Draft Environmental Assessment for a Fire Management Plan
Kankakee National Wildlife Refuge and Conservation Area
and Hackmatack National Wildlife Refuge

Appendix C: Mitigation
and Conservation Measures

March 2020
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Appendix C. Mitigation and Conservation Measures

The U.S. Fish and Wildlife Service (FWS or “Service”) will be consulting with FWS endangered species staff and preparing appropriate paperwork/consultation under 16 U.S. Code Section 1531 et seq., the Endangered Species Act of 1973 (ESA) 4D rule or Section 7 (of the ESA) on each annual prescribed burn plan. The Service will also consult with Illinois State and Wisconsin State threatened and endangered species specialists to avoid adversely affecting state-listed species.

MITIGATION MEASURES

Mitigation measures are designed to avoid or substantially reduce adverse impacts of mechanical treatments, prescribed fire, and wildfire response decisions.

Public Health and Safety

The Service is dedicated to ensuring the safety of all visitors and residents and properties adjacent to refuge boundaries. The following steps will help ensure public safety:

- The public will be restricted from the affected area during prescribed fire and wildfire operations.
- All refuge visitors will be accounted for prior to treatments.
- Residents adjacent to the refuges will be notified in advance of any prescribed burn, or if wildfire poses a threat of spreading outside refuge boundaries, or to avoid unnecessary smoke impacts.

Firefighter Safety

- Hazardous snags that may cause safety or control issues will be identified prior to burn day and flag the area to be avoided by fire personnel. If snags cannot be mitigated and pose a threat to firefighter or control problems, snags may be removed with prior consultation with natural resource staff.
- All holding lines will be easily identifiable for incident personnel.
- Weather and fuel conditions in the burn area will be monitored.
- Final checks of control lines will be conducted, making sure the burn unit is clear of unauthorized personnel.
- All notifications will be completed prior to ignition.

Wildfire Response

- The protection of human life is the single, overriding priority. The Service will set priorities for protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources based on human health and safety, values to be protected, and the costs of protection.
- Minimum Impact Suppression Tactics (MIST — see the “Glossary” in appendix D) will be employed to reduce impacts on rare plants and their associated plant communities, especially in the fire intolerant and nonpreference habitats where fire has likely not been a factor in their evolution.
- Natural resource and cultural resource staff will be included, to the extent possible, during all stages of wildfire responses (planning, implementation, and restoration).
• Fireline location will avoid sensitive areas wherever possible. Sensitive areas identified by FWS staff may include cultural or natural resources, utility infrastructure, and other resources or facilities that may be damaged by fire suppression efforts.

• Firelines will be re-contoured and water-barred, as needed, after the end of fire suppression activities.

• No modifications will be made to roadways, trails, water sources, or clearings except for spot maintenance to remove obstructions. All sites where modifications are made or obstructions removed will be rehabilitated to pre-fire conditions as deemed necessary by refuge management.

• As a matter of practice, burned areas will not be reseeded unless there are overriding concerns about establishment of invasive nonnative plant species. Any reseeding will be with native species and will only occur with the refuge manager’s prior approval.

• Fire-intolerant plant communities (such as those found in wetlands) will be protected from the adverse impacts of wildfire to the extent practicable.

• Surfactant chemicals (foams or other fire retardants) will not be used within 100 feet of wetlands.

• Surfactant chemicals are prohibited within 300 feet of any water channel.

• Avoid direct ground disturbance to listed/rare plants and exclude fireline construction (including handline and machine-constructed firelines) within 25 feet of plant population boundaries.

Wildfire Prevention and Education

• The Service will provide printed and electronic prevention material to FWS employees and increase prevention awareness through formal presentations, training, and practice.

Chemical Treatments

• Measures will be taken to minimize exposure to refuge staff and visitors. Refuge personnel will be trained pesticide applicators or work under someone who is. They will follow standard safety procedures.

• The location and weather conditions for the pesticide application will comply with the product label.

