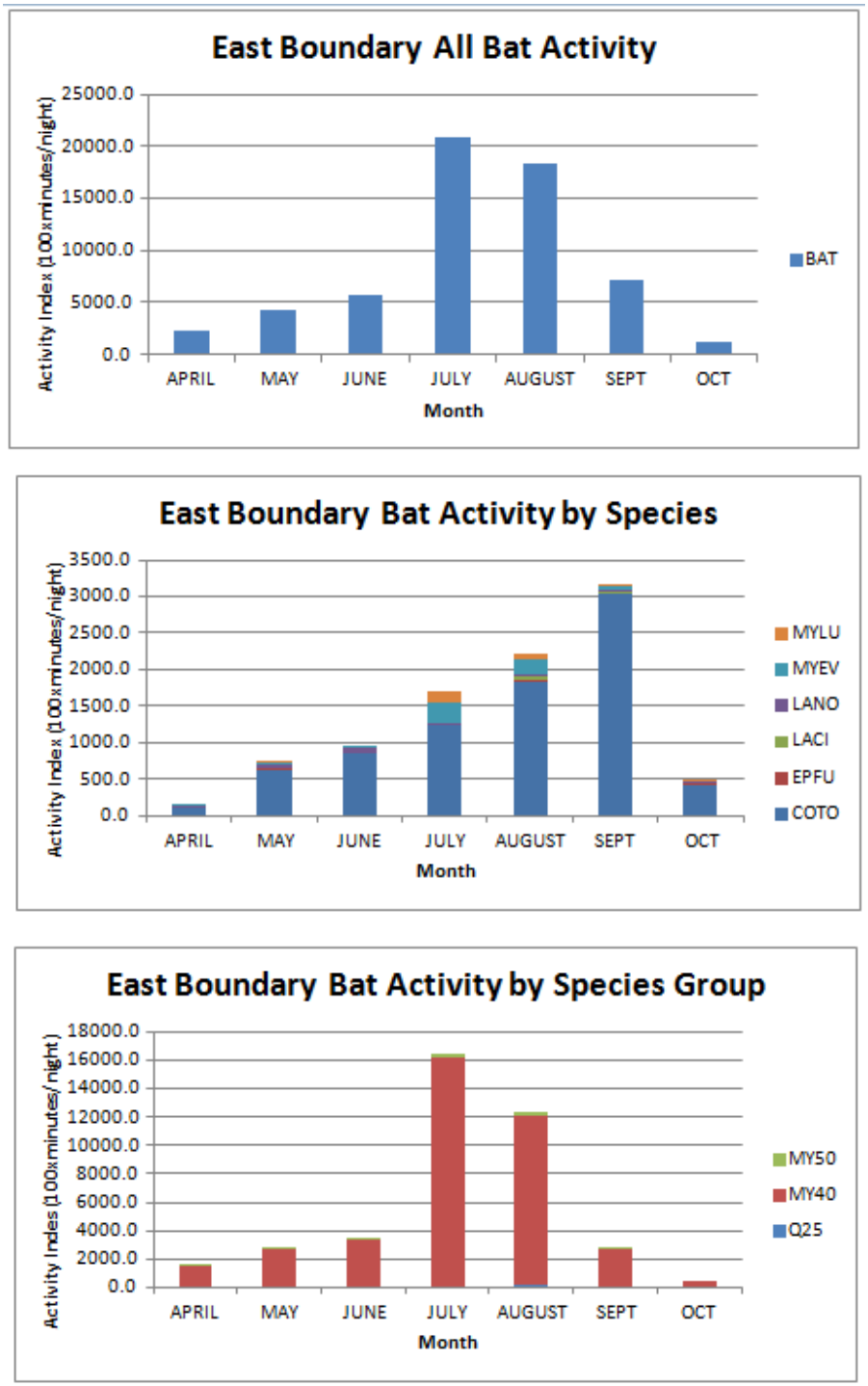


**Figure 5J. Activity Indices for all bats, target bat species, and bat species groups by month at East Boundary Cave on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

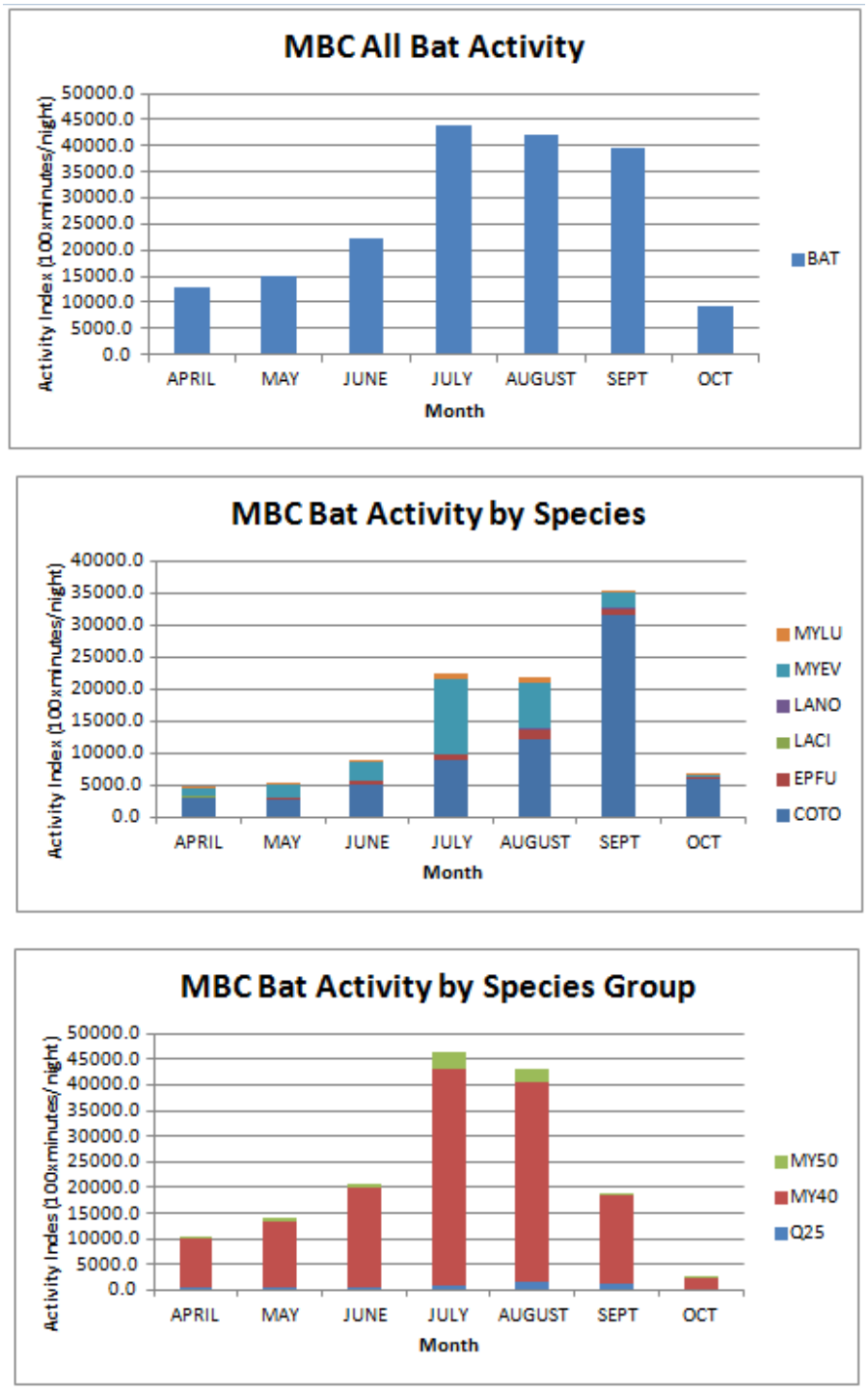


**Figure 5K. Activity Indices for all bats, target bat species, and bat species groups by month at Middle Butte Cave (MBC) on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

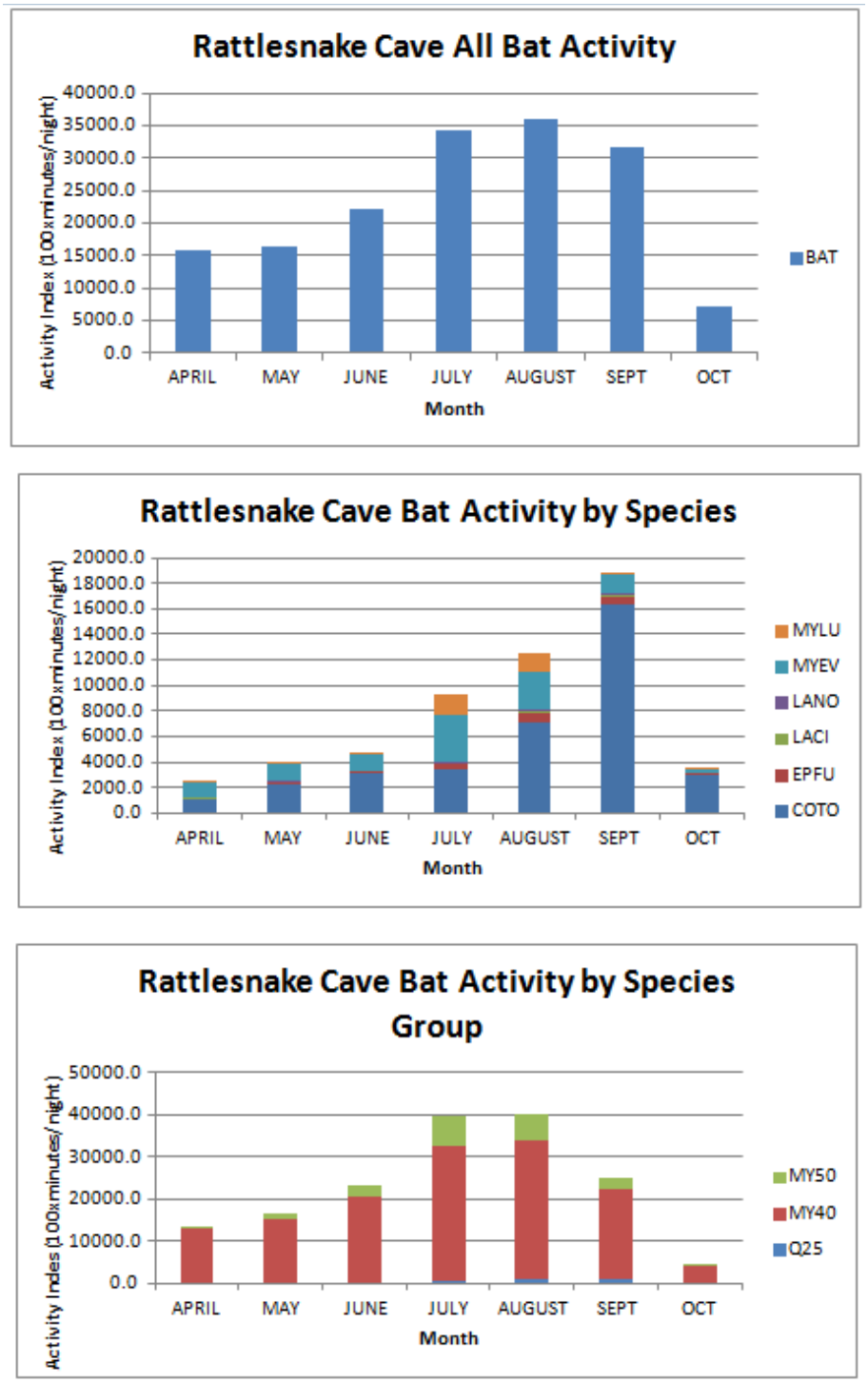


**Figure 5L. Activity Indices for all bats, target bat species, and bat species groups by month at Rattlesnake Cave (MBC) on the INL Site.** Note y-axes are at different scales. See text for explanation. Species: MYLU= *Myotis lucifugus*; MYEV=*Myotis evotis*; LANO=*Lasionycteris noctivagans*; LACI=*Lasiurus cinereus*; EPFU=*Eptesicus fuscus*; COTO=*Corynorhinus townsendii*. Species groups: MY50 combines *Myotis californicus* and *Myotis yumanensis*. MY40 is predominantly *Myotis ciliolabrum* but includes clutter and approach calls from *Myotis lucifugus* and *Myotis volans*. Q25 combines calls from *Lasionycteris noctivagans Eptesicus fuscus* and some *Lasiurus cinereus.*

Bat activity at all features peaked from July to September; however, a high amount of variability in activity patterns among features is apparent (Figures 5A through 5L). The exception to this is Middle Butte Cave and Rattlesnake Cave, features that appear remarkably synchronized (Figures 5K and 5L). In general higher levels of activity extended into September at all cave features, reflecting pre-hibernation swarming at known hibernacula. Western small-footed myotis was the most commonly detected bat at all features. Despite being one of the higher frequency calling species (characteristic frequency generally above 40 kHz), its activity levels dominated the "all bat" and "MY40" AI patterns at all features. No Western small-footed bat filter was prepared as the MY40 analysis sufficiently conveys the AI "signal" of this species.

Across the INL Site, the summer resident bat community appears to consist predominantly of western small-footed myotis, Townsend's big-eared bat, big brown bat and western long-eared myotis (*Myotis evotis*) with some little brown myotis and silver-haired bat (*Lasionycteris noctivagans*) evident at a few locations. There is evidence of summer residence of hoary bat (*Lasiurus cinereus*) with low levels of summer activity through the summer at many features. Myotis species with characteristic frequencies on the 50 kHz range [Yuma myotis (*Myotis yumanensis*) and California myotis (*Myotis californicus*)] were detected but at very low levels. At this time we have insufficient numbers of INL Site-specific call files to create reliable filters and did not attempt to differentiate either of these or other low occurrence species (e.g. long-legged myotis, fringed myotis, and possible red bat) for the baseline data. Activity levels for Yuma myotis and California myotis are reflected in the MY50 AI values. Little brown myotis, a species of greatest conservation need, had its highest summer activity levels at ATR, CFA, RWMC, and TAN (Figures 5A, 5B, 5G, and 5H). Among cave features, little brown myotis appeared to have its highest levels of activity at Middle Butte and Rattlesnake Caves. High levels of fall activity (suggesting pre-hibernation swarming) by little brown myotis at these caves are not evident (Figures 5K and 5L). Season patterns of activity at NRF appear strongly affected by fall tree bat migration (Figure 5E). Our acoustic data bolster the view that the INL Site provides important year-round habitat for Townsend's big-eared bat for all life stages; however, no feature included in the pilot data set appears to serve as a significant maternity site.

## 5.3 Participation in NABat

The North American Bat Monitoring Program (NABat) is a multiagency, multinational effort that is designed to standardize monitoring and management of bat species across multiple taxa (Loeb et al. 2014). Active acoustical monitoring for bats along drivable transects is part of that monitoring effort in North America (Loeb et al. 2014). In conjunction with the IDFG, BLM, USFS, and USFWS; the ESER Program developed two preliminary driving transects in 2014 for bats on the INL Site that follow methods described in the NABat protocol (Loeb et al. 2014) (Figure 6). The two routes on the INL Site are approximately 30 miles (48 km) long (Loeb et al. 2014). During surveys, an Anabat Detector is connected to a microphone that is mounted to the top of the vehicle. Surveys start 45 minutes after sunset and take about two hours to complete. The surveyor maintains a speed of 20 mph (32 kph) as consistently as possible throughout the survey period (Loeb et al. 2014). It is anticipated that at least one of these transects will become formally recognized by NABat, and that data from these transects can be used by state and federal agencies to better understand regional trends in species diversity and abundance.

