REGION 3 FEDERAL ASSISTANCE SECTION 7 EVALUATION FORM

PHASE 3 Part A: Completed by Ecological Services Field Office

Grant Proposal/Agreement/Amendment Title and Number:	Oak Savanna Restoration and Monitoring in Michigan and Ohio for Karner Blue Butterfly Population Recovery; Competitive SWG – U-C (F15AP00895)

Listed Species: **Karner blue butterfly** – endangered, **Mitchell's satyr butterfly** – endangered, **Northern long-eared bat** – threatened

I. Programmatic Recovery Biological Opinion:

- **Karner blue butterfly**: Biological Opinion for Issuance of Section 10(a)(1)(B) Incidental Take Permit to the Michigan Department of Natural Resources for the take of Karner Blue Butterfly (*Lycaeides melissa samuelis*) in Michigan. Log number 07-R3-ELFO-03. Issued 3/2/2009.
- **Mitchell's satyr butterfly:** Intra-Service Consultation on Recovery Activities (Permits and Funding) for Mitchell's Satyr Butterfly. Log No. 03-R3-ELFO-03
- **Northern long-eared bat**: Biological Opinion for Wildlife and Sport Fish Restoration Program for funding to the Michigan Department of Natural Resources. Log No. 15-R3-ELFO-10

II. Actions identified on the attached Phase 1 Form were contemplated in the referenced above Biological Opinion.	Yes	X	No	
III. The appropriate conservation measures identified in the referenced above Biological Opinion have been explicitly incorporated into the project design and are described in the attached Phase 1 Form.	Yes	X	No	
IV. The anticipated effects of the proposed action as described on Phase 1 Form are commensurate with the effects anticipated in the referenced above Biological Opinion	Yes	X	No	
V. Anticipated Take. There is sufficient information available about the proposed action to determine the amount and extent of incidental take.	Yes	X	No	

If Yes, complete sections 1 and 2 below:

1. Describe the type & extent of take anticipated to occur as a result of the proposed action.

KBB: Take of KBB is expected from activities related to savanna management. Disturbance, injury, harassment, and death to adults, pupae and larvae could occur from trampling, fire, mowing, brushing, vegetation removal, and herbicide application throughout occupied habitat. These activities may also disrupt resting, feeding, and reproductive behaviors. However, these activities are supported in Michigan's Karner blue butterfly HCP and are expected to provide overall benefits to the species and its habitat.

MSB: Take is expected to result from activities related to savanna management. Disturbance, injury, harassment, and death to adults, pupae and larvae could occur from prescribed fire, mowing, brushing, watering, manual removal or vegetation with hand tools or mechanical equipment and herbicide application through occupied habitat. These activities may also disrupt resting, feeding, and reproductive behaviors. Massasaugas may also be present in the surrounding areas and potentially affected by the proposed activities.

NLEB: Take of NLEB is expected from activities related to savanna management. Individual bats are expected to be disturbed, injured, harassed, and/or possibly killed due to prescribed fire and tree removal activities.

2. Reconcile take anticipated with proposed action with the type & extent of take authorized via the referenced above Biological Opinion (describe take authorization provided in the programmatic and confirm that the level anticipated with the proposed action is within those specified limits).

KBB: The type of incidental take anticipated from the proposed actions, namely, harm and death of individual butterflies, is consistent with actions considered in the BO and the conservation measures outlined in the BO. Incidental take will be monitored to ensure that no more than 1/3 of an occupied site is affected during implementation to assure consistency with the BO, and will annually tabulate and report in detail the acreage of take as required.

MSB: The type of incidental take anticipated from the proposed actions, namely, harm and death of individual butterflies, is consistent with actions considered in the BO and the conservation measures outlined in the BO. Incidental take will be monitored to ensure that no more than 1/5 of an occupied site is affected during implementation to assure consistency with the BO, and will annually tabulate and report in detail the acreage of take as required.

NLEB: The type of incidental take anticipated from the proposed actions, namely harm and death of individual bats, is consistent with actions considered in the BO and conservation measures outlined in the BO. The Michigan Department of Natural Resources will also adhere to the conservation measures provided in the interim 4(d) rule to minimize take of NLEB. Incidental take will be monitored to ensure that no more than 40,000 acres of NLEB roosting, swarming, staging, and migratory habitat

are affected during implementation to assure consistency with the BO, and will annually tabulate and report in detail the acreage of take as required.