• All products will be used according to label instructions, and the FWS will select the herbicide application that is most effective for the target species and least harmful to nontarget organisms. The FWS herbicide application crews will avoid drift damage during application of herbicides by observing practices such as:
  - choosing optimal times of year to apply herbicides;
  - using the lowest effective application rate; that is, apply the minimum amounts needed to effectively control the target species;
  - avoiding impacts to a wider area than is targeted from spray drift, to nontarget sites, by not treating on windy days — avoid drift spray by spraying when the wind speed is less than 10 mph;
  - using nozzles that reduce drift potential — carefully calibrate spray nozzles to achieve the correct droplet size and application rate, spray drift is effectively minimized (FWS 2009); and
  - using alternative application methods if necessary.
• The FWS will take other precautions such as
  - creating herbicide-free buffers around nontarget plants and known sensitive and rare plants and
    sensitive areas; and
  - shielding nontarget and sensitive plants with suitable material, such as a tree shelter, bucket, or
    other means

**Prescribed Fire**

• Local fire departments, local police, and other parties, as identified within the individual burn plan,
  will be notified prior to implementing prescribed burns.

• Prescribed fires will not be started until all contingency forces are confirmed to be available, as
  specified in each prescribed burn plan.

• Prescribed burns will not occur during extended inversions or if an “Orange AQI or Worse” or “Air
  Pollution” alert day is predicted or occurring within a proposed burn period. [https://airnow.gov](https://airnow.gov) (AQI = Air Quality Index).

• Agency or local law enforcement may be requested for traffic control if smoke could impact visibility
  on roads, highways, and Interstates.

• Warning signs will be posted to advise motorists of a prescribed burn in progress and the potential
  for reduced visibility on roads that may be impacted by a prescribed burn.

• Notification will be given to municipalities and landowners that border a refuge. Notices may also be
  posted physically and electronically to inform nearby communities of prescribed fires.

**Smoke Management**

The following smoke management mitigations will be followed if there is the potential to impact a smoke
sensitive area (hospitals, highways, recreation areas, and any populated area):

• Smoke management forecast will be verified with the National Weather Service. Smoke
  characteristics will be evaluated.

• Burning will only occur when fuels and atmospheric conditions are such that burning will not
  adversely impact identified smoke-sensitive area.

• Ignition techniques will be chosen to minimize potential for impact to smoke sensitive receptors.

• Burns will be implemented so that all ignition operations are completed during the burn period, and
  heavy fuels have had a chance to substantially burn out prior to the end of the day to minimize
  overnight smoldering and smoke production. All efforts will be made to not leave smoldering
  materials overnight.

**Wildlife**

• Refuge management and biological staff will be included at all stages of mechanical treatments,
  prescribed fire, and wildfire response.

• Adverse effects on wildlife will be minimized by appropriately timing prescribed burns to avoid the
  active periods for wildlife that are not able to escape a prescribed burn, such as turtles.
The timing of mechanical treatments and prescribed burns will be considered on a case by case basis for other wildlife species and incorporated into burn plans. For example, a prescribed fire in a wooded area will be avoided during the peak bird-nesting period and bat maternity season.

Prescribed fires in grasslands will be targeted to avoid the nesting season for bird and other wildlife (including reptiles and amphibians), unless benefits gained, such as woody vegetation control, is deemed essential.

Post suppression: snags for wildlife benefits will be retained unless required for suppression or safety reasons.

**Listed Plants and Animals**

- ESA Section 7 Intra-Service Consultation will be completed prior to any action being taken. This consultation is required before taking any action that has the potential to affect federally listed species or designated critical habitat.

- Refuge management and biological staff will be included at all stages of mechanical treatments, chemical treatments, prescribed fire, and wildfire response to identify areas where listed plants are known to occur and what steps should be taken to protect them.

**Mechanical Treatments**

- Prior to implementing any mechanical treatment and throughout the planning process, biological staff will be consulted to identify and avoid listed plants or animals and the habitat in which they are commonly found. In the more pristine areas and those that could potentially harbor special status plants, invasive plant control should be done with care, using manual means as much as possible.

- Use of heavy equipment will be minimal or as deemed necessary in wetland community types.

- Mechanical treatment of invasive/exotic plants should include best practices to minimize the potential of spreading seed sources or plant parts to native plant communities or elsewhere on the refuges, including cleaning equipment prior to leaving a treatment area, completing a boot check, clothing, and equipment check. Equipment brought in from outside a refuge, or from another part of the refuge, should be washed and inspected to ensure invasive/exotic plant seeds and parts are not transported onto refuge lands.