In 2014, ESER biologists conducted pilot surveys seven times on each route using active acoustical monitoring from the beginning of May through the end of October, when weather conditions permitted (Figure 6). On average, each survey was completed in 129 min. AnaBat units recorded 60 bat passes (i.e., > 2 pulses of a bat call when a bat passed in front of the microphone) during those surveys. After surveys, ESER biologists manually identified bat passes in AnaLookW. High-flying open-air foragers, big brown bats and silver-haired bats were detected the most on survey routes (Figure 7).

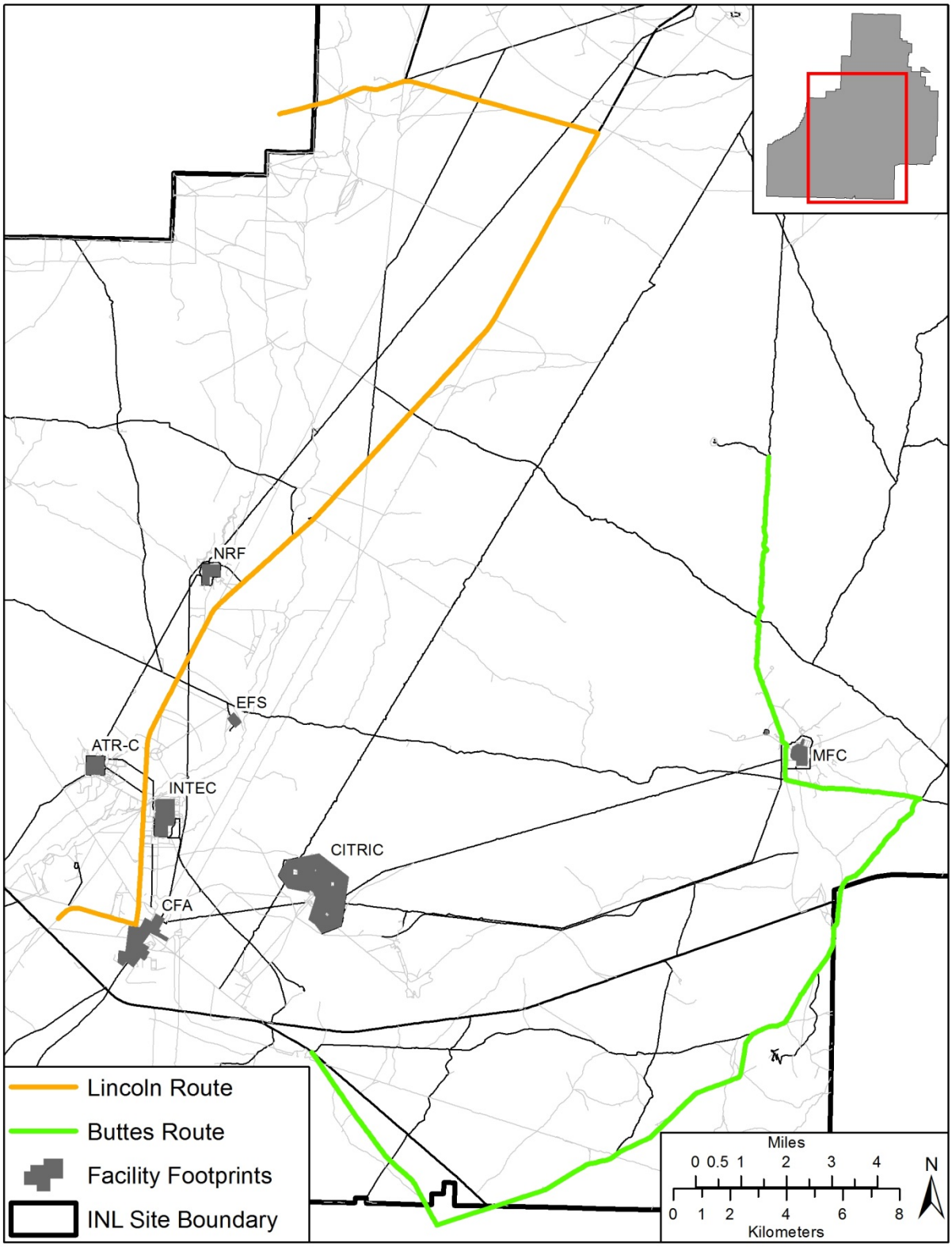


**Figure 6. Preliminary routes of driving transects for bats on the INL Site.**

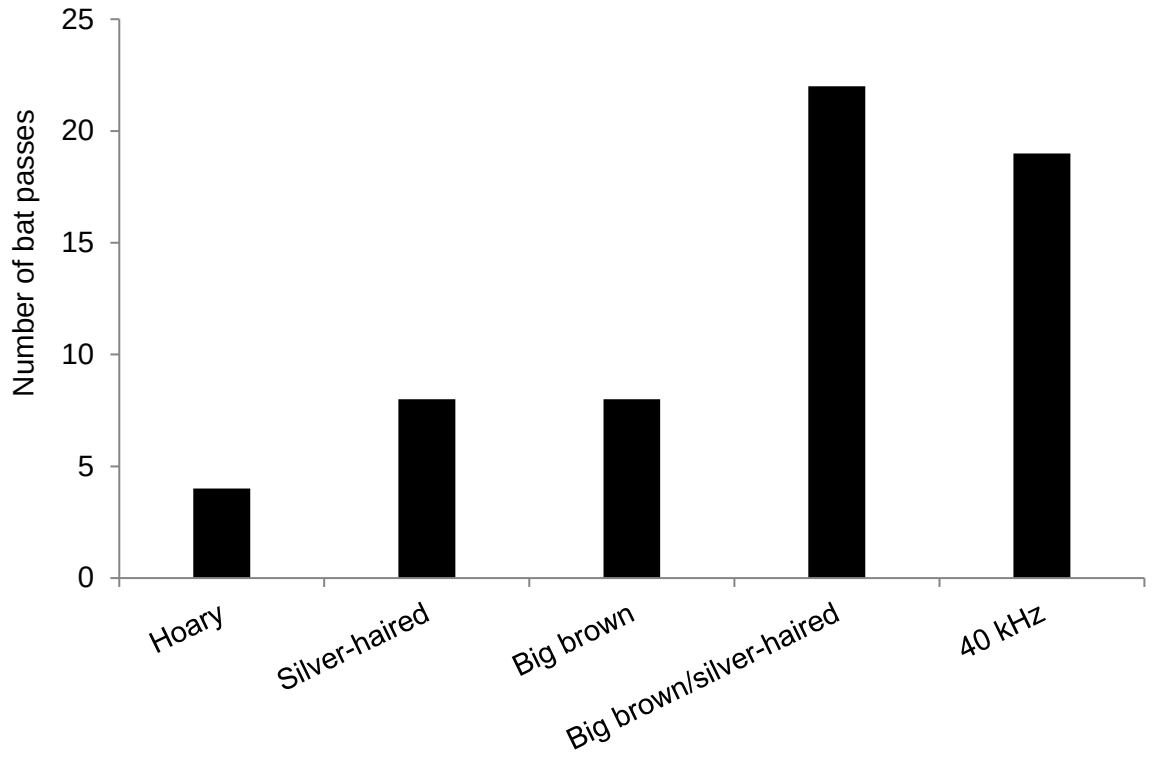


**Figure 7. Number of bat passes by species recorded on two active acoustical monitoring routes on the INL Site in spring, summer, and autumn 2014. Only species or species groups with > 1 bat pass were included in this figure. The species group labeled 40 kHz included western small-footed myotis, little brown myotis, and long-legged myotis.**

## 5.4 White-nose syndrome surveillance

Documenting internal temperature and humidity of caves is important to understand if environmental variables are suitable for the fungus (*Psuedogymnoascus destructans*) that causes WNS to subsist in caves on the INL Site (Blehert et al. 2009, Knudsen et al. 2013). Currently, national and state efforts to monitor WNS have used temperature and humidity loggers to assess the suitability of caves to support the fungus that causes WNS. During 2014, we deployed 15 HOBO U23-001 temperature and humidity loggers in 8 hibernacula on the INL Site (Table 3). Doing such will allow us to monitor internal temperature and humidity of caves during hibernation (November 1 to March 31). Data collected from temperature and humidity loggers will be consistent with national and state monitoring programs for WNS and will be in collaboration with the IDFG, BLM, and the USFWS. Caves will be entered annually in late October to retrieve loggers, download data, and then redeploy those devices.

As part of this Bat Protection Plan, DOE is participating in surveillance for the presence of the white-nose fungus and the determination of normal fungal loads in collaboration with IDFG, USFWS, and the NWHC. During winter 2016-2017 hibernation counts, swab samples will be collected from hibernating bats and sediment samples from cave floors using the latest established protocols. No bats will be harmed during this process. Samples will be routed through IDFG to the NWHC for diagnostic analysis for the presence of *Psuedogymnoascus destructans*. All sampling will be conducted consistent with OP-8, ESER Cave Protection and Access and an approved INL Site cave entry permit.

Because of the March 2016 confirmation of WNS in a little brown myotis in western Washington, WNS surveillance and response efforts have been stepped-up. USFWS has elevated Idaho's status from "at-risk" to "Intermediate" and IDFG, under the direction of the state WNS leads (Dr. Rita Dixon and Dr. Mark Drew), is leading the preparation of a coordinated interagency WNS response plan. ESER bat biologists are participating in the response plan preparation team. Additional WNS sampling/surveillance measures for the INL Site include:

- Fall swarming monitoring (On-hold per direction from NWHC, September 2016)
- Shifting hibernation counts to late in the season to increase probability for early detection of WNS (maintain the same biennial counting schedule)
- Winter and spring emergence bat swab sampling from November 1 to May 31 every year
- Annual training for facilities with reference to WNS surveillance
- Swabbing of bats found at facilities from November through May. Improving acoustic discrimination of little brown myotis and western small-footed myotis.

## 5.5 Carcass recovery and assessment

Timely response to a bat die-off can be effective at determining the cause of death, extent of mortalities, and to help institute methods to identify causes and reduce die-offs in the future. In the event that five or more bat carcasses of any species are discovered at any time in one location, we will immediately contact local and state IDFG biologists to begin investigating the cause of death. Moreover, we will follow the recommendations from IDFG regarding further sampling of live bats, sediment, or other substrates (i.e., cave walls) in the area of the die-off. See additional information in RP-7 2016.

Occasionally, individual bat carcasses are found at INL Site facilities. Most of these instances are when INL Site workers discover a bat carcass in facility buildings or outside in areas near facilities. When a bat carcass is found, the ESER bat biologist will collect and store the bat following procedure RP-7 2016. Carcasses may then be sent to a qualified laboratory to assess their levels of radionuclides.

(Note: According to the NWHC, five or more dead/sick bats at one location at the same time constitutes an unusual bat mortality/behavior event. In case of such an event, contact the Idaho Department of Fish and Game State Wildlife Action Plan Coordinator and/or Wildlife Health Forensics Laboratory, who will consult with the NWHC with respect to diagnostics.)

## 5.6 Relocating live bats

Any dead animal can harbor potentially harmful pathogens; it is common sense for any animal or carcass found at facilities to be handled only by trained personnel with the appropriate personal protection equipment. For bats, the most serious human health concern is rabies. Rabies transmission occurs when fluid (usually saliva) containing sufficient active virus enters a wound or comes in contact with mucous membranes. Once symptoms of infection present themselves, rabies is virtually 100% fatal in humans. The incidence of rabies in wild populations of bats is generally considered less than 1% (Kunz and Fenton 2003); nevertheless because of the seriousness of rabies infection, all bats encountered should be treated as though they present infection risk. Procedure RP-7 (2016), Handling Dead and Live Bats, presents approved instructions and context related to relocating wayward bats found roosting in buildings or other industrial areas.

Live bats occasionally are found in buildings, sheds, or storage facilities on the INL Site; especially during summer when bat pups are becoming more independent and during fall migration when

bats are shifting from summer to winter habitats. If a bat is found in an area where it is safe and will not be a nuisance to INL Site workers or disrupt work, the best course of action is to leave the bat alone and allow it to leave on its own volition. If a live bat is found and in an area where it is at risk of injury or is disrupting work, it may be necessary to move the bat. In this case, the best course of action is to have trained and rabies-vaccinated personnel relocate the animal outside of facilities following approved guidelines (White-nose Syndrome Conservation and Recovery Working Group 2015). If a bat is in imminent danger, presenting an unavoidable safety hazard, or impeding critical work activity and must be moved immediately, a bat may be moved out of danger by a facilities environmental manager with proper safeguards. See ESER procedure RP-7 (2016) for reference.

In the case of a sick or injured bat, contact the Idaho Department of Fish and Game.

(Note: This direction applies to apparent wayward bats observed in an unusual location and may not be applied to bats in established roosts. An individual lost bat may “roost” anywhere, such as over a door or in an office space, but a repeated and consistently used area with bat sign is indicative of a roost becoming established.)

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# 6.0 ADAPTIVE MANAGEMENT AND REPORTING

The INL Site Bat Protection Plan is based on principles of adaptive management. In general, this means that DOE, IDFG, and USFWS followed a systematic approach in planning for improved management and conservation of bats and their habitat on the INL Site, and future management actions will be based on feedback from the monitoring and surveying program (Section 5). Specifically, the INL Site Bat Protection Plan allows for adaptive management by listing the primary threats to bats and their habitat and articulating how these threats can be minimized (Sections 3 and 4); identifying critical areas of habitat for bats (i.e., hibernacula) and implementing conservation measure to protect those areas (Sections 4 and 5); and outlining a reporting mechanism that will ensure accountability (Section 1 and Section 6).

## 6.1 Reporting

To ensure that the USFWS, IDFG, and other collaborators have current information concerning bats on the INL Site, the ESER program will annually update the INL Site Bat Protection Plan. Annual progress reports will be prepared and appended to revisions of this plan (Appendix C). Reports will:

- Describe objectives for each year, methods, and results;
- Present and interpret important findings;
- Assess the efficacy of conservation measures; and
- Make recommendations for additional study, management actions, and plan revisions.

The next year's objectives would be identified and justified. In conjunction with that annual update, the ESER contractor, DOE, USFWS, and IDFG will meet to discuss changes in any section of the plan (e.g., shifts in trends of bat abundance on the INL Site), changes in the conservation status of bats that occur on the INL Site, or new policies that will benefit the conservation and management of sensitive bat species or their habitat (Appendix A and B).

As part of this Bat Protection Plan, the INL Site bat monitoring aspect of the program will contribute to a larger regional effort in collaboration with the USFWS, IDFG, and BLM; the baseline data collected concerning Townsend's big-eared bat has already improved our understanding of this species in eastern Idaho. Throughout the development of this plan, the ESER Program has also helped local federal and state agencies with implementing regional bat monitoring and management programs, provided bat expertise to agency biologists, collaborated on regional and national scale monitoring efforts, and disseminated initial findings to the public locally and at national scientific meetings. Most recently ESER bat biologists have used their expertise to assist IDFG managers in State Wildlife Action Plan development by providing specific knowledge about bat species studied at the INL Site as well as reviewing the entire bat section of the plan. The information collected on use of caves by bats will provide a foundation for a statewide WNS program, which will be important in guiding the conservation and management of bats not only at the INL Site, but in Idaho. The Idaho Department of Fish and Game considers the INL Site an important partner in bat conservation in the state (R. Dixon, IDFG, pers. comm.).