**If there is not sufficient information available to complete this section at the grant agreement/proposal stage, then a future project-specific section 7 consultation is required. States will provide project-specific information to the ESFO as project information becomes available. Incidental take anticipated to result from the proposed action will be described during the project-specific consultation and will be documented on a Phase 3B form. The Phase 3B form will also describe the reasonable and prudent measures that must be followed to exempt the incidental take.*

VI. The appropriate RPMs and TCs identified in the reference above Biological Opinions have been explicitly incorporated into the project design and are described on Phase 1 Form. Yes X No ____

Proposed & Candidate Species

I. Species: **Eastern massasauga rattlesnake (EMR)**

II. The proposed action as described on the attached Phase 1 form is Likely to result in Jeopardy or destroy or adversely modify critical habitat (provide rationale for conclusion either in space below or on a separate sheet of paper). Yes ____ No X

EMR (proposed as threatened): Take of the massasauga in location where hibernacula are unknown is probable as a result of mowing, prescribed burning, and manipulation of water levels. These activities will be restricted seasonally where possible, to occur when the rattlesnake is least likely to be active. Grant activities that may adversely impact hibernacula will be avoided in areas with known hibernacula. The Michigan DNR will follow conservation measures identified in the Draft Eastern Massasauga Rattlesnake Candidate Conservation Agreement with Assurances to minimize direct impacts to the species.

Conclusion

This concludes section 7 consultation of the proposed action. X
Formal conference is required for proposed/candidate species. ____
Further section 7 review is required at the project level (Phase 3B form required) ____

Tameka N Dandridge
Reviewing Biologist

10/15/16
Date

15-R3-ELFO-A08

REGION 3 WSFR SECTION 7 EVALUATION DOCUMENTATION
PHASE II: COMPLETED BY U.S. FISH AND WILDLIFE SERVICE

State: Michigan Grantee: Michigan Department of Natural Resources

Grant Title and Number: Oak Savanna Restoration & Monitoring Assessment in Michigan and Ohio Karner Blue Butterfly Population Recovery
LLC F15AP00895

Check the box, if the information on the Phase I documentation is adequate:

☒ List of Species ☒ Description of Proposed Action ☒ Description of Effects

I. WSFR Determination Determination of the effects of the proposed action on endangered, threatened, proposed, and candidate species and their proposed or designated critical habitat. When the determination(s) below is/are different than the State recommended determination(s) on the Phase I documentation, an explanation for the difference must be provided in Section II below.

A. Listed Species/ Critical Habitat (for each category, list species, attach list or reference Phase I documentation)

☒ a) *"No Effect"* (see attached Phase I)

Clubshell, Northern riffleshell, Rayed bean, Snuffbox, Hungerford's crawling water beetle

☒ b) "*May Affect, but is Not Likely to Adversely Affect*" (see attached Phase I)

Indiana bat, Kirtland's warbler, Piping plover, Rufa red knot, Copperbelly watersnake, Hine's emerald dragonfly, Poweshiek skipperling, Dwarf lake iris, Eastern prairie fringed orchid, Hougton's goldenrod, Michigan monkey-flower, Pitcher's thistle, Small whorled pogonia

☒ c) "*May Affect, and is Likely to Adversely Affect*" (see attached Phase I)

Northern long-eared bat, Karner blue butterfly, Mitchell's satyr

B. Proposed Species/ Proposed Critical Habitat (for each category, list species, attach list or reference Phase I documentation)

☒ a) *"No Effect"* (see attached Phase I)

Piping plover critical habitat, Hine's emerald dragonfly critical habitat, Poweshiek skipperling critical habitat

☐ b) "*May Affect, but is Not Likely to Adversely Affect*" (see attached Phase I)

☐ c) "*May Affect, and is Likely to Adversely Affect*" (Formal consultation/conference with ES FO is required)

d) *"May Adversely Affect/Modify, but is not likely to Jeopardize"* (Please see attached rationale in Phase I, also MOU in the permanent files - P:\Central subject matter\Endangered Species Act Compliance)

☐ NOTE: This determination is a conference, not a consultation, in regards to species proposed for listing that only considers whether these activities jeopardize the species proposed. The conference determination was made with guidance from Ecological Services as documented in the centralized subject-matter file. This determination for any proposed species applies only during the period when it is proposed for listing and consultation will be required for any activities that may affect the species or its suitable habitat that are still in progress after the species is listed.