**Prescribed Fire**

- A prescribed fire plan will be developed to govern the actual burn activity. The plan will follow the standards put forth by the National Wildlife Coordinating Group: [https://www.nwog.gov/sites/default/files/publications/pms484.pdf](https://www.nwog.gov/sites/default/files/publications/pms484.pdf).

- Wetlands can be used as a natural boundary for prescribed fire. When a wetland is being used as a boundary, the control line will be clearly identified or made to safely control fire behavior.

- Prescribed burns will be a multidiscipline planning process. Fire management and resource management staff will develop clear, concise objectives for the action, with measurable results. Plant communities in the proposed burn area will be monitored before and after the burn to determine the success of the action if staff and resources are available.
• Prior to implementing any prescribed fire and throughout the planning process, biological staff will be consulted to identify and avoid any special status plants or animals and the habitat in which they are commonly found. In the more pristine areas and those that harbor special status plants or animals, invasive plant control should be done with care, using manual means as much as possible.

• Avoid high-temperature burns from slash pile burning treatment — exclude all piling and burning of slash within 25 feet of plant community boundary.

Invasive Native and Nonnative (Exotic) Plants

Prevention

• Minimum Impact Suppression Tactics (MIST) will be employed to minimize soil disturbance in fireline construction, off-road vehicle use, and/or otherwise create conditions favorable for the spread of invasive plants.

• Biological staff will be consulted prior to fireline construction to identify known exotic plant and noxious weed areas when possible.

• Fire management operations will be staged away from known exotic plant and noxious weed infestations to the greatest extent possible.

• Firefighting equipment and firefighter personal gear will be checked for invasive weed seeds and plant parts and cleaned before movement of fire crews.

• When possible, prescribed burns will be conducted at a time of year when introduction or spread of invasive plants will be minimized, and mortality of invasive plant species will be maximized. If not possible, additional invasive plant species management actions (herbicide, mechanical removal) will be considered in concert with prescribed burning.

• Vehicles will minimize driving in areas infested with invasive/exotic plants at a time when movement of seeds is likely, and when this is not possible, vehicles, boots, and equipment will be cleaned after leaving an infested area. Vehicles, boots, and equipment will be considered clean when a visual inspection does not disclose seeds, soil, vegetative matter, and other debris that could contain or hold seeds.

• A designated location will be identified for the cleaning described above. This will be in a spot not conducive to exotic weed establishment and will be monitored for incipient weed populations.

Monitoring

• Post-treatment surveys in treated areas and site-specific evaluations will be conducted to determine appropriate treatment to control any invasive/exotic plants that are located.

• Mechanically treated and burned areas will be monitored for invasive/exotic plant establishment.

• New noxious weed populations, resulting from project implementation, will be treated and monitored.

Cultural Resources

• The fire management plan will include provision for archeological surveys to precede fireline construction.
• FWS staff will complete National Historic Preservation Act section 106 compliance prior to implementing any hazard fuel reduction projects if the treated areas could potentially contain cultural resources.

• FWS staff will participate in planning stages of hazard fuels reduction projects if the treated areas could potentially contain cultural resources.

• The creation of buffers around archeological sites and reducing hazardous fuels in the vicinity of the sites could be used to protect sites, where feasible, and safety is not compromised.

• Prior to treatments, an inventory will be conducted of previously unsurveyed areas using an archeologist who meets the Secretary of the Interior’s standards for conducting archeological surveys.

• Hazard fuels personnel will be briefed about protecting cultural resources. If archeological sites are discovered during surveys, they may be excluded from prescribed burns, and mechanical treatments in those areas may be limited.

• FWS staff will be contacted immediately if previously unrecorded cultural resources are discovered before, during, or after treatments. The cultural resources will be recorded, delineated, and protected.

• FWS staff will be contacted concurrent with the detection of a wildfire in areas that could potentially contain unrecorded cultural resources.

• Suppression personnel will be briefed about protecting cultural resources.

• Protecting structures and features is more important than minimizing acres burned.

CONSERVATION MEASURES FOR SPECIFIC SPECIES

Conservation measures are FWS recommendations on how to avoid, minimize, and/or mitigate adverse effects that may result from certain activities.