## 6.2 Plan Revisions

This Bat Protection Plan presents a framework for comprehensive bat conservation at the INL Site and the documentation of conservation measures employed to protect sensitive bat resources and

minimize mission-related impacts. As data are collected and analyzed through the program or challenges are encountered, this plan will be reviewed be ESER and DOE-ID managers, improvements will be identified, and the plan updated. New versions will be dated and given a revision number using a Revision History recording form on the inside cover page. Likewise, actions carried out at the INL Site, and information gained, can in turn inform revisions to the Idaho State Wildlife Action Plan.

Prior to any activities with the potential to affect bats, INL Site environmental managers and contractors should confirm that they are operating in accordance with the most recent version of this plan.

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# APPENDIX A:

# USFWS POLICY REGARDING PRELISTING VOLUNTARY CONSERVATION ACTIONS

**U.S. Fish and Wildlife Service**

**Policy Regarding Voluntary Prelisting Conservation Actions**

**SUMMARY**: We, the U.S. Fish and Wildlife Service, announce a final policy on crediting voluntary conservation actions taken for species prior to their listing under the Endangered Species Act of 1973, as amended (ESA). The policy gives landowners, government agencies, and others incentives to carry out voluntary conservation actions for unlisted species by allowing the benefits to the species from a voluntary conservation action undertaken prior to listing under the ESA to be used—either by the person who undertook such action or by a third party—to mitigate or to serve as a compensatory measure for the detrimental effects of another action undertaken after listing. This policy will help us further our efforts to protect native species and conserve the ecosystems on which they depend.

**Background**

The U.S. Fish and Wildlife Service (Service or FWS) is charged with implementing the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. 1531 *et seq*.); the goal of the ESA is to provide a means to conserve the ecosystems upon which listed species depend and a program for listed species conservation. Through its Candidate Conservation program, the Service encourages the public to implement conservation actions for species prior to them being listed under the ESA. Doing so may result in precluding the need to list a species, may result in listing a species as threatened instead of endangered, or, if a species becomes listed, may provide the basis for its recovery and eventual removal from the protections of the ESA. As explained below, the policy provides incentives to the public to implement these prelisting conservation actions. Note that this policy is consistent with the Service's March 8, 2016, proposed revisions to the 1981 mitigation policy (81 FR 12380).

Recognizing that species benefit from focused conservation actions taken to address threats to

their survival, the Service encourages landowners to conserve candidate and other unlisted species by stabilizing and increasing populations so that the species may not need listing. In March 2012, the Service published in the **Federal Register** an advance notice of proposed rulemaking inviting the public to identify potential changes to our regulations under the ESA (77 FR 15352, March 15, 2012). Our goal was to create additional incentives and improve or expand existing incentives for landowners and others to invest in early voluntary conservation actions to benefit species that may become listed as threatened or endangered species. Because we received a request from the Association of Fish and Wildlife Agencies to extend the comment period, we published a document in the **Federal Register** extending the comment period an additional 60 days (77 FR 28347, May 14, 2012).

The comments and recommendations in the 95 responses the Service received in response to the advance notice of proposed rulemaking supported the tenet that, if the need to list a species under the ESA can be avoided, everyone, including the species, benefits. The responses also underscored the need for incentives for individuals and agencies, both Federal and State, to invest in conservation actions for species prior to listing. The comments and recommendations made by the individuals, organizations, and agencies covered an array of issues such as the need for guidance on developing crediting programs, updating the Service's mitigation policy, the need for conservation strategies to guide candidate conservation agreements, streamlining the conservation agreement process, and improving conservation banking. On July 22, 2014, we published a draft policy (79 FR 42525), which was based on recommendations generated by the advance notice of proposed rulemaking, and we accepted public comments on the draft policy until September 22, 2014. On September 22, 2014, we extended the comment period on the draft policy until November 6, 2014 (79 FR 56602). The comments we received are available at http://www.regulations.gov under Docket No. FWS–R9–ES–2011–0099.

**Changes from the Draft Policy**

Based on comments we received on the draft policy and on discussions with State conservation or wildlife agencies, we include the following changes in this final policy:

(1) We added a definitions section to the policy to explain key terms.

(2) The draft policy stated that the credits earned by undertaking a prelisting conservation action may be transferred to a third party but must be used for the same species and within the same State where the credit was earned. In the final policy we require that the credit be used within a "service area" that is based on the biological needs of the species rather than on State boundaries and include a definition of "service area."

(3) We clarified that qualifying conservation actions must be part of a conservation program that is operational and generating conservation benefits for the species before the date on which a proposed rule to list the species under the ESA is published in the **Federal Register**.

(4) In section 4 of the policy, rather than using the phrase "positive assistance to the recovery of the species," we indicate that the benefit from the prelisting actions combined with the detriment of an action taken after listing must result in a "net conservation benefit" to the species and provide a definition of this phrase.

(5) We expanded the policy by incorporating, by reference, requirements and program elements that are contained in other Service mitigation policies to further define and govern voluntary prelisting conservation actions taken as part of a prelisting conservation program. We are incorporating these requirements from other Service mitigation policies in order to have consistency among all the different types of mitigation programs.

(6) We clarified the role of the U.S. Fish and Wildlife Service to indicate that the Service may assist a State in any aspect of a voluntary-prelisting-conservation program, but only if requested by the State.

(7) We expanded section 7 of the policy to incorporate, by reference, principles and requirements contained in Service mitigation policies that prelisting crediting programs need to encompass.

(8) We included a new section in the policy to further explain the relationship between this policy and candidate conservation agreements (both Candidate Conservation Agreements (CCAs) and Candidate Conservation Agreements with Assurances (CCAAs)).

**Policy Explanation**

*Introduction: Incentivizing voluntary conservation action prior to listing.* The policy has two stated purposes, as set forth in section 1. The first and more general purpose is to incentivize voluntary conservation actions on behalf of species before they reach the point at which they need to be listed as threatened or endangered under the ESA. Such voluntary conservation actions, if they address threats at a sufficient scale and for a long enough time, could result in stabilizing and increasing populations of the species such that the protections of the ESA would not be needed. In other words, the voluntary conservation actions could contribute to precluding the need to list the species. The policy seeks to reward those who voluntarily undertake actions to help the species when they have no legal obligation to do so. As described in more detail later, the reward is that the benefits to the species from a voluntary conservation action undertaken prior to listing may be available to be used—either by the person who undertook that action or by a third party—to mitigate or be a compensatory measure for the detrimental effects of another action undertaken after listing. In this policy, the credit earned by undertaking a prelisting conservation action can be transferred to a third party if the prelisting conservation action and the credit are for the same species and within the appropriate biological area (i.e., service area). The service area may encompass more than one State.

*Clarifying existing regulations at 50 CFR 402.14(g)(8).* A second, more narrow, purpose of

the policy is to clarify a provision that has been in the regulations that implement section 7 of the ESA since 1986, but that received little explanation then or thereafter. That provision, set forth in 50 CFR 402.14(g)(8), states that the Service "will give appropriate consideration to any beneficial actions taken by the Federal agency or applicant, including any actions taken prior to the initiation of consultation" during the course of consultation under section 7(a)(2) of the ESA or "early consultation" under section 7(a)(3). The policy makes clear that beneficial actions "taken prior to the initiation of consultation" include actions taken prior to listing, provided they meet the policy's definition of a "voluntary prelisting action." Note that the Service will also give appropriate consideration during our consultation process to other beneficial actions that do not qualify for the special treatment described in this policy. In addition to clarifying that prelisting beneficial actions are among the actions to be given "appropriate consideration," the policy also clarifies how the Service will give appropriate consideration to those beneficial actions that are subject to the policy. Specifically, in the course of section 7 consultations, the Service will consider the beneficial effects of a voluntary prelisting conservation action to be included as part of the environmental baseline for the agency action if requested by the action agency or, in the case of an agency action involving a permit applicant, by such applicant.

The policy also makes clear that the Service will evaluate the conservation value of a prelisting conservation action based on its inclusion and priority in a conservation strategy for the species. A conservation strategy is a foundational document that should guide all conservation efforts for at-risk unlisted species, including Federal, State, Tribal, and private conservation actions. A strategy can be authored by any one of these entities, but ideally it will be created as a collaborative effort, with States playing a primary role, and the public having an opportunity to contribute. A conservation strategy that is used in a voluntary-prelisting-conservation program must be reviewed by the Service if the Service is not an author, co-author, or part of the effort that developed the strategy.

Coordinated efforts will likely result in better conservation outcomes for the species and efficiencies in implementing and monitoring conservation actions. While a strategy may cover more than one State and be ecosystem-based and thus include a suite of species, from the Service's perspective, the primary goal of the strategy is to provide the necessary detailed information to guide management of a species so that it is successfully conserved and does not need the protections of the ESA.

*How voluntary prelisting conservation actions are to be treated.* Section 3 of the policy sets forth in general terms how the Service will treat voluntary prelisting conservation actions. Two possibilities are described. First, such an action can be treated as a voluntary prelisting conservation action to offset the impacts of the incidental taking of a listed species for which a permit is sought under section 10(a)(1)(B) of the ESA in conjunction with a habitat conservation plan. Alternatively, where a proposed action that detrimentally affects a listed species is authorized, funded, or carried out by a Federal agency, the voluntary prelisting conservation action can be treated as a compensatory measure for the proposed action. Section 7 of the ESA, unlike section 10(a)(1)(B), does not explicitly require that detrimental impacts be mitigated, but it is a long-established practice under section 7 that Federal agencies or their permit applicants can incorporate mitigating measures into their proposed projects so as to reduce their overall impact. The policy makes clear that voluntary prelisting conservation actions can be used in this manner.

Section 3 of the policy also establishes that a voluntary prelisting conservation action undertaken by anyone, including a Federal agency, can be used as described in the policy. Unlike some other incentive-based policies (e.g., the Safe Harbor Agreements (SHAs) policy (64 FR 32717, June 17, 1999) and the Candidate Conservation Agreements with Assurances (CCAAs) policy (64 FR 32726, June 17, 1999)) that apply only to non-Federal property owners, this policy applies to anyone or any entity that undertakes the prelisting conservation action through a program that follows this policy.

*Defining voluntary prelisting conservation actions.* Section 4 of the policy defines "voluntary prelisting conservation actions." The definition has three key components. First, the action has to be undertaken before the species it is intended to benefit is listed under the ESA. An action can be undertaken at any time prior to a species being listed. Once a species has been listed, however, no new voluntary *prelisting* conservation actions would receive credit under this policy, but ongoing actions initiated prior to a final listing would continue. Second, the policy also specifies that actions taken prior to the policy being finalized will not be considered under this policy. However, any conservation actions taken outside the policy would still be considered in a listing decision. Third, the action must be truly voluntary, one that is not required by the ESA or by any other Federal, State, or local regulatory mechanism.

The Service recognizes that State wildlife agencies have management expertise, authority, and responsibility for conservation of unlisted species in their respective jurisdictions. Acknowledging this jurisdiction, the third component requires that actions undertaken are part of a State-administered program, and the program must reference or include a conservation strategy for the species that has been developed or adopted by the State. The policy contemplates the active engagement of the States in designing and implementing a program to encourage voluntary prelisting conservation actions, as further described in section 5 of the policy. The policy envisions that the States will use a collaborative and transparent approach in designing such a program. The policy also makes it clear that States can use Federal funds in accordance with section 6 of the ESA to administer and oversee the implementation of the prelisting conservation program to ensure the successful implementation and maintenance of the voluntary prelisting conservation actions as they relate to candidate species. The States may allow for another entity (e.g., local government or nongovernmental organization) to fulfill the measuring, monitoring, and oversight obligations that are necessary to ensure the successful implementation and maintenance of the voluntary prelisting conservation actions. Regardless of

which State agency or entity is authorized to develop and track prelisting mitigation actions, the State agency with jurisdictional authority for the species identified (plant or animal) must be provided an opportunity to participate in the development of, and ultimately either approve or deny, any mitigation plans or criteria for issuing credits that may affect those populations.

*Role of the States.* The role of the States under the policy, should they choose to participate, is addressed in greater detail in section 5. This section of the policy aims to ensure the primacy of the States in conserving species before they are listed, while also ensuring an effective partnership with the Service so that voluntary prelisting conservation actions will be recognized by the Service in the event that the species is later listed. An important role of the States is to ensure that voluntary prelisting conservation actions are effectively implemented and maintained. The primary tracking and oversight is to be done by the States, which will then annually provide information on the conservation actions to the Service. However, in some cases, a single State may be unable to take a lead role in implementing a program that qualifies under this policy. States may then decide to form partnerships or consortiums in order to pool resources or to better manage species whose ranges include multiple States. Additionally, under some circumstances, no State agencies within a State may be able to fully implement a program under this policy. In these cases, the Service or another entity may assist a State, if requested. To avail themselves of the postlisting opportunity provided by the policy, persons planning to undertake voluntary prelisting conservation actions must do so within the framework of a State- or multi-State-approved program and a State conservation strategy for the species or multi-species-ecosystem- or landscape-conservation strategy; the Service must have reviewed both the program and conservation strategy. If no State conservation strategy exists, the State may adopt a strategy developed by another entity.

Some States may have their own laws or regulatory authorities (separate from the ESA) under which they can require mitigation requirements for certain activities. If that is the case, and a person

who undertakes a voluntary prelisting conservation action is allowed by the State to treat the benefits of that action as fulfilling the mitigation requirements of State law, the individual cannot subsequently use the same action as mitigation for a separate activity carried out after listing. That is, if used prior to listing to meet the mitigation requirements of State law, the benefits of prelisting conservation actions cannot be used again as mitigation for separate actions carried out later. Use of prelisting conservation actions to meet State mitigation requirements should be reflected in the register maintained by a State so as to avoid using the same credit(s) for multiple actions.

*Role of the U.S. Fish and Wildlife Service.* The role of the Service is addressed in section 6 of the policy. This section explains that the Service will assist the State(s), as requested, in tracking the implementation and maintenance of the prelisting conservation actions, as well as reviewing any voluntary prelisting conservation programs developed under this policy. While States have the primary role in managing species that are not listed under the ESA, they may not have the necessary resources or authority to implement a conservation program for some species or to fully track the prelisting conservation actions. Consequently, the Service may assist the States, if requested by a State, to help achieve the mutual goal of conserving species before they are listed under the ESA. Additionally, the Service will coordinate between the State(s) and other Federal agencies to help develop conservation actions and assist in tracking the implementation and maintenance of those actions, if requested. Should a species be listed, the Service will review and approve the use of credits from voluntary prelisting conservation actions as compensatory measures or mitigation under sections 7 and 10, respectively, of the ESA.

*Quantifying beneficial and detrimental impacts.* Providing credit for an effort to mitigate or serve as a compensatory measure for the impacts of a detrimental action to a species (or any other resource) requires measuring both the detrimental impact and the offsetting benefit to be secured through a voluntary prelisting conservation program. Section 7 of the policy provides that, in

evaluating the impacts of both detrimental actions and beneficial actions, the Service will use the same criteria, standards, and metrics to quantify the former as it is used to quantify the latter. While the policy provides general guidance on establishing the metrics, and references the FWS's ESA mitigation policies for further information, it does not specify the metrics that will be used for particular species. Instead, those will need to be developed independently and are likely to vary from species to species or situation to situation. However, the benefit of a voluntary prelisting conservation action for which credit may be available must be greater than the detriment from the action for which the credit will be used; that is, the benefit from the prelisting action, combined with the detriment from a later action, must result in a net conservation benefit to the species. This would be achieved by permanently setting aside a minimum of 10 percent of the credits for each action to gain a net conservation benefit to the species (i.e., net benefit credits). The percent set aside could be greater than 10 percent in some cases—if, for example, the status of the species is declining precipitously. The specific percentage will depend on the status of the species and the nature of the actions. Some additional credits will also be set aside to manage for risk of the conservation actions failing to achieve their intended purpose; these do not need to be permanently set aside. Also, a voluntary prelisting conservation action can be supplemented with an additional postlisting conservation action so that the combined benefit of prelisting and postlisting conservation actions is greater than the detriment from the postlisting detrimental actions.