d) Continued

C. Candidate Species (for each category, list species, attach list or reference Phase I documentation)

☐ a) *"No Effect"* (see attached Phase I)

☐ b) "*May Affect, but is Not Likely to Adversely Affect*" (see attached Phase I)

☒ c) "*May Affect, and is Likely to Adversely Affect"* (Formal consultation/conference with ES FO is required)

Eastern massasauga

d) *"May Adversely Affect/Modify, but is not likely to Jeopardize"* (Please see attached rationale in Phase I, also MOU in the permanent files - P:\Central subject matter\Endangered Species Act Compliance)

☐ NOTE: This determination is a conference, not a consultation, in regards to species proposed for listing that only considers whether these activities jeopardize the species proposed. The conference determination was made with guidance from Ecological Services as documented in the centralized subject-matter file. This determination for any proposed species applies only during the period when it is proposed for listing and consultation will be required for any activities that may affect the species or its suitable habitat that are still in progress after the species is listed.

WSFR Specialist: Jessica Piispanen Date: 2015.08.24 09:51:38 -05'00'

WSFR Chief: Date: 2015.08.24 10:08:35 -05'00'

II. Explanation of non-concurrence: For each determination that differs from the Phase I documentation, provide rationale for the non-concurrence.

On the phase 1, the determination of "no effect" was made for Kirtland's warbler, Piping plover, Rufa red knot, Copperbelly watersnake, Hine's emerald dragonfly, Poweshiek skipperling, Dwarf lake iris, Hougton's goldenrod, Michigan monkey-flower, Pitcher's thistle, Small whorled pogonia. Because work is being done outside and there is a chance of encountering and affecting these species, I am making the determination of "may affect, but is not likely to adversely affect" for Kirtland's warbler, Piping plover, Rufa red knot, Copperbelly watersnake, Hine's emerald dragonfly, Poweshiek skipperling, Dwarf lake iris, Hougton's goldenrod, Michigan monkey-flower, Pitcher's thistle, Small whorled pogonia.

III. Notes:

Based on the information provided in the phase 1, I determined that a phase 3 is needed for the eastern massasauga, northern long-eared bat, Karner blue butterfly, and Mitchell's satyr.

REGION 3 WSFR SECTION 7 EVALUATION DOCUMENTATION

PHASE I: COMPLETED BY GRANTEE

(See Phase I Instructions for completing this form)

State: Michigan **Grantee:** MDNR-Wildlife **Grant Program(s):** Competitive SWG

Grant Title and Number (add amendment no.): Oak Savanna Restoration and Monitoring in Michigan and Ohio for Karner Blue Butterfly Population Recovery

I. Location:

A. List counties where grant activities will occur.

The Karner blue butterfly activities proposed in this grant will potentially occur in all Michigan counties in the lower peninsula. The coordination and administration of this grant will occur in Michigan DNR's main offices in Ingham County. Other indoor facilities in various parts of the state may be used for interactions with DNR staff and partners.

B. Describe the action area (see instructions).

Grant supported Karner blue butterfly activities may occur on public and private lands throughout Michigan's lower peninsula. Determining detection probabilities, evaluating occupancy, and conducting habitat management will take place in the butterfly's natural habitats.

Report writing, data analysis, administration, and coordination activities will take place in administrative offices and other indoor facilities.

II. Species/Critical Habitat:

A. Species information

1. Using the FWS web site (http://www.fws.gov/midwest/Endangered/), list species that are/or may be present in the county(ies):

There are 21 species in Michigan on the Federal List of Threatened and Endangered Species in Michigan's lower peninsula (see attached table). These include 15 animal species and 6 plant species. In addition, the eastern massasauga rattlesnake is a candidate for listing, this species will be taken into consideration during the proposed grant activities.

2. List species, from "1." above, that are not in the action area, and explain why:

Clubshell, northern riffleshell, rayed bean, snuffbox, and Hungerford's crawling water beetle are not in the action area because they only occur in streams, and no grant activities are planned in streams.

B. Using the FWS web site, identify whether federally designated or proposed critical habitat is present within the action area:

The only designated critical habitat in Michigan is for piping plover and Hine's emerald dragonfly. Proposed Poweshiek skipperling critical habitat is also in Michigan.