Northern Long-Eared Bat

The 4(d) rule, under the authority of the Endangered Species Act, went into effect on February 16, 2016, for the northern long-eared bat (federally threatened). As a result, certain additional prohibitions and restrictions are applicable to tree operations. Incidental take of the bats (as a result of the removal of hazardous trees for the protection of human life and property) is not prohibited. “Tree removal” is defined as cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation likely to be used by the bats.

Mechanical Treatments

• **All Year:** No cutting or destroying a known northern long-eared bat maternity roost tree at any time of year.

• **November 15 through March 31:** Preferred tree cut period for all resource management approved trees, including within 0.25 mile of bat hibernacula. For prescribed burns, protect snags 5” diameter at base height (DBH) and larger.¹ ²

• **June and July:** Northern long-eared bat pup season — 3” DBH and larger trees protected from cutting down throughout a refuge, including within 0.25 mile of bat hibernacula. Prescribed fire is prohibited.³
• No cutting or destroying any known northern long-eared bat occupied maternity roost tree or any trees within a 150-foot radius from the known maternity tree.

• **April and May and August 1 through November 14:** 5” DBH and larger trees protected from being cut down throughout a refuge, including within 0.25 mile of bat hibernacula.

**Prescribed Fire**

• **November 15 through March 31:** Protect snags 5” DBH and larger. In preparing for a burn, methods to prevent the combustion of dead trees are preferred over tree removal. When hazard tree removal is necessary, it should be accomplished during the winter cut period of November 15 through March 31.

• **June and July:** Northern long-eared bat pup season — prescribed fire is prohibited. Burns will not occur in wooded areas in June and July, which is the peak season when mothers roost in trees raising their pups.

• **April and May and August 1 through November 14:** For prescribed burns, protect snags 5” DBH and larger. When possible, it is preferred to avoid conducting prescribed burns April through October when bats are active.

**Prior to Burns**

• When possible prior to burns, fuels will be raked away from the bases of standing snags that are greater than or equal to (≥) 3” DBH to limit ignition of trees, which could serve as maternity roost habitat for northern long-eared bats or other bat species.

• Large snags and trees should be left on the landscape to provide ample maternity roosting habitat for current and future use.

• Burns will be implemented so that all ignition operations are completed during the burn period, and heavy fuels have had a chance to substantially burn out prior to the end of the day to minimize overnight smoldering and smoke production. Smoldering of interior fuels overnight in burn units will be allowed.

**Notes:**

1. The preferred cut period for standing trees coincides with when northern long-eared should be hibernating — predominantly in mines and caves.

2. There is evidence that roost availability is likely not a limiting factor for northern long-eared bats, therefore protecting smaller size-class trees (3” to less than 5” DBH) as roost habitat outside the pup season would impose unnecessary and expensive restrictions on routine refuge operations. Protection of 5” DBH and larger trees offers protection to northern long-eared bats and habitat trees.

3. The primary intent during these months is to prevent direct bat mortality. June and July have been designated by the Service as “pup season” for the northern long-eared bat. Prior to gaining the ability to fly, juvenile bats are particularly vulnerable to tree-removal activities. Some studies have shown use, by northern long-eared bats, of smaller trees as maternity roost trees, thus the protection of smaller-class trees. Nonvolant (flightless) pups are likely the most vulnerable to death and injury from fire.

**Rusty Patched Bumblebee**

Access to diverse and abundant floral resources is essential for the rusty patched bumble bee during its active season, which is typically long compared to most other bumble bee species. The species is active and reliant on flowers during the entire growing season (mid-March through mid-October). Therefore, any action that
will increase the diversity of wildflower resources throughout the growing season will tend to contribute positively to rusty patched bumble bee colony health.

The recommendations herein will provide for most other bumble bees, solitary bees, and many butterflies. The inclusion of milkweed in floral resources will also provide for monarch butterflies.