Over time, new scientific information may indicate that the metric may need revision or a new metric should be used. The Service will work with the program administrator to decide if the metric needs to be changed. However, any new or improved metrics will not undermine or devalue existing credits or voluntary conservation action agreements except in cases where failure to utilize a new or revised metric would appreciably reduce the likelihood of survival and recovery of the affected species in the wild. In these cases, the Service will require a new or improved metric for credits not

yet used or sold and will work with the landowner to find alternatives to address the needed changes.

*Preferential use of voluntary prelisting conservation actions to offset the impacts of postlisting activities.* Since the purpose of the policy is to incentivize voluntary prelisting conservation actions by allowing the benefits of such actions to serve as mitigation or a compensatory measure for the detriments of postlisting actions, that purpose would clearly be undercut if the Service were routinely to require some other form of mitigation or compensatory measure for actions that it consults on or authorizes after listing. Put differently, those who invest in voluntary prelisting conservation actions under the policy are likely to want a reasonable assurance that, when the Service evaluates the mitigation or compensatory measure needs for postlisting activities, we will give first consideration to these already-established mitigation or compensatory measures. However, although prelisting conservation actions may be proposed by a proponent as mitigation or a compensatory measure for postlisting detrimental actions, this policy does not prevent the Service from encouraging or recommending an alternative mitigation or compensatory measure in circumstances where it is determined to clearly produce a better, or more certain, environmental outcome. Such circumstances are expected to be the rare exception to the preference to use existing credits from voluntary prelisting conservation actions. Likewise, if the proponent of a postlisting action can achieve a commensurate or better environmental outcome with less effort, cost, and time expended, the policy allows the proponent the flexibility to make that choice.

*Effect of using voluntary prelisting conservation actions to offset the impact of postlisting activities.* As previously noted, section 5 of the policy makes clear that, if a State treats the benefits of a prelisting conservation action as meeting State mitigation requirements for actions carried out prior to listing, the use of those benefits precludes their later reuse. In a parallel fashion, section 8 of the policy provides that, after listing, once the Service allows the benefits of a prelisting conservation action to serve as mitigation or a compensatory measure for the impacts of a postlisting action, those

same benefits cannot not be used again to offset the impacts of other later postlisting actions.

*Relationship to Candidate Conservation Agreements.* Although CCAs, CCAAs, and voluntary prelisting conservation actions covered by the policy serve the same purpose, conservation of unlisted species before they become listed, they employ different mechanisms, have different approval requirements, and have other important differences.

First, a CCAA is intended to provide a landowner (non-Federal) with an assurance that, if the species covered by the CCAA is later listed as threatened or endangered, no new restrictions or conservation obligations will be imposed on the landowner for that species. In contrast, the purpose of the policy's treatment of a voluntary prelisting conservation action is to give a landowner (Federal or non-Federal) the opportunity to have that action serve as mitigation or a compensatory measure for the detrimental impact of an action undertaken after the species is listed as threatened or endangered.

Second, CCAAs are subject to more exacting approval requirements. To qualify for a CCAA, a non-Federal landowner must commit to carry out conservation measures that are designed to reduce or eliminate those current and future threats on an enrolled property, that are under the control of the property owner, in order to provide a net conservation benefit to the covered species. In contrast, to be treated as a voluntary prelisting conservation action under the policy, an action need only be beneficial to a particular species; the policy requires no specific magnitude of benefit. While it is possible for a voluntary prelisting conservation action to satisfy the requirements of both the CCAA policy and this policy, the action cannot be treated under both policies. Using the same conservation action as mitigation or a compensatory measure against a future detrimental action is inconsistent with the intent of the CCAA policy to secure durable conservation commitments that would constitute a particular landowner's contributions necessary to preclude the need to list a species. However, a landowner may participate in both a CCAA and a voluntary prelisting conservation actions program if the actions taken under a mitigation program are in addition to those taken to satisfy the CCAA

requirements. Also a landowner may terminate their participation in a CCAA and participate in any type of mitigation program. In this situation, the assurances and the incidental take permit associated with the CCAA would no longer be in effect. Section 10 of the policy clarifies this relationship between candidate conservation agreements and prelisting conservation actions as defined by the policy.

**Summary of Comments and Recommendations**

On July 22, 2014, we published a document in the **Federal Register** (79 FR 42525) that requested written comments and information from the public on the draft Policy Regarding Voluntary Prelisting Conservation Actions. In that document, we announced that the comment period would be open for 60 days, ending September 22, 2014; we later extended that period to November 6, 2014. Comments we received are grouped into general categories specifically relating to the draft policy.

*General Comments*

*Comment (1):* Many State agencies indicated that resources from the Service are essential to setting up and implementing a voluntary-prelisting-conservation program.

*Our Response:* We agree with the commenters that resources would be needed to setup and implement a program under this policy. However, the Service does not have funding or other resources to provide to the States, other than funding under section 6 of the ESA that may be used for candidate species. The policy does explicitly allow a State to designate a third party (e.g., an entrepreneurial conservation banker) as its agent in carrying out the State role in implementing a voluntary-prelisting-conservation program, although it must retain an effective role in oversight of any program implementation assigned to a third party.

*Comment (2):* Some commenters suggested that we clarify what constitutes a ‘voluntary’ action

under this policy to better explain what actions would qualify as voluntary. Other commenters thought that conservation actions that are required under an already-established State program, such as a State mitigation program, should qualify as a voluntary action and be able to receive credit under this Federal policy.

*Our Response:* Section 4 of the policy provides a definition of voluntary prelisting conservation actions. We disagree with the commenters that a conservation action required under an already-established State program should also receive credit under this policy. The goal of the policy is to encourage *additional* conservation actions for unlisted species, and, thus, we have made it clear in the policy that conservation actions required under already-established State programs will not be eligible for credit under this policy.

*Comment (3):* Numerous commenters did not think our use of the term "positive assist to recovery" was appropriate and instead suggested we use the term "net conservation benefit."

*Our Response:* We agree and have substituted the term "net conservation benefit" in the final policy; we have also added a definition of that term.

*Comment (4):* Regarding section 4 of the policy, which describes voluntary prelisting conservation actions, numerous commenters said that we should use the natural range of species rather than restrict actions to within State boundaries.

*Our Response:* We agree with the commenters and have revised the policy to indicate that where voluntary prelisting conservation actions will be undertaken is based on the biology of the species and not on State boundaries. We have also indicated that under this policy, programs can be developed that include multiple States and species.

*Comment (5):* Most commenters supported the need for conservation strategies or plans to guide conservation actions, and that the conservation plan or strategy does not have to be developed by the Service. Some commenters requested clarification on whether the Service has to approve a strategy

and who could develop the strategy. Guidance for developing a strategy was also requested.

*Our Response:* We agree and provide guidance on what we recommend be included in a conservation strategy for use in developing prelisting conservation programs that will address threats to a specific species and result in conservation actions that contribute to not needing to list that species. In the final policy, we indicate that while the Service does not have to approve a strategy, we must review it if we were not an active participant in the development of the strategy.

*Comment (6):* Several commenters requested that we clarify how new science will affect credits already established. Commenters thought it was important to assure credit producers or credit buyers that those credits will retain their value over time.

*Our Response:* In the **Adaptive Management** section of the policy, we clarified that any new or improved metrics that are based on new science will not undermine or devalue existing credits or voluntary conservation action agreements, except in cases where failure to utilize a new or revised metric would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

*Comment (7):* Many commenters said the program needs to be transparent.

*Our Response:* We agree and have required that the program, particularly the metrics used to calculate credits and debits and the availability of credits, be transparent and available to the public.

*Comment (8):* Actions underway before the policy is finalized should be eligible for crediting as well as actions taken "historically" if those actions can be appropriately documented.

*Our Response:* Since a primary goal of the policy is to encourage entities to take *additional* voluntary conservation actions for unlisted species, the policy is clear that actions taken prior to the effective date of the policy are not eligible to receive credits. However, as we clarified in the preamble and section 3 of the policy, under the ESA section 7 regulations (50 CFR 402.14(g)(8)), the Service "will give appropriate consideration to any beneficial actions taken by the Federal agency or applicant,

including any actions taken prior to the initiation of consultation" during the course of consultation under section 7(a)(2) of the ESA or "early consultation" under section 7(a)(3).

*Comment (9):* Some commenters requested that we define "landowner" and that definition should include entities that lease land and not just entities that own a property. Entities that lease land and take voluntary prelisting conservation on those lands should be eligible to earn credits under the policy.

*Our Response:* While we have not defined "landowner" in the policy, we do use this term to generally refer to property owners. However, we believe the policy is clear that it applies to any entity, including ones that lease land, as long as they have the authority to implement, maintain and monitor the voluntary conservation actions they are seeking credit for under the policy.

*Comment (10):* Many of the commenters indicated that the policy lacked information on how to set up a crediting program that meets the policy.

*Our Response:* We agree that the draft policy lacked specifics on what a program needs to include or address to qualify under this policy, and we have expanded sections of the final policy with more information. For example, we expanded the section on the definition of "prelisting conservation action," and added the following sections to the policy: principles and requirements of voluntary prelisting conservation actions; metrics; site selection, conservation actions, and management; duration; biological effectiveness; durability; and program administration.

*Comment (11):* Several commenters requested that the policy provide more detail on how the Service or States will determine the level of conservation benefit.

*Our Response:* We have included a section on **Principles and Requirements of Voluntary Prelisting Conservation Programs** that outlines, in general, how a net conservation benefit should be achieved. We have purposely not been prescriptive in order to provide flexibility to States who desire to set up a program under the policy. The policy does require that a minimum of 10 percent of

the credits must be permanently set aside and cannot be used when taking a detrimental action that requires mitigation or a compensatory action. In the policy, we define these as "net benefit credits."

*Comment (12):* Many commenters stated that the policy lacked details on the metrics that would be used to determine credits and debits.

*Our Response:* We agree that the draft policy lacked detail on the metrics used to calculate credits and debits. In this final policy, we added a section describing general requirements for metrics and referenced the Service's ESA mitigation policies, which are more detailed, but are not overly prescriptive because metrics will need to vary by species.

*Comment (13):* Commenters stated that the policy should include information on how a voluntary prelisting program will address risk and additionality.

*Our Response:* We agree and have addressed additionality in section 7 of this policy as well as in section 11 in relation to CCAAs; we address risk in section 8 of this policy.

*Comment (14):* Several commenters suggested that the policy use the same standards and metrics that other mitigation programs use to ensure consistency; there is no need for the Service to develop new standards and metrics. Some commenters cautioned us not to let programs with lower standards undercut the viability and efficiency of programs with higher standards like this policy. In addition, commenters asked how this policy relates to the Service's new mitigation policy under development.

*Our Response:* We agree that the policy should be as consistent as possible with other mitigation programs and policies. In finalizing this policy, we ensured that it is consistent with other Service mitigation policies and, in fact, refer to those policies for more detailed information rather than repeating that information in this policy.

*Comment (15):* Several comments also suggested we incorporate concepts from the Service's 2014 Greater Sage-grouse Range-wide Mitigation Framework (Framework).

*Our Response:* We reviewed and incorporated many concepts from the Framework into the

**Principles and Requirements of Voluntary Prelisting Conservation Actions** section of this final policy.

*Comment (16):* Commenters suggested that we either refer to or use elements from the Service's 2003 Guidance for the Establishment, Use, and Operation of Conservation Banks.

*Our Response:* In finalizing this policy, we ensured that it is consistent with the Service's current conservation-banking policy, as well as the new, more comprehensive Service mitigation policy, and we reference the principles and standards in the new mitigation policy rather than repeat them in this document.

*Comment (17):* One commenter requested that we clarify in the policy who owns the credits if public funds are used to implement the voluntary conservation actions that provide the benefit.

*Our Response:* Except for projects where federal funding is specifically authorized to provide mitigation, federally-funded conservation projects, including the non-federal contribution required for federal cost-share conservation programs, undertaken for purposes other than mitigation will not be considered to be additional voluntary conservation actions (and not eligible to receive credits under this policy) except as outlined in Section 7 of the policy. However, credits may be generated by activities undertaken in conjunction with, but supplemental to, such programs in order to maximize the overall ecological benefits of the restoration or conservation project. Where federal funds have been used in the establishment of a mitigation area, the allocation of credits will be proportionate to the non-federal contribution. Preventing participants in some federal conservation projects or programs with a cost-share or in-kind match from receiving credits under this policy may have unintended consequences for those federal programs and unnecessarily limit the potential of this policy. The Service will continue to evaluate this aspect of the policy and the extent to which federal conservation programs with a cost-share or in-kind match can be used to leverage this policy in providing a strong conservation incentive towards conserving pre-listed species.

*Comment (18):* Several commenters indicated that voluntary-prelisting-conservation programs should be able to cover multiple States and include multiple species.

*Our Response:* We agree and have clarified in the policy that voluntary-prelisting-conservation programs may include multiple State and species. In section 4 of the policy, **Definition of Voluntary Prelisting Conservation Actions**, we refer to a "State- or multi-State-administered program."

*Comment (19):* Commenters suggested that the policy be broadened to allow other entities, in addition to States, to assume roles for administration of voluntary-prelisting-conservation programs, including tracking and monitoring of the implementation and success of conservation actions, as well as transfer and debiting of credits.

*Our Response:* We agree with this suggestion; section 8 addresses the possible roles of cooperators. Partnerships among States (e.g., a consortium) are encouraged to facilitate the implementation and oversight of voluntary-prelisting-conservation programs. A State may designate a third party (e.g., an entrepreneurial conservation banker) as its agent in carrying out the State role in implementing a voluntary-prelisting-conservation program.

States may assign oversight functions to a third party, including a Federal agency, or conservation consortiums such as Landscape Conservation Cooperatives (LCCs). The program administrator (State or other entity) will be the entity with enforcing authority for the establishment, operation, and management of a voluntary-prelisting-conservation program and must have the ability to enforce management actions, reconcile funding issues, incorporate adaptive management, track debits and credits, and report results and other activities, as needed. A State agency must, however, retain an effective role in oversight of any program implementation assigned to a third party

*Comment (20):* Several commenters requested that we clarify the relationship between Candidate Conservation Agreements with Assurances and voluntary prelisting conservation programs; the Service should indicate if a non-Federal entity can participate in both programs or be able to switch

from one program to the other.

*Our Response:* We added section 11 to explain the relationship and differences between this policy and candidate conservation agreements (both Candidate Conservation Agreements (CCAs) and Candidate Conservation Agreements with Assurances (CCAAs)). Candidate Conservation Agreements with Assurances apply only to non-Federal property owners; this policy applies to anyone or any entity who undertakes the prelisting conservation action through a program that follows this policy. Landowners enrolled in CCAs or CCAAs can receive credit under this policy for prelisting conservation actions if the actions are additional to the conservation measures required by the CCA or CCAA. Conservation measures and prelisting conservation actions will need to be independently accounted for and reported to each respective program. Also, a landowner can exit the CCAA program and enter the same property in a voluntary prelisting conservation program. However, in this situation, the assurances and the incidental take permit associated with the CCAA would no longer be in effect.