No management or monitoring activities supported by this grant will occur in piping plover critical habitat Hine's emerald dragonfly critical habitat, or Poweshiek skipperling proposed critical habitat.

*Note: If II.A and II.B above have no species or critical habitat, skip sections III and IV and go to V.

III. Description of Proposed Action: In the space provided or on an attached sheet, describe the action(s) in sufficient detail so that the potential effects of the action can be identified and fully evaluated.

Objective 1. Restore or enhance at least 500 acres of habitat for Karner blue butterfly in Michigan

We will restore or enhance at least 500 acres of oak savanna for KBB in Michigan. Approximately 250 and 250 acres of savanna management will occur on private and public land, respectively. Restoration and enhancement actions will focus on increasing occupied KBB patch size or improving connectivity among known occupied sites. Habitat management will focus on setting back succession and controlling invasive species. Specific techniques will include mechanical mowing of woody vegetation, prescribed burns, and application of herbicide treatments.

Objective 2. Develop and implement a monitoring framework to begin assessing the effects of prescribed fire and mowing on Karner blue butterfly in Michigan

Because monitoring is an essential component of adaptive management, we will build upon a new occupancy-based KBB survey in Michigan by augmenting the sample design to include an evaluation of habitat management actions. Our design will facilitate long-term evaluation of management, by allowing comparisons of KBB use of sites before and after management, and comparisons of KBB use among burned, mowed, and untreated sites over time. We will assess occupancy status (i.e., proportion of sites occupied) of habitat patches within burned, mowed, and untreated strata. We will also collect data on KBB relative abundance and distribution, and information on the presence of lupine and nectar sources. This new facet of Michigan's survey program will also provide improved data on the distribution and relative abundance of KBB beyond what is possible under current resource limitations. If proven successful, this survey approach will be shared with other conservation partners across the range of the species.

IV. Description of Effects: In the space provided or on an attached sheet, describe the effects, including beneficial, of the project actions on the identified species, species habitats and federal critical habitat (see II above).

Eastern massasauga rattlesnake
Eastern massasauga and Karner blue butterflies (KBB) co-exist in southwestern Michigan. Certain management activities planned under this grant have the potential to result in incidental take of EMR.

The EMR is likely to be affected by the habitat management and population monitoring techniques proposed for this grant. It is anticipated that by following the conservation strategies identified in Michigan's draft EMR CCAA (Appendix A), direct impacts to individual rattlesnakes will be minimized and the effects of take will not rise to the level of jeopardizing the species.

Karner blue butterfly
KBB individuals are likely to be affected during this project. Certain management activities planned under this grant have the potential to result in incidental take of KBB. By implementing our KBB HCP guidelines (http://www.fws.gov/midwest/Endangered/permits/hcp/kbb_mi/pdf/MichiganKBBHCPFinal.pdf), we believe that take will be minimized and that the long term benefit of improving KBB habitat will increase KBB populations.

Indiana bat
Indiana bats may use project sites for foraging, and it is possible that a roost tree could occur in forests where management is proposed. Forest management activities such as prescribed burning and timber management have the potential to affect Indiana bat. In areas of potentially occupied habitat, habitat management activities will only occur between October 1 and March 31 when the bats are not present on the landscape. If habitat management activities need to be conducted outside this window, we will reinitiate Section 7 consultation with the USFWS Ecological Services East Lansing Office.

Northern long-eared bat

Northern long-eared bats may use project sites for foraging or roosting. Prescribed burns that occur in forested habitats or in savannas/openings that contain scattered trees may affect northern long-eared bats. Generally, fires generated through prescribed burning in forests are limited to the ground and understory, and flame consumption of mature trees is rare. Additionally, some tree removal may occur during openings and savanna management on public and private lands to set back succession. This type of management typically occurs in areas that have previously been maintained as openings or savannas, or in early successional forest stands that have previously been clearcut. It is anticipated that even if individual bats are affected by these activities, the effects on individuals will not result in jeopardy to the population.