This section contains recommended activities to meet the rusty patched bumble bee conservation objectives and targets. The entirety of the information in this section can be found at https://www.fws.gov/midwest/endangered/insects/rpbb/pdf/ConservationGuidanceRPBBv1_27Feb2018.pdf

- Increase the diversity of native wildflowers by direct seeding to establish a new cover type – for example, conversion of cropland, intensively managed pasture or range, or intensively managed hay lands to native floral and grassland habitat.
- Implement or alter grazing practices, prescribed fire, or other land management to increase the diversity of native wildflowers and that maintain or facilitate the development of nesting and overwintering habitat.
- Remove and control invasive plants (such as garlic mustard) in woodlands, forest edges, prairies, and meadows and in any habitats used for foraging, nesting, or overwintering.
- Increase the diversity of native wildflowers in grasslands and pastures by inter-seeding or similar practices.
- Establish native trees and shrubs (such as willows and serviceberry) whose flowers are often good early season pollen and nectar sources.

**Prescribed Fire**

Prescribed fire is an excellent tool to maintain, restore, and enhance rusty patched bumble bee habitat, but must be implemented with considerable care and planning. Prescribe fire has the potential for complex effects on the plant communities that are critical to the persistence of local colonies and fire and smoke could harm or kill bees in the burned area. In addition, fire may not be needed to conserve a rusty patched bumble bee colony(ies) unless certain aspects of the plant community (such as low density of nectar or pollen plants) are currently limiting colony growth. When using prescribed fire, the following measures are recommended:

- Consider the landscape in which the actions will occur; specifically, the area within 0.6 mile from the area of interest, to determine if there are nearby floral resources available.
- Consider the timing of the burns and the habitat within the areas that burns will occur; in particular, consider when floral resources will return and be available for foraging.
- Only burn a specific area once every 3 to 6 years. Use the maximum length fire return interval that is adequate to maintain or restore meadows and/or high-quality native prairie habitat on each unit. Allow at least 3 years to elapse without fire (that is, minimum 4-year rotations) before re-burning any area. Burning more frequently may be required for establishing new habitat (such as burning for 2-3 years in a row)
- Burn only small sections at a time. If feasible to achieve management objectives, allow fires to burn in a patchy (“finger”) pattern within units. Do not make a concerted effort to burn “every square
inch”; leave fire “skips” unburned. Burning under cool or damp conditions may increase survival of insects present in the litter layer within the burned unit.

• Map the extent of each fire in rusty patched bumble bee habitat to ensure that future fire planning is based on an accurate understanding of prior fire history.

• Mow firebreaks that will result in patches of unburned areas, if possible, to serve as refuge for animals within burn areas. Consider the use of proactive techniques to increase the patchiness of fires, especially if habitats that would serve as sources of recolonizing adults are small or within the foraging distance of the burn unit.

• Conduct pre-burn bumble bee surveys and evaluate other applicable information to understand the distribution and relative abundance of rusty patched bumble bees within and among burn units and elsewhere within the area inhabited by the local colony(ies). See the rusty patched bumble bee survey protocols provided in FWS rusty patched bumble bee ESA guidance website at https://www.fws.gov/midwest/Endangered/insects/rpbb/surveys.html.

• Avoid high intensity fires. High fuel levels increase the likelihood that fires may destroy nesting habitat for rusty patched bumble bees. Therefore, consider reducing fuel levels (for example, by haying the previous late fall) before conducting burns where fuel levels seem to be high – if that would not interfere with the burn objectives

• If the configuration of burn units is changed or other changes are made to the prescribed burn plan, review the location and timing of recent burns. Evaluate the potential effects of those recent burns on the current abundance and distribution of rusty patched bumble bees within the management area and elsewhere within the presumed extent of the local population (for example, one or more colonies may be found within the High Potential Zone, see maps at https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html).

• Plan for the contingency that a prescribed fire could escape a burn unit and burn one or more additional units that contain rusty patched bumble bee habitat. If this is reasonably likely, determine how the rusty patched bumble bee colony or group of colonies would persist despite such a scenario.

If burning in foraging habitat

• Only burn from mid-October through mid-March, if possible, so that floral resources are not reduced when the species is feeding. If feasible to achieve your management objectives, conduct spring burns as early as is feasible or late fall burns. Late spring burns may reduce the nectar and pollen sources for newly emerged queens that are gathering food to establish their colonies.