*Comment (21):* Commenters indicated that the policy should allow entities to "stack" credits on the same piece of property depending on how conservation requirements are set up.

*Our Response:* We added a reference to the issue of credit stacking to section 8 and directed readers to the Service's mitigation policy for additional information.

*Comment (22):* Several commenters stated that the policy will impinge upon a State's ability to administer at-risk species conservation by adding requirements for the conservation of those species.

*Our Response:* States have the option of creating a voluntary-prelisting-conservation program; such programs are not required by the Service. Should a State decide to create such a voluntary program, that State can design it so it does not interfere with or preclude that State from using other programs and approaches to address the conservation needs of at-risk species.

*Comment (23):* Some commenters believed that the policy will act as an incentive to list species

under the ESA, as actions will only have value when a species is listed.

*Our Response:* The mechanism for generating or earning credits is to undertake specific voluntary conservation actions that are designed to contribute to not having to list a species. Cumulatively, such actions taken by multiple landowners may result in keeping a species from being listed rather than providing reasons to list a species.

*Comment (24):* Some commenters believed the policy will provide a mechanism for people to avoid ESA regulations and will put at-risk species at a greater risk.

*Our Response:* If the landowners are actually providing benefits to a species prior to listing, thus before the credits can be used, the species will not be put at greater risk of accelerated decline from these voluntary conservation actions.

*Comment (25):* Some commenters questioned how the policy is legal since current habitat conservation plan (HCP) and section 7 consultation regulations do not require a net conservation benefit, while a net benefit is a requirement of this policy.

*Our Response:* While it is true that the HCP and section 7 regulations (50 CFR 17.22 (b)(1), 17.32 (b)(1), and 50 CFR 402 subparts A and B) do not specify that a net conservation benefit be achieved, both are viewed as recovery tools and in practice many HCPs and section 7 consultations can contribute toward recovery of listed species. The overall goal of this policy is to provide additional incentives to entities to take early voluntary conservation actions that will benefit unlisted species; the goal is that enough of these actions will be implemented in accordance with a conservation strategy so that the species does not need the protections of the ESA. To achieve this goal, a net conservation benefit standard is essential. In any case, use of this policy is entirely voluntary—HCPs and section 7 consultations can continue as always in the absence of voluntary-prelisting-conservation programs.

*Comments Responding to Specific Questions Asked in the Draft Policy*

In the draft policy, we requested input on six specific questions. The following is a summary of the comments we received and our responses:

(1) The policy requires an overall positive assistance to the species; how should we define this benefit?

*Comment:* Several commenters suggested we use the term "net benefit to recovery" in the policy and should assert a clear goal that allows for the development of standards for defining benefit, including how impacts and offsets should be valued. Other commenters recommended we use a 1 unit of credit to equal 1 unit of debit with no set aside. The credit creation and value must incorporate the term "positive assist." Other commenters suggested we add examples of what constitutes a positive assist.

*Our Response:* In this final policy, we are no longer using the term "net benefit to recovery" or "positive assistance" but are using "net conservation benefit" as the standard under the policy.

(2) The policy requires that a prelisting conservation action be part of a State plan. What approach should we take if there is no State plan for the species?

*Comment:* The policy is overly restrictive in requiring adherence to a State plan because few such plans exist that identify conservation needs of individual species and strategies to address them. The policy should define what constitutes an "appropriate" conservation plan; any plan that meets standards of that definition should be eligible. If no plan or strategy from a State exists, we should rely on a strategy from other interested parties and agencies. Commenters stated that State wildlife action plans (SWAPs) should be used, or if there are none, we should collaborate with the States to develop a conservation plan or ad-hoc conservation plans approved by States and FWS. A number of commenters support the requirement that actions must be within the framework of a State or multi-State approved program and the use of SWAPs, though not every SWAP will include "species-specific metrics." SWAPs will provide a basis for developing policy at the State

level.

*Our Response:* The commenter is confusing a State prelisting-conservation program, through which a State administers a voluntary prelisting crediting system, with a conservation strategy or plan for a particular species that identifies the conservation actions needed to address specific threats to that species. A State must have in place a voluntary-prelisting-conservation program that it administers and through which an individual or other entity can establish and use conservation credits. A conservation strategy or conservation plan can be developed by various sources; for example, many conservation strategies result from the cooperative efforts of States, the Service, and species experts. Such species plans may be found in SWAPs but are not required to be in a SWAP. Sources of such strategies can vary as long as the Service has had the opportunity to review the strategy. The conservation actions identified to address the priority threats causing the decline of a species are the essential requirement of a conservation strategy or plan rather than the source or author.

(3) For those species for which the State does not have the authority or jurisdiction, should we revise the policy to allow prelisting conservation actions for these species to receive credit? If so, how would these prelisting conservation actions be tracked and monitored?

*Comment*: All agencies with plant or animal authority should be allowed to implement the policy, but the State's fish and wildlife management agency should be involved. A Federal agency or third party could provide tracking and monitoring. Eligibility to obtain credits for prelisting conservation activities should not be limited to States in which a plan has been developed. The ability for the Service to administer a program can accommodate those instances where a State plan has not been adopted or the State, itself, does not have authority or jurisdiction over such species.

*Our Response:* States have the responsibility for species that are not federally listed under the

ESA. The Service may assist a State in administering or monitoring a prelisting program, if requested by the State. In addition, through a formal agreement with a State, another entity may administer the prelisting program for that State.

(4) How should we quantify the value of the voluntary prelisting conservation actions and credits?

*Comment*: We received a variety of ideas on how the value of credits should be quantified. Some commenters indicated States should decide the value of credits with minimal assistance from FWS while other commenters thought FWS should not be quantifying the credit or debit methodologies because these are supposed to be State-run programs, but FWS should approve them. Some commenters believed the value of the credits should be tied to the value of the threat reduction to the species. The unit of measure should not be in dollars, but should be measured by the importance to the survival of the species. Others thought that the buyer and seller should determine the value of the credit with State and FWS input, while another commenter suggested that quantifying the value of voluntary conservation actions should be addressed through facilitated discussions with stakeholders. After FWS develops a quantification tool, it should be released to the public for additional comments. The commenter suggested we include criteria for approval from other existing programs. If credits are devalued or not recognized, a landowner should be able to go back to the baseline with no penalty like in SHAs. The commenter also suggested we use conservation-banking and recovery-crediting approaches. Other commenters suggested that the value of the voluntary prelisting conservation actions should be determined at the time the impact to the species occurs to account for new science rather than assign the value when the conservation action is taken. A final commenter indicated that we should develop criteria to quantify the value of the conservation actions and credits by using metrics that are derived from existing habitat exchanges, CCAs, CCAAs, and other existing programs administered by State or local governments as potential models or templates.

*Our Response:* A State participating in the voluntary-prelisting-conservation program will be responsible for assigning conservation value to credits, approving and recording credit trading and transfer transactions, and maintaining a register of all voluntary prelisting conservation actions that is publically accessible. To provide the required net conservation benefit to a species, such actions must be based on priority conservation actions identified within a species-specific State or other Service-reviewed conservation strategy to address threats to that species.

The State agency or other entity administering the prelisting program will provide appropriate oversight to ensure the effective implementation and maintenance of voluntary prelisting conservation actions and provide a mechanism to notify the Service of each voluntary prelisting conservation action. Regardless of which State agency or entity is authorized to develop and track prelisting mitigation actions, the State agency with jurisdictional authority for the species identified (plant or animal) must be provided an opportunity to participate in the development of, and ultimately either approve or deny, any criteria for issuing credits that may impact those populations.

In order to determine conservation benefits (from voluntary prelisting conservation actions that generate credits) and potential impacts (debits for development sites), pre-project baselines of a property must be assessed. Pre-project baseline refers to the habitat or species population conditions at any given point in time against which conservation actions are measured to determine ecological gain or loss. If the species of interest is listed, the Service will consider the beneficial effects of voluntary prelisting conservation actions when determining the mitigation actions a non-Federal entity needs to implement under an HCP or when evaluating the compensatory measures a Federal agency chooses to implement in conjunction with a section 7 consultation. The Service's determination of the effects of the action being considered under these two sections of the ESA will reflect the conservation value of the voluntary actions.

Section 7 of the policy provides that, in evaluating the impacts of both detrimental actions and beneficial actions, the Service will use the same criteria, standards, and metrics to quantify the former as were used to quantify the latter. These criteria should be similar to those established for conservation banks and similar habitat exchanges. While the policy provides guidance on establishing the credits and metrics, it does not specify those that will be used for particular species. Instead, those will need to be developed independently by a State or entity administering the prelisting program and are likely to vary from species to species or situation to situation.

(5) Based on the species and the nature of the actions, how should we determine the percentage set aside?

*Comment:* A few commenters believed the draft policy is overly restrictive in limiting methods to create a net benefit. Currently it only allows the goal to be achieved by withdrawing a certain percent of credits from use. There should be a diversity of approaches available such as those included in the Recovery Credit System policy. FWS should set a guideline (not restriction) for balancing credits and debits that allows use of biologically appropriate mitigation ratios, restricting use of debits to areas not essential to recovery, limiting the activities available for debiting, and withdrawing credits from use. Each of these methods, as well as others, may be an appropriate way to ensure a net benefit. In addition, FWS should require a certain reserve of credits to be set aside to deal with potential project failure. By setting a 10 percent 'buffer' or reserve, States would have a consistent target with which to build out credits. Another commenter stated that for species that are extremely endangered (i.e., extremely small populations, extremely limited habitat, extremely low reproductive potential, and extremely poor colonizers of novel territory), mitigation is not likely to be an appropriate tool. They went on to suggest that for those species that are more robust and/or have relatively secure populations and habitat, mitigation seems a reasonable opportunity to increase populations and habitat. For actions that occur in

suitable occupied habitat and are intended to increase habitat quality or population size, the percentage set aside might be as low as 3:1 or 2:1. In the case where the mitigation effort is attempting to establish populations in unoccupied habitat, or marginal quality habitat, the acceptable percentage set aside should be much higher (greater than 3:1, possibly much higher, depending on risk and the projected possibility of success). Calculating percentage set aside should consider the likelihood of 'success' and benefit to the species; high risk actions with lower probabilities of success should be tried on small scales (in the spirit of adaptive management and learning), but should carry a high percentage set aside.

*Our Response:* While we agree that there may be more than one method to ensure that a net conservation benefit is achieved, such as those found in the Recovery Credit System (https://www.gpo.gov/fdsys/pkg/FR-2008-07-31/pdf/E8-17579.pdf ) and the Greater Sage-grouse Range-wide Mitigation Framework (http://www.fws.gov/greaterSageGrouse/documents/Landowners/USFWS_GRSG%20RangeWide_Mitigation_Framework20140903.pdf), we decided to use a required minimum 10 percent set aside as a uncomplicated but effective method to reach a net conservation benefit.

(6) The policy allows for the transfer of credits. How could we develop an uncomplicated trading system mechanism?

*Comment:* The majority of commenters supported the concept of transferring credits to other entities, but one commenter stated that it is not FWS's job to develop trading system mechanisms. A commenter believed this is an area of State authority and the policy gives States license to run their own programs. Several commenters urged FWS to encourage States to rely upon existing tools, models, and mechanisms in the administration of their programs. They suggested that credit trading systems could be established utilizing the following mechanisms:

- Adoption by States of an FWS-approved prelisting-conservation program.

- An agreement (e.g., memorandum of understanding) between a State and FWS that records credits and debits in a tracking system developed and run by that State to record credit purchase agreements.
- Establishment of conservation action sites via the process and using a template conservation action plan identified in the program.
- Purchase of credits from project proponents established through a credit-purchase agreement provided to the State.
- Record credit availability in the State through a State-administered credit registry.

One commenter believed issue of the transfer of credits warrants a separate policy provided to the State. A few commenters stated FWS should use the wetlands mitigation policy (https://www.epa.gov/sites/production/files/2015-03/documents/2008_04_10_wetlands_wetlands_mitigation_final_rule_4_10_08.pdf) as a model; and that we need an online system to account for credits both generated and as they are being used, and to keep track of transfers. Credit transfers should be modeled after existing wetlands (or species) banking programs. Another commenter suggested that the State, FWS, and the landowner should work out the value and number of credits based on some defined criteria such as scale of project, quality of habitat created or protected, or perhaps increase in species. Credits could also be released over time as improvements in habitat, populations, or both are documented.

One commenter stated we should engage those individuals and entities at the State-level that will use the system during development, and not just those that will administer it; a cooperative approach can help build support.

*Our Response:* In section 7 of the final policy, we did not require a specific trading system mechanism but instead outlined general principles and requirements of a voluntary-prelisting-conservation program to ensure that any program under this policy will meet the overall goal of

providing a net conservation benefit to species covered by such a program. We also reference principles and standards found in the Service's mitigation policy.

**Policy Regarding Voluntary Prelisting Conservation Actions**

**Section 1. Purpose.** The purpose of this policy is to incentivize voluntary conservation efforts on behalf of species before they are listed as endangered or threatened species under the Endangered Species Act (ESA); and to clarify the manner in which the Service "will give appropriate consideration to any beneficial actions taken by the Federal agency or applicant, including any actions taken prior to the initiation of consultation" under section 7(a)(2) or 7(a)(3), or to offset the impacts of incidental take of a listed species under section 10(a)(1)(B), of the ESA, as provided at 50 CFR 402.14(g)(8).

**Section 2. Definitions.** The following definitions apply specifically to this policy:

*Additionality*: Conservation benefits of a conservation action or measure that improve upon the baseline condition of the impacted species or its habitat in a manner that is demonstrably new and would not have occurred without the prelisting conservation action.

*Compensatory measures*: Under section 7(a)(2) or 7(a)(3) of the ESA, actions that provide compensation for unavoidable adverse impacts to species or their habitat. Under this policy, these actions are taken in advance of the impact.

*Conservation strategy*: A science-based foundational document or a best conservation practice that can guide Federal, State, Tribal, and private conservation actions for candidate and other at-risk unlisted species. A conservation strategy identifies the current condition of the species, includes an assessment of threats, and identifies conservation and science needs, actions that address those threats

and needs, and their implementation and monitoring.

*Credit (species credit, habitat credit)*: A defined unit of trade representing the increase or improvement of populations, or quantity or quality of habitat of a species, at a mitigation site or within a mitigation program. Credits are often expressed as a measure of habitat surface area (e.g., an acre or hectare); linear distance of constant width (e.g., stream mile); number of individuals, mating pairs, or family groups of a particular species; habitat function (e.g., habitat suitability index); or other appropriate metric that can be consistently quantified and traded.

*Debit*: A defined unit of trade representing the loss of populations, decrease in number of individuals, or decrease in habitat quantity or quality of a species at an impact site. Debits will be expressed using the same metrics used to value credits at mitigation sites.

*Mitigation*: Under section 10(a)(1)(B) of the ESA, programs, projects, or actions intended to offset known or projected impacts to species or their habitats. Under this policy, these actions are taken in advance of the impact.

*Net benefit credits*: Credits set aside that are not available for use as mitigation. For the purposes of this policy, net benefit credits are used to achieve the net conservation benefit.

*Net conservation benefit*: The cumulative benefits of the mitigation or compensatory measures (i.e., beneficial actions taken under a voluntary prelisting conservation program) that provide for an increase in the population(s) of the species of interest directly or indirectly through the enhancement or restoration of its suitable habitat, or maintenance of currently suitable habitat, that reduces or eliminates current and future threats, taking into account the duration of the voluntary prelisting conservation actions and all the adverse effects of the impact project. The net conservation benefits must be sufficient to contribute, either directly or indirectly, to the conservation of the species.