Eastern prairie fringed orchid

Extensive inventories were conducted for eastern prairie fringed orchid in Michigan in 1990, and an excellent data set has been developed on known populations and their status. The species is most strongly associated with lakeplain prairies. KBB is known to occur in this rare natural community. Habitat management goals for lakeplain prairie would be aimed at maintaining and improving the quality of the community while improving habitat for KBB. Personnel conducting habitat management activities under this grant are aware of documented locations of eastern prairie fringed orchid populations and will be able to avoid impacting the species by restricting management activities to hand clearing and use of herbicides to only spot treatments that avoid effects to individuals, and by timing prescribed burns to occur before or after plant growth. If a burn cannot be timed to avoid the growth period of eastern prairie fringed orchid or if other methods are to be used that cannot avoid affecting individuals, a site specific consultation with USFWS Ecological Services East Lansing office will occur before work is initiated.

Copperbelly water snake

Copperbelly water snakes occur in lowland swamps, often in a forested floodplain matrix or adjacent to an upland forested corridor. This species has been surveyed extensively in recent years (http://web4.msue.msu.edu/mnfi/abstracts/zoology/Nerodia_erythrogaster_neglecta.pdf), and was confirmed at four sites in the state. No management activities would be undertaken with funds from this grant on sites where copperbelly water snakes have been documented recently or historically. Because the status of this species has been documented through recent surveys, it is extremely unlikely that undocumented populations are present at any sites where habitat management activities will occur.

Kirtland's warbler

Kirtland's warblers require a very specific forest age structure and growth pattern in the jack pine forests that they use in their breeding range. This species has been surveyed extensively over the last 40 years and no management activities would be undertaken with funds from this grant on sites where Kirtland's warbler have been documented recently or historically.

Rufa red knot

For the counties in which rufa red knot may occur, no actions that occur along coastal areas during the red knot migratory window of May 1-September 30 will take place under this grant.

Mitchell's satyr and Poweshiek skipperling

Mitchell's satyr butterfly and Poweshiek skipperling have been surveyed extensively. Mitchell's satyr only occurs in remote locations at fourteen sites in Michigan. Habitat management may occur in occupied habitat for Mitchell's satyr butterfly only. No activities will occur in Poweshiek occupied habitat. It is anticipated that following the conservation measures in the Biological Opinion for issuance of section 10(a)(1)(A) permits for MSB recovery that direct impacts to Mitchell's satyr butterfly will be minimized and that the effects of take will not rise to the level of jeopardizing the species.

Hine's emerald dragonfly

Hine's emerald dragonfly sites are classified as calcareous wetlands or northern fens with an underlining layer of shallow dolomite. The management and monitoring activities proposed in this grant will not take place in or modify habitat for the types of wetlands where this species occurs.

Piping plover, dwarf lake iris, Houghton's goldenrod, Pitcher's thistle
No effects are expected for piping plovers, dwarf lake iris, Houghton's goldenrod, or Pitcher's thistle because these species only occur in dune and lakeshore habitats and management activities covered in this grant do not take place in these habitats.

Michigan monkey-flower
Michigan monkey-flower grows in spring-fed, alkaline, saturated soils and these are rare habitats that would not be targeted for habitat management activities under this grant.

Small whorled pogonia
Small whorled pogonia occurs in one county (Berrien) and its habitat is mixed forest uplands. We do not plan management activities in dry mixed forest uplands, so there will be no effect on this species.

Piping plover, Hines's emerald dragonfly, and Poweshiek skipperling critical habitat
No habitat management activities will occur in piping plover, Poweshiek skipperling, or Hine's emerald dragonfly critical habitat.

V. Recommended Determination(s) of Effect(s): For all species and critical habitat identified in Section I, mark (X) the appropriate determinations.

A. Listed, Proposed and Candidate Species

X a) "*No Effect*"
List species for which this recommendation is applicable (or attach list): Copperbelly water snake, Kirtland's warbler, piping plover, rufa red knot, Hine's emerald dragonfly, Poweshiek skipperling, dwarf lake iris, Houghton's goldenrod, Michigan monkey-flower, Pitcher's thistle, and small-whorled pogonia

X b) "*May Affect, but is Not Likely to Adversely Affect*"
List species for which this recommendation is applicable (or attach list): Eastern prairie fringed orchid and Indiana bat

X c) "*May Affect, and is Likely to Adversely Affect*"
List species for which this recommendation is applicable (or attach list): Eastern massasauga, northern long-eared bat, Karner blue butterfly, Mitchell's satyr

B. Federally Designated and Proposed Critical Habitat

X a) "*No Effect*" to Critical Habitat
List critical habitat(s) for which the recommendation is applied. Piping plover critical habitat, Hine's emerald dragonfly critical habitat, and Poweshiek skipperling proposed critical habitat

___ b) "*May Affect, but is Not Likely to Adversely Affect*" Critical Habitat
List critical habitat(s) for which the recommendation is applied.