• If burning cannot occur outside the active season, burn no more than one-third of the suitable foraging habitat within the management area each year. Consider the landscape context of the burns and include in the assessment the land within 0.6 mile of the area.

  o If possible, burn small sections at a time. Divide rusty patched bumble bee habitat, where prescribed fire is proposed, into as many burn units as is feasible and burn no more than one unit in any single year. Units should contain approximately equal amounts of rusty patched bumble bee habitat to ensure that the colony that is using the site is not disproportionally affected by any single burn.

  o In cases where there are nearby local colonies of rusty patched bumble bee that will provide immigrants from outside of the management area it may also be feasible to conserve a rusty
patched bumble bee colony with less than three burn units, but that would require close coordination with neighboring landowners.

**If burning in overwintering habitat or early spring foraging habitat**

- If burning during the overwintering period (mid-October through mid-March) or in spring, burn no more than one-third of the suitable habitat within the management area each year. Units should contain approximately equal amounts of rusty patched bumble bee habitat to ensure that the colony that is using the site is not disproportionately affected by any single burn. Consider the landscape context of the burns and include in the assessment the land within 0.6 mile of the area.

- If there is a need to burn in late spring to address a particular management need (such as controlling smooth brome), other precautionary measures will be especially important. These include the division of occupied rusty patched bumble bee habitat into as many burn units as is practicable; ensuring that fires do not escape from burn units; maximizing the number of years between fires; and reducing fuel loads (for example, by grazing) in rusty patched bumble bee habitat in units where frequent or intense fire is not necessary.

- If it is not practicable to divide rusty patched bumble bee habitat into separate burn units within a management area, then the recommendation is to, instead, carefully implement grazing or haying, if feasible. Alternatively, consider the landscape context to determine if at least two-thirds of suitable habitat remains unburned within 0.6 mile of the management area.

**Chemical Treatments**

Targeted herbicide and insecticide use can be a useful management tool to control pests and invasive plants. Nevertheless, rusty patched bumble bees are unlikely to thrive if they are exposed to insecticides that are used broadly and systemically (for example, seed coatings) or are foliar sprayed.

Whenever applicable, in order to prevent insecticide exposure to pollinators, the safest action is to avoid use of insecticides in rusty-patched bumble bee habitat or in areas near habitat. There are a number of resources available to help with decisions on how to reduce pesticide use, how to reduce the potential for drift of pesticide to habitat, and how to keep yards and lawns pollinator friendly.

**Mowing and Haying**

Mowing and haying can be a useful management tool to control invasive plants and maintain open meadows and prairies. Meadows and gardens with a variety of structural layers of habitat and bunch grasses have been shown to have a higher diversity of bumble bees than areas without such features. However, sites under certain mowing regimes (such as May and/or July mowing) were found to have significantly fewer nests than non-mowed areas, likely due to a loss in floral resources. When mowing or haying, the following measures are recommended:

- Mow outside of the active season (mid-October through mid-March), if possible, in areas that provide summer foraging habitat. If mowing must occur during the active flight season (mid-March through mid-October), attempt to create a mosaic of structurally different habitat patches or ensure that the extent of the area mowed is not likely to affect more than one-third of the foraging habitat that is available on site or within the larger landscape (within 0.6 mile) of the site boundary.

- Mow at the highest cutting height possible, ideally 12-16 inches, or a minimum of 8-10 inches, if possible. Mowing at this height will reduce disturbance of established nests or overwintering queens.
• Mow no more than 1/2 of the open, nonforested foraging habitat within the management area per year, if possible. Leave patches of unmowed habitat for the entire year. Consider the habitat availability in the larger landscape context (within 0.6 mile) of the area.

• In cases where there are nearby local colony(ies) of rusty patched bumble bee that will provide immigrants from outside of the management area, it may also be feasible to conserve a rusty patched bumble bee colony(ies) with less than three mow units, but that would require close coordination with neighboring landowners.

• Mow at reduced speeds (less than 8 mph), if possible, to allow time for bees to avoid mowing equipment.

• Map the extent of mowed areas in rusty patched bumble bee habitat to ensure that future mowing planning is based on an accurate understanding of prior mowing history.