*Program administrator*: The entity with enforcing authority for the establishment, operation, and management of a voluntary prelisting conservation program. The administrator or their designee(s)

must have the authority to enforce management actions, reconcile funding issues, implement adaptive management, track debits and credits, report results, and perform other activities as needed.

*Service area*: The geographic area within which credits may be applied to offset debits associated with future development activities. Service areas are mapped geographies with unique ecological significance and sometimes political boundaries. The area should be based on the conservation needs of the species as outlined in a conservation strategy for that species.

**Section 3. Treatment of Voluntary Prelisting Conservation Actions.** If requested to do so by the person, Tribe, or Federal, State, or local government agency that undertakes a qualifying voluntary prelisting conservation action, or by a third party to whom the credits have been transferred, the Service will treat the action as (1) a measure to minimize and mitigate the impact of the taking of an endangered or threatened species pursuant to section 10(a)(1)(B) of the ESA, or (2) an intended compensatory measure of a proposed Federal agency action subject to the consultation requirements of section 7(a)(2) or 7(a)(3) of the ESA. Specifically, in the course of section 7 consultations, the Service will consider the beneficial effects of voluntary prelisting conservation actions to be included as part of the environmental baseline for the action under consideration if requested by the action agency or, in the case of an agency action involving a permit application, by such applicant. Under section 10(a)(1)(B) of the ESA, the Service will consider the credits available through voluntary prelisting conservation actions when determining the mitigation actions a non-Federal entity needs to implement under a habitat conservation plan. The Service's determination of the effects, or the mitigation needs, of the action being considered under these sections of the ESA will reflect the credits previously awarded under an approved conservation program for the voluntary prelisting action based on priority actions identified in a conservation strategy for the species. The credits earned by undertaking a prelisting conservation action may be transferred to a third party but must be

used for the same species, or suite of species, and within a recognized "service area" for particular species. Establishing service areas is critical to ensuring that future impacts are adequately offset. In general, larger service areas provide greater flexibility to trade credits and debits.

**Section 4. Definition of Voluntary Prelisting Conservation Actions.** As used in this policy, the term "voluntary prelisting conservation action" refers to any conservation measure undertaken to benefit an unlisted species of plant or wildlife as described below, including but not limited to:

- The acquisition or transfer of ownership of land or water or interests therein for conservation purposes;
- The restraint or relinquishment of the lawful use of a particular resource negatively affecting such species;
- The establishment, restoration, enhancement, preservation, or commitment (e.g. financial or legal) to continue management of habitat for such species; and
- The cooperation either in the introduction of such species into a portion of its historical range where it is absent or in the augmentation of such species in an area where it occurs.

Prelisting conservation actions may be supplemented with additional postlisting conservation actions. The benefit of those combined conservation actions must be functionally greater than the detriment of the action for which the credit is used and retired. That is, the benefit from the conservation actions combined with the detriment of the postlisting action must result in a net conservation benefit to the species (see definition in **Section 2**).

A voluntary prelisting conservation action must be:

(1) Beneficial to an unlisted species that is, or may become, a candidate for listing as threatened or endangered;

(2) Started prior to the date a final rule is published in the **Federal Register** to list the species as an endangered or threatened species under the ESA and after the date this policy is finalized. The actions must be part of an already established conservation program that meets the principles and requirement of this policy, or be included in a voluntary conservation program that has been developed under this policy after the date this policy is finalized. Note that in contrast to the conservation action, the voluntary prelisting conservation program must be operational and generating conservation benefits for the species before the date on which a proposed rule to list the species is published in the **Federal Register**;

(3) Undertaken as part of a State- or multi-State-administered program (including a program that consists of a partnership or consortium of States) that implements a conservation strategy for the species and is intended to encourage voluntary conservation measures for the species; and

(4) Not required by any Federal, State, or local law, regulation, permit, or other regulatory mechanism.

If voluntary prelisting conservation actions have served as mitigation or a compensatory measure for the environmental impacts of activities regulated by the State and undertaken prior to the listing of a species as an endangered or threatened species, such voluntary prelisting conservation actions cannot earn credit under this policy. Funds available under section 6 of the ESA may be used to supplement funding that is generated by the program itself to administer and oversee the implementation of the program.

The program must be reviewed by the Service to ensure it is in compliance with this

policy and the Service's mitigation policies. The voluntary-conservation-action program must identify:

- The service area;
- The metrics that will be used to measure progress toward meeting the conservation outcomes;
- The type and location of compensatory actions;
- A registry or tracking system that ensures transparency;
- Defined process for seeking approval of compensatory-mitigation projects;
- Defined process for a credit buyer to secure credits through a contractual agreement;
- Administrative standards that define monitoring, adaptive-management, financial-assurance, and oversight roles (see sections 7 and 8, below, for additional information); and
- Potential amount or level of take associated with voluntary prelisting conservation actions if the species of interest becomes listed.

*Conservation Strategy*

To contribute to efforts to prevent the listing of a species, conservation actions must be carefully planned and focused on specific threats in particular areas. If well crafted, conservation actions will stabilize and increase populations of candidate and other at-risk species (at-risk species are unlisted species that are declining and are at risk of becoming candidates for listing under the ESA; at-risk species may include, but are not limited to, State-listed species, species identified by States as species of greatest conservation need, or species with State heritage ranks of G1 or G2). A species conservation strategy is essential to guide the development of a voluntary-prelisting-conservation program. Without a conservation strategy it is difficult to determine the value to assign

to a specific prelisting conservation action. Should the species subject to prelisting crediting be listed under the ESA, the strategy can be the basis for developing a recovery outline and plan.

A strategy is a living document and should be updated as new information is obtained; of particular importance would be new information on the species' status, threats, and aspects of its biology that would change management practices, as well as compatibility with other management plans and conservation actions. Strategies, especially initial ones, do not need to be as complex as a recovery plan, nor is it necessary to know everything about a species before one is developed. However, a strategy does need to include enough information to set preliminary demographic and habitat targets for the species and to guide the on-the-ground conservation actions designed to meet these targets. The strategy-development process should be a collaborative effort and the information used in a strategy should undergo scientific peer review or be derived from scientific literature that has already been peer reviewed.

A voluntary-prelisting-conservation program must be based upon a conservation strategy that includes the seven elements listed below.

1. *Goals, Objectives, and Criteria.* The goal is a statement of what the strategy is designed to achieve. For example, for a candidate species, the goal may be to contribute to precluding listing by increasing the number of populations and individuals through habitat management. Objectives describe the conditions and means necessary for achieving the goal; they can be identified in terms of reduction or elimination of threats to the species, or demographic parameters. Criteria, or performance standards, are the values by which it is determined that an objective has been reached; they must be specific, measurable, achievable, realistic, and results-oriented, and have a timeframe.

2. *Geography or Landscape Context.* Provide a description of the lands where the species currently exists (e.g., locations, what land ownerships are involved, how many acres are involved). Include available maps. This information will assist in prioritizing work with landowners and in setting

service areas. Include available maps in a standard GIS format, e.g., map package, shape file, or file geodatabase, and maps with descriptive information about objectives and criteria values.

3. *Current Conditions*:

A. Species Information.

i**.** Identify the more important populations or core areas that are necessary for the conservation of the species.

ii**.** Summarize appropriate biological information about the species, including its taxonomy, life-history characteristics, biological needs (including habitat requirements), current distribution and abundance, and other relevant information. Much or all of this information can be cross-referenced if it is already available.

B. Conservation Efforts. Include a description of ongoing action or actions that are part of a formalized conservation effort that is being implemented or is about to be implemented. Indicate the threat(s) that the action(s) is addressing, the anticipated response of the species, how long the effort will be in place, and the extent of the range of the species it covers. Describe how the different efforts complement each other and fit within the strategy.

4. *Assessment of Threats*. Develop a concise description of known, suspected, and anticipated threats to the species; include a deconstruction of the threats into sources and stressors, and consider the exposure of individuals and populations to the threat (geographical and temporal (seasonal, ongoing, or near future)). Indicate which threats may have more significant impacts on the species. A geographical representation of the threats across the landscape, or species' distribution, or local occurrence level of the species would be beneficial. If the conservation strategy is intended to define what conservation actions would preclude the need to list the species, indicate the threats that must be addressed and the anticipated response of the species.

5. *Conservation Action; Priorities and Implementation*. Provide a description of the specific

conservation actions or best management practices needed to address the identified threats and to achieve sustainable populations. Prioritize the actions to address the more significant threat(s), indicate key partners or cooperators to engage to implement them, and indicate when the actions should commence. Identify where these actions need to be implemented and indicate if any actions can be combined or if particular actions need to be completed or initiated before others.

6. *Measurement and Reporting of Success*. Include a monitoring plan describing procedures to monitor and report progress on the implementation and the effectiveness of the specific conservation actions called for in the strategy by creating benchmarks for species populations or habitat indicators. If the conservation strategy is intended to inform a future listing decision, annual reporting should include a description of the degree to which the threats are being addressed by the conservation actions in the strategy and the response of the species to date.

7. *Climate-Change Impacts and Resilience*. Identify and promote measures that help reduce the effects of climate change and improve the resilience of the species and its habitat. Such measures include:

- Protecting and restoring core, unfragmented habitat areas, and the key habitat linkages among them;
- Anticipating and preparing for shifting wildlife and plant movement patterns;
- Monitoring, preventing, and slowing the spread of invasive species whose introduction does or is likely to cause environmental harm; and
- Developing, analyzing, and using mitigation measures that account for uncertainty and risk, as needed, particularly when considering change agents such as climate change.

**Section 5. Role of the States.** A State choosing to participate in the voluntary-prelisting-conservation program established by the policy will assign conservation value to credits, approve and

record transactions transferring and trading credits, and maintain a register of all voluntary-prelisting-conservation actions that is publically accessible. The State will provide appropriate oversight to ensure the effective implementation and maintenance of voluntary-prelisting-conservation actions and provide a mechanism to notify the Service at least annually of each voluntary-prelisting-conservation action taken under a program. Regardless of which State agency or entity is authorized to develop and track prelisting-mitigation actions or compensatory measures, the State agency with jurisdictional authority for the species identified (plant or animal) must be provided an opportunity to participate in the development of, and ultimately either approve or deny, any mitigation plans or criteria for issuing credits that may affect those populations. In addition, the State agency with jurisdictional authority for the species may decide whether they also want to approve each credit assignment. The voluntary-prelisting-conservation actions must be based on conservation actions identified within a State conservation strategy for the species. If no State strategy exists, a State may adopt a strategy developed by another entity. The Service must review the strategy that is used in conjunction with the voluntary-prelisting-conservation program. Partnerships among States (e.g., a consortium) are encouraged to facilitate the implementation and oversight of voluntary-prelisting-conservation programs for species whose ranges encompass multiple States. Utilization of existing resources such as landscape conservation cooperatives (LCCs) can provide support for such landscape conservation-planning efforts. In addition, oversight functions can be performed by another entity, including a Federal agency.

A State may designate a third party (e.g., an entrepreneurial conservation banker) as its agent in carrying out the State role in implementing a voluntary-prelisting-conservation program, but must retain an effective role in oversight of any program implementation assigned to a third party.

**Section 6. Role of the Fish and Wildlife Service.** The Service, when requested, may assist the State

in any aspect of a voluntary-prelisting-conservation program. The Service will coordinate between the State and other Federal agencies to help develop conservation actions and review implementation of actions taken by other Federal agencies to ensure effectiveness and maintenance of those actions. The Service will review any voluntary-prelisting-conservation program for consistency with this policy and the other mitigation policies and guidelines established by the Service.

The Service's involvement in any given voluntary-prelisting-conservation program will include the following roles:

- Provide ongoing expertise and advice to State voluntary-prelisting-conservation programs and State wildlife agencies as requested;
- Collaborate with States and review conservation strategies that are to be used in conjunction with voluntary-prelisting-conservation programs;
- Accept and evaluate annual reports from voluntary-prelisting-conservation programs, including evaluation of the effectiveness of any voluntary prelisting conservation action performed in relation to both the species of interest and the program;
- Review programs that seek to provide credits under this voluntary-prelisting-conservation policy; and
- Provide, as necessary, any conferencing or consultations under section 7 of the ESA that may be required for projects under a voluntary-prelisting-conservation program on Federal lands.

**Section 7. Principles and Requirements of Voluntary Prelisting Conservation Actions.** A voluntary-prelisting-conservation program must explain how the net-conservation-benefit requirement will be met. Each voluntary prelisting conservation action, regardless of land ownership, must provide benefits additional to those that would be achieved if the voluntary prelisting conservation

action had not taken place during ongoing land-use activities. The additional value (additionality) may result from conservation benefits to the species of interest associated with restoration, enhancement, or creation of habitat; protection of habitat (e.g., fire-protection measures, legal and financial site protections); other activities that reduce threats (e.g., threats from disease or predation); and most likely a combination of all three categories. The amount of credit a voluntary prelisting conservation action will earn is determined at the time the action is proposed or initiated.

The proposed voluntary prelisting conservation actions must comply with all applicable Federal, State, and local laws. Lands already designated for conservation or mitigation purposes cannot be used to generate credits under a voluntary-prelisting-conservation program unless the proposed mitigation project would add additional conservation benefit for a particular species above and beyond that attainable under the existing land designation. Examples of lands that cannot be used to generate credits under this policy unless additional conservation benefit is achieved include public lands already dedicated for conservation purposes; private lands enrolled in government programs that compensate landowners who permanently protect, restore, or create habitat for the species of interest; or lands protected by a habitat-management agreement with the Service or similar programs.

Conservation actions on non-Federal lands that are supported by Federal funds or an associated non-Federal match are not eligible to accrue credits for purposes of this policy. However, credit can be accrued for actions on those same lands that provide additional conservation benefits to that generated by Federal funds and the associated non-Federal match (e.g., if a landowner maintains the conservation action beyond the term of the Federally-funded conservation effort), but only if the conservation benefit can be clearly demonstrated and is legally attainable.

In the exceptional case in which: 1) acquisition of private land easements through U.S. Department of Agriculture (USDA) conservation easement programs are an essential element of an effective species conservation strategy, 2) crediting of the non-federal contribution to the USDA

conservation easement program to mitigation purposes is necessary in order to make participation financially feasible for the affected private landowners, and 3) USDA agrees to allow the non-federal contribution to be credited for mitigation, the pro-rata share of benefits of a USDA conservation easement program associated with the non-federal contribution may be accepted as a qualifying voluntary prelisting conservation action. All other required characteristics of voluntary prelisting conservation actions and the associated conservation program set forth in Sections 4 and 7 of this policy must also be satisfied.

Credits may be generated by activities undertaken in conjunction with, but additional to, Federally-funded conservation programs in order to maximize the overall ecological benefits of the restoration or conservation project. For example, when Natural Resources Conservation Service (NRCS) financial assistance is used for habitat restoration for a species, a landowner may participate in a voluntary-prelisting-conservation program once the financial term of the NRCS contract expires or for activities additional to the NRCS contract. Where federal assistance is solely technical in nature and there is no financial assistance, there are no additional restrictions for landowners to participate in and receive credit under a voluntary prelisting conservation program. In treating any voluntary prelisting conservation action as a measure to minimize and mitigate the impact of the taking of any endangered or threatened species pursuant to section 10(a)(1)(B) of the ESA, or as an intended part of any proposed Federal action subject to the consultation requirements of section 7(a)(2) or 7(a)(3) of the ESA, the Service will evaluate the beneficial impacts of such action according to the same criteria, standards, and metrics that it uses to evaluate the detrimental impacts of activities that give rise to mitigating or compensatory measures. The following principles, requirements, and elements must be incorporated into any voluntary-prelisting-conservation program established under this policy.