___ c) "*May Affect, and is Likely to Adversely Affect*" Critical Habitat
List critical habitat(s) for which the recommendation is applied.

Signatures:

Prepared by:
Name/Title: Christine Hanaburgh/ Wildlife Division Federal Aid Coordinator

Signature: Christine Hanaburgh Date: August 13, 2015

Telephone No. (517) 284-6187 email: HanaburghC@michigan.gov

Reviewed by:

Name/Title: Dan Kennedy/Endangered Species Program Coordinator

Signature: Dan Kennedy Date: August 13, 2015

Telephone No. (517) 284-6194 email: KennedyD@michigan.gov

REFERENCES:

Bailey, R.L. 2010. Modeling habitat suitability and population demographics of the eastern massasauga rattlesnake in managed lands in southwestern Michigan. Thesis, Michigan State University, East Lansing, USA.

Bissell, K. M. 2006. Modeling habitat ecology and population viability of the eastern massasauga rattlesnake in southwestern lower Michigan. Thesis, Michigan State University, East Lansing, USA.

Weatherhead, P. J., and F.W. Anderka. 1984. An improved radio transmitter and implantation technique for snakes. Journal of Herpetology, 264-269.

FEDERALLY LISTED THREATENED, ENDANGERED AND CANDIDATE SPECIES IN MICHIGAN'S LOWER PENINSULA

Scientific Name	Common Name	Federal Status
Animals – Mammals		
Myotis sodalis	Indiana bat	Endangered
Myotis septentrionalis	Northern long-eared bat	Threatened
Animals – Birds		
Dendroica kirtlandii	Kirtland's warbler	Endangered
Charadrius melodus	Piping plover	Endangered
Calidris canutus rufa	Rufa red knot	Threatened
Animals – Reptiles		
Nerodia erythrogaster neglecta	Copperbelly water snake	Threatened
Sistrurus catenatus catenatus	Eastern massasauga rattlesnake	Candidate
Animals – Insects		
Somatochlora hineana	Hine's emerald dragonfly	Endangered
Brychius hungerfordi	Hungerford's crawling water beetle	Endangered
Lycaeides melissa samuelis	Karner blue butterfly	Endangered
Neonympha mitchellii mitchellii	Mitchell's satyr	Endangered
Oarisma poweshiek	Poweshiek skipperling	Endangered
Animals – Mussels		
Pleurobema clava	Clubshell	Endangered
Epioblasma torulosa rangiana	Northern riffleshell	Endangered
Villosa fabalis	Rayed bean	Endangered
Epioblasma triquetra	Snuffbox	Endangered
Plants		
Iris lacustris	Dwarf lake iris	Threatened
Platanthera leucophaea	Eastern prairie fringed orchid	Threatened
Solidago houghtonii	Houghton's goldenrod	Threatened
Mimulus glabratus michiganensis	Michigan monkey-flower	Endangered
Cirsium pitcheri	Pitcher's thistle	Threatened
Isotria medeoloides	Small whorled pogonia	Threatened

APPENDIX A

Eastern Massasauga Rattlesnake (EMR) Candidate Conservation Agreement with Assurances Draft Conservation Measures

Conservation Measures

Management Strategies for Managed Lands

These habitat management guidelines were developed to provide land managers with a framework to protect EMR populations while creating and/or restoring suitable habitat needed to sustain EMR populations on enrolled lands. These guidelines reflect current knowledge of researchers and resource managers in Michigan. However, we also recognize that our understanding of the factors, including management actions, influencing EMR population dynamics are limited. There is varying degrees of support for the efficacy for the conservation measures currently available for EMR (e.g., informed judgment of experienced land managers, well-documented research across multiple types of sites, etc.). Therefore, as resources allow, an adaptive management approach that targets key assumptions and uncertainties related to management actions is critical to meeting the CCAA standard over the life of this agreement (Section 10). These guidelines will be followed on enrolled lands identified as 'Managed Land'.