**Coordinated Management**

For coordinated management among nearby sites, conservation of the rusty patched bumble bee will ultimately depend in part on connecting patches of high quality habitat, and coordinated management may be one avenue to do so. The following recommendations will help facilitate coordinated management:

• Conduct bumble bee surveys or review available data to understand the extent of nearby local rusty patched bumble bees colonies and habitats. This may facilitate coordination and management of colonies that may cross between management units and ownerships. To see where there are known locations of the rusty patched bumble bee, see the rusty patched bumble bee interactive map at [https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html](https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html).

• Coordinate management activities with property owners and managers of nearby rusty patched bumble bee habitats. For example, plan burns and other temporarily adverse management activities during years when nearby habitats will not be burned.

• Where there are nearby local colony(ies) (within the estimated dispersal distance of 10 kilometers [6 miles]) of rusty patched bumble bee that will provide immigrants from outside a management area, it may be feasible to conserve a rusty patched bumble bee colony(ies) with less than the recommended number of management units (for example, mow or burn units). This would require close coordination with neighboring landowners to ensure that dispersal of adults is likely to be sufficient to reinforce numbers in the mowed area. To determine if there are nearby colonies, see the maps at [https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html](https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html) – the red “High Potential Zone” polygons are areas with recent records of the species.

**Eastern Massasauga Rattlesnake**

Prescribed burning and mowing are important tools for managing habitat for eastern massasaugas and many other grassland-dependent wildlife and plants. However, fire and mowing can kill individual snakes if done after the snakes have emerged from hibernation. In general, avoid burning and mowing during the massasaugas active season. For people managing lands on or near eastern massasauga occupied sites, the recommendation is to use “The Eastern Massasauga Rattlesnake: A Handbook for Land Managers,” available at [https://www.fws.gov/midwest/endangered/reptiles/pdf/eama-mgmt-guide.pdf](https://www.fws.gov/midwest/endangered/reptiles/pdf/eama-mgmt-guide.pdf).

More information can be found at [https://www.fws.gov/midwest/endangered/reptiles/eama/faqFinalListEMR.html](https://www.fws.gov/midwest/endangered/reptiles/eama/faqFinalListEMR.html).
Whooping Crane

Eastern Prairie Fringed Orchid
The 1999 “Eastern Prairie Fringed Orchid Recovery Plan” contains conservation measures (page 14) and recovery strategy (page 18); the plan can be accessed at https://www.fws.gov/midwest/endangered/plants/pdf/epfoplan.pdf.

Management Condition
The eastern prairie fringed orchid (federally threatened) occurs in grass- and sedge-dominated communities that are susceptible to woody vegetation encroachment in the absence of fire, creating an almost continual management need. In addition, if past actions have destroyed some ecosystem functions, then management may be needed to mimic the lost function. For example, drainage and water table loss can directly impact orchid populations and can also accelerate invasion by woody plant species. Invasion by aggressive non-native plant species such as glossy buckthorn, reed canarygrass and purple loosestrife can also require corrective action. Moderate management needs are for threats that are not directly impacting orchid populations, such as invasion of early stages of woody or nonnative plant species, or surrounding land use.

Leafy Prairie Clover
The final listing rule (56 FR 19953) for leafy prairie-clover (federally endangered) stated that all known populations were threatened by encroachment from competing herbaceous vegetation and/or woody plants, and this remains largely true today (USFWS 2015). Conservation needs for leafy prairie-clover include (1) increased use of prescribed fire or other techniques to maintain open conditions with limited competing vegetation in areas with sufficient soil depth to support the plant; (2) continued efforts to reintroduce/augment Illinois populations; and (3) development of a population viability analysis for the species across its entire range to provide a better estimation of the extinction risk faced by individual populations and the species as a whole (USFWS 2019).

Prairie Bush Clover
The recovery plan (USFWS 1988) for prairie bush clover states that the primary management objective for a site of a document plant population must be protection and preservation of the population, and that a detailed management plan should be prepared for each documented population.

The recovery plan (USFWS 1988) states that prescribed burns may be useful to control encroaching shrubs and trees, but the effect of fire on the plant is not fully known. If fire is used,

- it should be restricted to early spring (before May 15) to avoid destroying seedlings; and
- no more than one-half of any population should be burned in any one year.

- If spring burns are ineffective in controlling shrubs, it may be necessary to resort to hand cutting.

It is prudent to exclude herbicides and mowing on the assumption that these activities are harmful to populations of prairie bush clover (USFWS 1988).