*Principles of Voluntary-Prelisting-Conservation Programs*

Any program developed for unlisted species that includes voluntary prelisting conservation actions for the purposes of generating credit to be used as mitigation (under section 10 of the ESA) or compensatory measures (under section 7 of the ESA), should a species be listed, must incorporate all of the following principles:

- Attain net conservation benefit: Overall outcomes must result in a net conservation benefit to the species; programs will be structured to attain this net conservation benefit. The net conservation benefit will be achieved by permanently setting aside a minimum of 10 percent of the credits generated that cannot be applied to offset the effects of a detrimental action that requires mitigation or a compensatory action (these are known as net benefit credits; see definition in **Section 2**). The percent set aside will be based on the status of the species and the nature of the action(s). In some cases, a voluntary-prelisting-conservation program may require that the percent set aside be greater than 10 percent (for example, if the status of the species is declining precipitously).
- Use a landscape-scale approach to inform mitigation when appropriate for the species of interest;
- Ensure transparency, consistency, and participation; and
- Base crediting decisions in science.

The latter three principles are described in greater detail in the Service's mitigation policy.

*Requirements of Voluntary-Prelisting-Conservation Programs*

We expect that approaches to voluntary prelisting conservation that follow the above principles and adhere to the requirements below will achieve the best outcomes for conservation through effective management of the risks associated with voluntary prelisting conservation actions.

Application of equivalent requirements across all mitigation sources will better ensure conservation goals are met. For the following requirements, see the Service's mitigation policy for information:

- *Site Selection*: Voluntary-prelisting-conservation programs should ensure that conservation actions are sited in priority locations that are identified in species-specific conservation strategies and are the most likely to successfully and fully contribute to conservation of the species of interest.
- *Duration*: The length of time that the voluntary prelisting conservation actions persist on and influence the landscape should be commensurate with the value of the credits issued for the action. A voluntary conservation action that provides temporary benefits to the species should receive proportionately fewer credits than an action whose benefits to the species are permanent. The conservation program must ensure that credit transactions assign enough credits to fully offset the duration and amount of projected project impacts that will negatively affect the species.
- *Effectiveness*: Voluntary-prelisting-conservation programs should be designed to be reasonably likely to deliver expected conservation benefits, target those actions that will provide the greatest benefit to the species of interest, and be measurable.
- *Durability*: Actions or plans proposed as voluntary-prelisting-conservation programs must be accompanied by adequate management, and legal and financial assurances that ensure the program and associated conservation actions will be in place and effective for the intended duration.

*Best Available Science*

Voluntary prelisting conservation programs must incorporate best-available science into conservation strategies, decisions, and continually seek better information in areas of greatest

uncertainty. Programs should develop and utilize the scientific information and tools necessary to identify efficient and effective means to determine baseline and future conditions, and to monitor and evaluate effectiveness of prelisting conservation actions.

*Metrics*

Metrics developed to measure an increase in ecological functions and services at voluntary-prelisting-conservation-program sites (credits) and to measure an expected loss in ecological functions and services at impact sites (debits) must be science-based, quantifiable, and peer reviewed; repeatable; sensitive; transparent; practical; and based on the conservation goals for the species as outlined in a conservation strategy for the species. See the Service's mitigation policy for further explanation of metrics.

*Site Selection, Conservation Actions, and Management*

Voluntary-prelisting-conservation programs should be established on private, public, or Tribal lands where they will provide the greatest benefit and reduce the greatest threats to the species of interest. Priority areas where voluntary prelisting conservation actions should be located should be biologically based, identified in the species' conservation strategy, and integrated, as appropriate, among private and public land ownerships.

Minimum requirements for establishment and operation of voluntary-prelisting-conservation-program sites include real estate assurances, financial assurances, a management plan, and a site-level agreement. See the Service's mitigation policy for information on real estate and financial assurances, and management plans.

*Site-level Agreements*

The site-level agreement defines the roles and responsibilities of the landowner, the agencies, and any other parties, and provides an operational framework for development, implementation, monitoring, and compliance of the project. Site-level agreements must include a description of the amount of voluntary-prelisting-conservation-program credits to be provided, including a brief explanation of the metric used for this determination, and a process for adaptive management that will address uncertainties, including new information and unforeseen or unregulated situations (e.g., weather, fire). Each agreement must identify discrete ecological- and administrative-performance standards to be met, and possible contingencies and consequences for not meeting standards. Monitoring will be designed to validate the effectiveness of the conservation actions, answer program questions, contribute to filling knowledge gaps, and provide data to inform adaptive-management decisions.

Site-selection criteria will outline the types of sites that are ecologically suitable for providing the desired habitat conditions and functions based on the species conservation strategy. In determining the ecological suitability of the project site, the following factors will be considered, to the extent practicable:

- Physical characteristics of the site;
- Landscape-scale features, such as habitat diversity, function, and connectivity;
- Juxtaposition of the voluntary-prelisting-conservation-action site relative to other areas of suitable habitat and ecological features;
- Ecological compatibility with adjacent land uses;
- Legal compatibility with existing and adjacent land uses;
- Compatibility with existing conservation plans and assessments;
- Development trends;

- Anticipated land-use changes;
- Habitat status and trends;
- The relative locations of the impact and compensation sites; and
- Local or regional goals for the protection or restoration of particular habitat types or functions.

*Site Selection—Pre-project Baselines*

In order to determine conservation benefits from voluntary prelisting conservation actions, pre-project baselines must be assessed. "Pre-project baseline" refers to the habitat or species population conditions at any given point in time against which conservation actions are measured to determine ecological gain or loss. Baseline conditions should be assessed and measured using the same methodology employed to predict future conditions during project-planning stages and ultimately to verify project conditions and associated credits during periodic and final monitoring of voluntary-prelisting-conservation-action sites. A consistent methodology must also be applied to predict impacts to a species of interest and its habitat (see *Metrics*). For voluntary-prelisting-conservation-program sites, baseline measures should explicitly acknowledge the potential threat of anthropogenic and natural disturbance, as well as the overall landscape resiliency of the site.

Pre-project baseline methods will be consistently employed across the area covered by the voluntary-prelisting-conservation program, unless variation of conditions and available data justify differences. The Service has not developed or endorsed any one specific methodology for determining pre-project baseline conditions. States and other management entities may find it useful to cooperatively develop, adapt, adopt, or align methods that can be consistently applied across larger landscapes. The methods that will be used for measuring these types of baselines should be determined early in the voluntary-prelisting-conservation-program development. Consider including

information about scale (e.g., plan-level, State-level), vegetation base layers, existing disturbance layers, breeding area date, occupied habitat, etc.

*Duration and Timing*

The length of time voluntary prelisting conservation actions persist on and influence the landscape needs to be sufficient to generate credits to fully offset the duration and degree of harm from the projected impacts from a project. Duration includes the time extent of the direct, indirect, and cumulative effects of an impact as well as the time period for an impact site to be fully restored for the affected species. As a general rule, the Service will expect that credits generated through voluntary prelisting conservation programs be permanent in nature, particularly if they are evaluated as contributing to precluding the need to list. However, some impacts may be temporary and in these cases, the benefits of the conservation actions can be temporary.

While voluntary prelisting conservation actions will begin before a project that negatively affects the species begins, their implementation may overlap with that project. However, because negative impacts typically begin to occur in the early stages of projects (i.e., construction and initial operations), the benefits of voluntary prelisting conservation actions should accrue before or as early in the life of the project as possible. When the success of the voluntary prelisting conservation actions is demonstrated prior to impacts occurring, ecological risk (due to uncertainty of implementation and time lag) is reduced. These benefits need to be verified via standardized monitoring.

*Effectiveness—Biological*

Voluntary prelisting conservation actions must have a high likelihood of success based on the biophysical setting. Actions must be supported by sound science. Actions that are unproven, especially those where time lags in providing conservation benefits are not adequately addressed,

should not be prioritized for implementation. However, such unproven actions can be encouraged without causing significant environmental risk by allowing a portion of credit to be released for implementation of actions, and holding back the majority of credit until defined and observable performance criteria related to habitat quality are achieved (see *Credit Release* in **Section 8**).

Conservation actions are also more likely to be meaningful if they are aggregated. Voluntary-prelisting-conservation-action sites are most effective if they are large enough so that they will, either in themselves or in conjunction with adjacent landscape conditions, provide long-term, targeted biological benefits. Voluntary prelisting conservation actions are not effective if they occur in areas affected by a development project (i.e., on-site), where future development is likely to occur, or in areas where benefits are likely to be reduced over time by incompatible land uses and surrounding landscape-edge effects. Applying credits from one area to multiple debit sources in the same service area may provide more concentrated landscape-level conservation benefits.

Potential credits associated with proposed restoration and enhancement activities will be evaluated on a given site in comparison with both pre-project baseline and projected future condition that would be expected in the absence of the proposed voluntary prelisting conservation actions. Preservation projects will be evaluated, and credits proportionately assigned, according to the magnitude and likelihood of existing and future threats to the habitat and/or the value of that site to conservation of the species. Crediting for such avoided loss may be acceptable if it reduces threats, is discounted according to the likelihood of loss, and includes actions above and beyond closure to development (e.g., permanent conservation easement).

*Adaptive Management*

Adaptive management is an iterative approach to decision-making, providing the opportunity to adjust decisions in light of learning with an overarching goal of reducing uncertainty over time.

Incorporating adaptive-management strategies into conservation strategies and voluntary-prelisting-conservation management plans can help to manage risk and uncertainty for any type of conservation action area. Adaptive-management processes require establishment of management benchmarks to ensure progress toward goals, protocols to monitor progress related to these benchmarks, and the resources and ability to make adjustments as needed to ensure objectives are achieved. The adaptive-management plan should include triggers for identifying when corrective actions should be taken.

Over time, new scientific information may indicate that the metric may need revision or a new metric should be used. The Service will work with the program administrator to decide if the metric needs to be changed. However, any new or improved metrics will not undermine or devalue existing credits or voluntary conservation action agreements, except in cases where failure to utilize a new or revised metric would appreciably reduce the likelihood of survival and recovery of the affected species in the wild. In these cases, the Service will require a new or improved metric as appropriate and will work with the program administrator and landowner(s) to find alternatives to address the needed changes.

**Section 8. Program Administration.** The program administrator (State or other entity) will be the entity with enforcing authority for the establishment, operation, and management of a voluntary-prelisting-conservation program. The administrator or their designee(s) must have the ability to enforce management actions, reconcile funding issues, incorporate adaptive management, ensure that monitoring of implementation and effectiveness of voluntary conservation actions is completed, track debits and credits, report results, and conduct other activities as needed.

The authority granted to the administrator ensures that conservation benefits from voluntary prelisting conservation actions will persist. As successful habitat conservation will most likely require coordination across Federal, State, tribal, and private interests, the program administrator

should be recognized through a formal agreement developed with major stakeholders including Federal, State, and tribal partners. The agreement should clearly articulate the selection process for any entity responsible for administration of various elements of the program.

The entity handling funds (usually the program administrator) must have the ability to separately manage, collect, and distribute funds. Prior to collection of any funds, plans should be in place that explain the maximum time funds can be held before being spent, how funds will be invested (including inflation protection), tracking and accounting for benefits generated by funds, guidelines for avoiding potential conflicts of interest between collecting and spending funds, and responsibility for performance of voluntary prelisting conservation actions.

*Compliance and Enforcement*

Compliance will be monitored by the program administrator; compliance measures must include a credit-verification process, a tracking system, and a review of periodic monitoring reports. Processes to verify that conservation actions meet program standards provide assurances that voluntary-prelisting-conservation-action sites are delivering benefits. A system to track both debits and credits is essential in ensuring compliance, increasing transparency, and allowing the administrator to determine the success of the actions in achieving conservation. Monitoring reports at both the program and site level will be required at least annually, and copies must be submitted to the Service. Monitoring will be structured to provide feedback on which conservation actions successfully yield intended results and which have a higher likelihood of failure. Site-level reports will document site conditions, attainment of administrative- and ecological-performance standards (measurable attributes used to determine if the management plan meets the agreed-upon goals and objectives), and management actions taken and expected to be taken in the future.

Enforcement structure and procedures will be developed at the program level. At the site

level, agreements must include clear enforcement provisions that dictate the consequences of non-compliance, including a requirement that if the conservation actions fail to meet performance standards, the credit provider provide equal compensation through other means. If the agreement holder does not satisfy the crediting requirements, the regulating entity must have the ability to suspend or terminate credit releases, credit sales, or the agreement itself, and to pursue penalties for violations as appropriate.

*Credit Release*

To manage risk and uncertainty, a voluntary conservation program should create release schedules that only allow use of prelisting conservation actions when specific success criteria are met. Success criteria must be designed to identify when risk and uncertainty have been substantially reduced. The Service recommends providing phased credit releases based on both ecological and administrative performance. A legally binding credit agreement must be in place between any party generating credits and the program administrator. The credit agreement will provide a schedule for credit releases as appropriate milestones are achieved. Failure to meet these milestones will result in suspension of credit release to ensure compliance. Administrative criteria that allow for initial credit release could include: Site agreement and management plan have been approved; the site has been secured with an appropriate real estate instrument; and appropriate financial assurances have been established. Subsequent credits may be released for meeting ecological milestones (as determined through site monitoring) and financial milestones (e.g., endowments partially funded by portions of each credit sale). The credit-release schedule will reserve a significant share of the total credits for release only after full achievement of performance standards. As discussed in **Section 4** of this policy, credits must be permanently set aside to achieve the net-conservation-benefit requirement.

*Credit Stacking and Bundling*

The Service recognizes the inherent efficiencies in leveraging multiple conservation efforts on the landscape and encourages these coordinated efforts. However, prelisting conservation actions taken under a voluntary prelisting conservation program and other conservation actions that occur on the same mitigation site must be accounted for separately, and all aspects of the different actions must be managed and tracked in a transparent manner. Stacking mitigation credits within a mitigation site (i.e., more than one credit type on spatially overlapping areas) is allowed, but the stacked credits cannot be used to provide credits for more than one permitted environmental impact action even if all the resources included in the stacked credit are not needed for that action. To do so would result in a net loss of resources in most cases because using a prelisting conservation species credit separately from the functions and services that accompany its habitat, such as carbon sequestration or pollination services, would result in double counting (i.e., double dipping). Double counting is selling or using a unit of the same ecosystem function or service on the ground more than once. This can occur through an accounting error in which the credit is used twice, and it also can occur when stacked credits are unstacked and one or more functions or services are used separately. For example, a credit representing an acre of habitat is used once as a species habitat credit for a permitted action and again as a carbon credit for a different action in a different location. The loss of species habitat at the first impact site included all functions and services associated with that habitat including carbon sequestration, so selling that same unit of compensatory mitigation again for carbon sequestration results in no carbon offset for the loss of carbon sequestration at the second impact location. Using a stacked credit separately to reflect its various values is an ecologically challenging accounting exercise.

**Section 9. Prelisting-Credit-Trading Process.** Individuals or entities that have engaged in the

generation of voluntary-prelisting-conservation-action credits may trade or sell the credits before or after listing. The administrator will establish a process and a legal mechanism for transferring credits to a third party. While there is flexibility in how the process will work in each State, this policy lays out the minimum requirements for that process. An example of a legal mechanism would be a Conservation Banking Agreement, which is part of an established or new conservation bank. In this case, the agreement outlines the use and operation of such a bank. The Service established banking guidance in 2003, which is incorporated into the Service's mitigation policy.