When deviations from these guidelines are necessary, a written request to the Service must be submitted as described in "Modifications of the CCAA" on page 25 of the CCAA. If a Participating Landowner is requesting the modification, the DNR must be notified as well. In cases where a quick review is necessary (i.e., short burn windows in the spring, urgent situations), approval must be obtained from the Service. In emergency human health and safety situations (to be decided by the land manager) when pre-approval to deviate from these guidelines is impractical, descriptions of the actions taken will be carefully documented and provided to the DNR and the Service after the fact. Development activities, such as new buildings, parking lots or transportation infrastructure, in enrolled lands designated as managed habitat will require modifications to the CCAA. Development activities in Unmanaged Land will not require modifications; however, they will be subject to Section 7 reviews if a federal nexus exists.

Wetland Protection

The primary threat to the EMR is habitat loss, in particular the effects of past, widespread wetland loss. While the DNR lands may have been intended for recreation, forestry, game species, or other purposes they have nonetheless played an important role in conserving EMR by providing places where wetlands have been conserved. The effectiveness of DNR lands as part of conservation landscape for the EMR is demonstrated by the number of remaining EMR populations they support. Conserving wetlands is one of the most significant EMR conservation measures provided by the DNR lands.

Prescribed Fire

Fire is a natural process that occurs in many natural communities, including fens and

other vegetation types occupied by EMR (Spieles et al. 1999). Fire in fens serves to keep the vegetation open, reduce shrub and tree cover, reduce surface cover and encourage germination and reproduction of many plant species.

Prescribed fire will be allowed in managed habitat even though it has the potential to kill individual snakes. At some managed sites, prescribed fire may be the preferred or only effective management treatment for invasive species or discouraging woody growth for the purpose of maintaining important habitat. The following guidelines will allow managers to enhance or increase suitability of EMR habitat while minimizing the potential loss of individual snakes. Heat from prescribed fire does not reach far into the soil. Therefore, burning during the inactive season is not expected to harm hibernating EMR. Smith et al. (2001) observed that snakes exposed to low intensity fire were more likely to survive than those exposed to high intensity fires. Mortality from prescribed fire is possible, even when steps are taken to reduce that mortality (Durbian 2006, Cross 2009), but the impacts of fires likely vary with other threats, snake population size, fire intensity, and fire frequency. Snakes and other reptiles may move from the burn unit, but in order to provide them more time and potential refuges these guidelines include recommendations to decrease rate of spread and intensity. Rattlesnakes have been known to seek subterranean refuges and may survive less intense fires (Smith et al. 2001).

Prescribed fire promotes dynamic changes in the landscape that set back succession, improve EMR habitat, and may be beneficial to EMR populations in the long run. The impacts from prescribed fire on EMR populations are uncertain and, therefore, will be evaluated for its positive and negative effects to EMR populations and habitat (See Section 10). The following precautions will be observed when using prescribed fire to increase habitat suitability for rattlesnakes.

1. Burning in managed EMR habitat when snakes are inactive or not emergent is unrestricted except when current conditions could possibly result in snake emergence. If available, use a Snake Emergence Prediction Model (SEPM). If the model predicts that snakes may be emergent, burning will be conducted according to the protocols described below. If the model predicts snakes are not active, then burning is unrestricted.
2. Land managers will leave unburned areas adjacent to prescribed burns to serve as snake refugia whenever possible.
3. Prescribed burn plans will use 'back burning' as the primary ignition strategy. This approach will minimize entrapping snakes between flame fronts. However, the burn manager may make the judgment, during a burn treatment, that encirclement ignition or strip firing is necessary to protect human safety or property.
4. A scientific fire behavior model, such as the United States burn model, the Canadian burn model or equivalent will be used to formulate a burn prescription for a maximum rate of spread no faster than 16 chains per hour (17.6 feet per minute) with an average targeted rate of 10 chains per hour or less (11 feet per minute), except in known hibernacula areas. A slower rate of spread may allow snakes within the burn unit adequate time to find refugia.

5. Where hibernacula are known to be dense (greater than 5 hibernacula per acre), no burning is allowed from March 15 to May 15, unless the Snake Emergence Prediction model predict snakes to be inactive and not yet emerged. Where hibernacula are known to be diffuse (less than 5 hibernacula per acre) across the landscape, burns between March 15 and May 15 can move at no faster than 8 chains per hour (8.8 feet per minute).
6. Fire breaks will be established following existing fuel breaks (roads, rivers, trails…) to the greatest extent possible. Cultivation (disking or roto-tilling) of burn breaks will be minimized to the extent that human health and safety are not jeopardized. Cultivation and mowing fire breaks will be established during the inactive season to the extent possible (See 7.1.2 & 7.1.3).