Buyers of established voluntary-prelisting-conservation-action credits may include any public or private entity. The Service and any relevant State wildlife agencies must review the overall process for third parties to purchase prelisting credits from the administrator. The administrator controlling funds will have the ability to separately manage, collect, and distribute funds. Prior to collection of any funds, the administrator must have plans in place that establish: the maximum time funds can be held before being spent; how funds will be invested (including inflation protection); processes for tracking and accounting for benefits generated by funds; guidelines for avoiding potential conflicts of interest between collecting and spending funds; and responsibility for performance of prelisting-conservation-action projects. In the case where the State agency itself engages in implementing voluntary prelisting conservation actions to earn credits, we strongly recommend that either a third party acts as the administrator or a public review process is incorporated into the voluntary-prelisting-conservation program to ensure transparency.

In addition to designing the legal agreement to facilitate trading of prelisting credits, the administrator will address the following requirements to facilitate the exchange of prelisting credits:

- *Legal Instrument*. The mechanism for executing a specific trade such as a written agreement, conservation-banking agreement, contract, or other similar legal document.

- *Credit Calculation*. While the credits will have been established before a trade is conducted, credit calculation is necessary to confirm that the number of credits a potential buyer is required to purchase is based on the degree or amount of impact that the buyer's development action has on the species or its habitat. The credit calculation will include the amount needed to provide the required net conservation benefit.
- *Approval***.** Potential third party buyers of prelisting credits need formal approval from the necessary regulatory agencies, including the Service and program administrator, to be in compliance with their permit requirements through the acquisition (exchange/trading) of credits. This step determines that buyers are both eligible to purchase and need to acquire credits to offset their impacts.
- *Registry*. The register of prelisting credits, managed either by the State or program administrator, will track the acquisition of credits and certify that those credits are no longer available for use by another entity. Buyers may be required to pay an account origination fee that helps defer the costs of managing the registry.
- *Control of Funds*. Confirm the availability and use of sufficient budgetary and financial assurances (whether the responsibility of the State, project developer, or a third party) to ensure, with a high degree of confidence, the durability and effectiveness of prelisting-conservation-action measures.
- *Sale of Credits*. Third-party buyers and sellers will typically negotiate and finalize a credit purchase rather than the administrator. The registry will not set the price of the credits, and will not set the terms and condition of sales.
- *Verification Program*. Sellers will conduct appropriate verification of all credits on a set schedule through independent verifiers and provide the data to the State or program

administrator using a monitoring and evaluation framework to determine the effectiveness of prelisting-conservation-action measures and progress toward the goals and objectives established by species strategies and plans, and to direct adjustments when necessary to correct reversals in voluntary prelisting conservation actions and adapt to changing conditions (see discussion under *Adaptive Management* in **Section 7**). In addition, verification of credits will be necessary before the time at which credits can be used as mitigation for a listed species and continue to be verified on a schedule or plan that would be identified in Section 7 or Section 10 documents.

**Section 10. The Single Use of Voluntary Prelisting Conservation Actions as a Mitigation or Compensatory Measure.** To the extent that a voluntary prelisting conservation action is treated by the Service as a measure to minimize or mitigate any future impact of the taking of an endangered or threatened species pursuant to section 10(a)(1)(B) of the ESA, or as an intended compensatory measure of a Federal agency action subject to the consultation requirements of section 7(a)(2) or 7(a)(3) of the ESA, that action and its associated credits may not be used again. However, a short term action generating credits that is subsequently continued beyond a previously specified ending date can earn additional prelisting conservation action credits generated during the new time period, as long as the new time period starts prior to the effective date of listing for that species.

**Section 11. Relationship of Voluntary Prelisting Conservation Actions to Candidate Conservation Agreements.** Landowners enrolled in Candidate Conservation Agreements (CCAs) or Candidate Conservation Agreements with Assurances (CCAAs) can receive credit under this policy for prelisting conservation actions if the actions are additional to the conservation measures required by the CCA or CCAA. In order to track conservation actions and ensure additionality, conservation

measures and prelisting conservation actions should be independently accounted for and reported to each respective program. Alternatively, a landowner can exit the CCAA program and enter the same property in a voluntary prelisting conservation program. However, the assurances and the incidental take permit associated with the CCAA would no longer be in effect.

Actions managed in perpetuity through an agreement associated with a voluntary-prelisting-conservation program would provide both additionality and durability to the conservation measures provided under often shorter term candidate agreements. The ability to fund additional conservation on individual CCA or CCAA properties through voluntary-prelisting-conservation-action dollars could further guarantee implementation of positive conservation actions. By keeping open the ability for those in CCAs or CCAAs to market their additional conservation improvements to others needing to offset unavoidable impacts, more landowners could be encouraged to enroll in candidate agreements. Providing a menu of conservation options for landowners and reducing risk and uncertainty by securing conservation actions under a voluntary-prelisting-conservation program may contribute to an overall positive conservation goal for a species that operates on a landscape scale and for which protection and management of existing habitat is key to its survival.

**Considerations of Executive Orders and Acts**

As mentioned above, we intend to apply this policy in considering voluntary-prelisting-conservation programs. Below we discuss compliance with several Executive Orders and statutes as they pertain to this policy.

*Regulatory Planning and Review (Executive Orders 12866 and 13563)*

Executive Order 12866 provides that the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget will review all significant rules. OIRA has determined that this final policy to be significant rule because it may raise novel legal or policy issues arising out of

legal mandates, the President's priorities, or the principles set forth in this Executive order.

Executive Order 13563 reaffirms the principles of E.O. 12866 while calling for improvements in the nation's regulatory system to promote predictability, to reduce uncertainty, and to use the best, most innovative, and least burdensome tools for achieving regulatory ends. The executive order directs agencies to consider regulatory approaches that reduce burdens and maintain flexibility and freedom of choice for the public where these approaches are relevant, feasible, and consistent with regulatory objectives. E.O. 13563 emphasizes further that our regulatory system must be based on the best available science and that the rulemaking process must allow for public participation and an open exchange of ideas. We have developed this policy in a manner consistent with these requirements.

*Regulatory Flexibility Act (5 U.S.C. 601 et seq.)*

Under the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq., whenever an agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effects of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions). However, no regulatory flexibility analysis is required if the head of the agency certifies the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that the rule will not have a significant economic impact on a substantial number of small entities.

This policy sets forth the Service's policy regarding the consideration of voluntary prelisting conservation actions through sections 7 or 10 of the ESA should a species be listed. A full description of the action, why it is being considered, and the legal basis for this action are set forth earlier in this document. The policy will provide an incentive to Federal, State, or local government agencies,

Indian Tribes, nongovernmental organizations, or private individuals to take voluntary conservation actions for species before they are listed under the ESA.

The Service, States, local government agencies, Indian Tribes, nongovernmental organizations, or private landowners are the entities that are affected by this policy. However, the effect is very limited; if they so choose, each entity would only need to report, to the State with a voluntary-prelisting-conservation program, limited information on any voluntary prelisting conservation action they took and for which they wished to receive credit under this policy. Therefore, for the reasons described above, this policy will not have a significant economic impact on a substantial number of small entities.

*Unfunded Mandates Reform Act (2 U.S.C. 1501 et seq.)*

In accordance with the Unfunded Mandates Reform Act (2 U.S.C. 1501 *et seq*.):

(a) On the basis of information contained in the "Regulatory Flexibility Act" section above, this policy will not "significantly or uniquely" affect small governments. We have determined and certify pursuant to the Unfunded Mandates Reform Act, 2 U.S.C. 1502, that this policy will not impose a cost of $100 million or more in any given year on local or State governments or private entities. As explained above, small governments could potentially be affected because the policy could place additional requirements on any city, county, or other local municipalities. However, the requirement, under this policy, which is to collect minimal information on any prelisting conservation actions they voluntarily choose to implement and report to their State wildlife agency, will only result in a minimal effect.

(b) This policy will not produce a Federal mandate on State, local, or Tribal governments or the private sector of $100 million or greater in any year; that is, it is not a "significant regulatory action"" under the Unfunded Mandates Reform Act. This policy could impose only minimal obligations on local or tribal governments and as well as on State governments if they choose to

participate. As such, a Small Government Agency Plan is not required.

*Takings—Executive Order 12630*

In accordance with Executive Order 12630, this policy will not have significant takings implications. This policy will not pertain to "taking" of private property interests, nor will it directly affect private property. A takings implication assessment is not required because this policy (1) will not effectively compel a landowner to suffer a physical invasion of property and (2) will not deny all economically beneficial or productive use of the land or aquatic resources. This policy will substantially advance a legitimate government interest (establish a policy through which the Service would consider voluntary prelisting conservation actions through sections 7 and 10 of the ESA should a species become listed) and will not present a barrier to all reasonable and expected beneficial use of private property.

*Federalism—Executive Order 13132*

In accordance with Executive Order 13132 (Federalism), this policy does not have significant Federalism effects and a federalism summary impact statement is not required. This policy pertains only to the Service's treatment of voluntary prelisting conservation actions should a species become listed under the ESA, and will not have substantial direct effects on the States, on the relationship between the Federal Government and the States, or on the distribution of power and responsibilities among the various levels of government. A State that chooses to participate under the policy must monitor prelisting conservation actions. As States have an existing mechanism to conduct the monitoring for other purposes, the policy does not create a new requirement.

*Civil Justice Reform—Executive Order 12988*

In accordance with Executive Order 12988 (Civil Justice Reform), this policy will not unduly burden the judicial system and meets the requirements of sections 3(a) and 3(b)(2) of the Executive Order. The establishment of a policy for the Service to consider voluntary prelisting conservation

actions in the context of sections 7 and 10 of the ESA should the species be listed should not significantly affect or burden the judicial system.

*Paperwork Reduction Act of 1995*

This policy contains a collection of information that we submitted to OMB for review and approval under the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). We may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. OMB has reviewed and approved this information collection and assigned OMB Control Number 1018-0158, which expires 01/13/2020.

OMB Control No.: 1018-0158.

Title: Voluntary Prelisting Conservation Actions.

Service Form Number(s): None.

Description of Respondents: Individuals; businesses and organizations; and State, tribal and local governments.

Respondent's Obligation: Required to obtain or retain a benefit.

Frequency of Collection: Ongoing for recordkeeping and annually for reporting.

| ACTIVITY | NUMBER OF RESPONDENTS | NUMBER OF RESPONSES | COMPLETION TIME PER RESPONSE | TOTAL ANNUAL BURDEN HOURS |
|---|---|---|---|---|
| Report Information to States | 400 | 400 | 15 minutes | 100 |
| States Collect and Annually Report Information to the Service | 10 | 10 | 20 hours | 200 |
| States develop a Voluntary conservation-action program | 10 | 10 | 320 hours | 3,200 |
| Development of a Conservation Strategy | 10 | 10 | 200 hours | 2,000 |
| Development of a Site | 16 | 16 | 100 hours | 1,600 |

| ACTIVITY | NUMBER OF RESPONDENTS | NUMBER OF RESPONSES | COMPLETION TIME PER RESPONSE | TOTAL ANNUAL BURDEN HOURS |
|---|---|---|---|---|
| Agreement | | | | |
| Management Plan Development for Sites | 16 | 16 | 120 hours | 1,920 |
| Credit Agreement Development | 16 | 16 | 80 hours | 1,280 |
| Totals | 478 | 478 | 841 hours | 10,300 |

We will collect the following information from the States:

- Description of the prelisting conservation action being taken.
- Location of the action (does not include a specific address).
- Name of the entity taking the action and their contact information (email address only).
- Frequency of the action (ongoing for X years, or one-time implementation) and an indication if the action is included in a conservation strategy for the species.
- Any transfer to a third party of the credits earned by implementing a voluntary conservation action.

We estimate that 10 States will choose to participate in the first three years of the program. Each State will collect information from landowners, businesses, organizations, and tribal and local governments that wish to receive credit for voluntary prelisting conservation actions. States may collect this information via an Access database, Excel spreadsheet, or other database of their choosing and submit the information to the Fish and Wildlife Service (via email) annually. We will use this information to calculate the amount of credits that the entity taking the conservation action will receive. We will keep track of the credits and notify the entity of how much credit they have earned. The entity can then use these credits to mitigate or offset the detrimental effects of other actions they take after the species is listed (assuming it is listed).

We have added some additional information collection requirements into this final policy including the need for a State to develop a Conservation Strategy, or reference an already-established strategy, the need for the States to develop, in conjunction with the entity taking a voluntary conservation action under the State program, a Site Agreement which would also have a Management Plan. The State program would also need to have the requirement to have a credit agreement between the entity that earns the credits for the voluntary prelisting conservation actions, the State agency, and a third party that wishes to purchase the credits. As outlined above in the policy, the State program must also include the following information: the service area; the metrics that will be used to measure progress toward meeting the conservation outcomes; the type and location of compensatory actions; a registry or tracking system that ensures transparency; defined process for seeking approval of compensatory-mitigation projects; defined process for a credit buyer to secure credits through a contractual agreement; administrative standards that define monitoring, adaptive-management, financial-assurance, and oversight roles (see sections 7 and 8, below, for additional information); and potential amount or level of take associated with voluntary prelisting conservation actions if the species of interest becomes listed.

We received one comment on the information collection requirements in the draft policy. All comments received are addressed above. The public may comment, at any time, on the accuracy of the information collection burden in this policy and may submit any comments to the Information Collection Clearance Officer, U.S. Fish and Wildlife Service, Mailstop BPHC, 5275 Leesburg Pike, Falls Church, VA 22041-3803 (mail); or hope_grey@fws.gov (email).

*National Environmental Policy Act (NEPA)*

We have analyzed the policy in accordance with the criteria of the National Environmental Policy Act (NEPA) (42 U.S.C. 4332(c)), the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508), and the Department of the

Interior's NEPA procedures (516 DM 2 and 8; 43 CFR part 46).

We have determined that the policy is categorically excluded from NEPA documentation requirements consistent with 40 CFR 1508.4 and 43 CFR 46.210(i). This categorical exclusion applies to policies, directives, regulations, and guidelines that are "of an administrative, financial, legal, technical, or procedural nature." This action does not trigger an extraordinary circumstance, as outlined in 43 CFR 46.215, applicable to the categorical exclusion. Therefore, the policy does not constitute a major Federal action significantly affecting the quality of the human environment.

*Government-to-Government Relationship with Tribes*

In accordance with the President's memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments" (59 FR 22951), Executive Order 13175 "Consultation and Coordination with Indian Tribal Governments," and the Department of the Interior Manual at 512 DM 2, we have considered possible effects on federally recognized Indian tribes and have determined that there are no potential adverse effects of issuing this policy. Our intent with the policy is to provide a consistent approach to the consideration of voluntary prelisting conservation actions, including those taken on Tribal lands. Participation in a prelisting conservation program as described in this policy is voluntary.

*Energy Supply, Distribution, or Use*

Executive Order 13211 (Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use) requires agencies to prepare Statements of Energy Effects when undertaking certain actions. The policy is not expected to significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action and no Statement of Energy Effects is required.

**Authors**

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**Authority**

The authority for this action is the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.).

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# APPENDIX B:
# AGENCY COORDINATION AND COMMUNICATIONS

(insert as developed. Include approvals and any agency statements of consistency with state and federal guidance.)

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# APPENDIX C:
# ANNUAL PROGRESS REPORTS

(Insert after first year plan is active)

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