Mowing and Hydro-axing

In Michigan, mowing has been used to set back succession, control invasive species or establish fire breaks. Mowing is also used to maintain dikes, trails, and other areas designated for human use. While mechanical treatments are an important wildlife management tool, they have been identified to cause direct snake mortality. Mechanical treatments are intensive management techniques that may threaten the long-term survival of localized EMR populations.

The following precautions will be observed when mechanical treatments are used in managed habitat to increase habitat suitability for rattlesnakes and minimize mortalities:

1. Set mower deck heights to maintain turf grass at <15 cm (6 inches) at all times.
2. In areas with known hibernacula, mowing and hydro-axing are not allowed at any time of year.
3. Management will follow the most recent rutting guidelines for the DNR.
4. Mowing or hydro-axing of grasses over 6 inches will occur only during the inactive season, except to control non-native vegetation in degraded habitats.

After snakes have emerged, mowing and hydro-axing will only be allowed when land managers are trying to improve EMR habitat in highly degraded sites (>90% canopy closure or >75% nonnative invasive species). For example, a land manager may want to control invasive species or convert agricultural fields to native grasslands.

Cultivation

In Michigan, cultivation has been used to establish new habitat plantings, set back succession, and establish fire breaks. Cultivation is strongly discouraged in managed habitat regardless of snake activity.

However, the following cultivation practices will be considered acceptable in managed habitat:

1. Areas that are to be treated with mechanical soil disturbance will be mowed during the inactive season to less than 15 cm (6 in) in height so that they are unattractive to snakes the following spring.
2. Areas may be continuously maintained as row-cropped agriculture.
3. Narrow strips of land may be cultivated for the establishment of fire breaks, as outlined in the prescribed fire guidelines.

4. Cultivation may be used when necessary to protect human or natural resource health and safety (e.g., wildfire suppression).

Water Level Manipulation

Maintaining the natural hydrology is critical for maintaining viable populations of amphibians and reptiles. In some wetland complexes, the natural fluctuations in water levels help maintain open landscapes. The groundwater or saturated soils protect hibernating snakes from freezing during winter. Draining removes the heat sink capabilities of the water and weakens the thermal link to warmer areas farther underground. Therefore, alterations to wetland hydrology may have negative impacts on amphibian and reptile populations. EMR, like other wetland snakes, have been shown to tolerate submersion for short periods (about 2 weeks) of time when water temperatures are near freezing. They then rely on cutaneous gas exchange. Individuals will be able to respond to flooding during the active season by moving. Flooding will not kill the snakes during the active season, but may force them out of suitable habitat. Extended flooding may destroy elements of the habitat. Beavers promote dynamic changes in the landscape, and may be beneficial to the snake population in the long run. Beaver activity should be evaluated for its positive and negative effects on EMR habitat and also on human interests.

The following precautions will be observed when manipulating water levels in managed habitat:

1. Water levels in managed habitat will not be drawn down during the inactive season, except for human health and safety reasons.
2. Water levels may not be raised for more than two continuous weeks during a single inactive season, except for health and safety concerns.
3. Permanent flooding or drainage that results in loss of EMR habitat is prohibited.
4. Water levels may be raised during the active season.
5. This agreement does not obligate the DNR to manage beaver to maintain water levels.
6. Temporary flooding to mimic the restorative effects of beaver activity for one to five years will need written pre-approval from the Service.

Forest Management

Most forestry activities that are conducted in accordance with sustainable forest management principles are not expected to negatively impact EMR populations. In most cases forest management practices will benefit EMR, especially when the following guidelines are observed on Managed Lands.

1. Conduct timber harvesting operations when substrate is firm and dry in mid to late summer or when the ground is adequately frozen so that rutting and compaction is minimized.
2. Reforest stands through natural regeneration or tree planting (including appropriate site preparation, such as trenching and scarification). Planting densities should be at levels that assure a similar cover type pattern, or retain or mimic more open forest communities (e.g., pine barren or savanna). Savanna and pine barren restorations are encouraged.
3. Consider increasing fine and coarse woody debris retention, creating brush piles and favoring other habitat elements. Slash burning will occur only during the inactive

season.

Chemical Control

Chemicals have been used by many natural resource professionals to achieve specific habitat management goals and objectives. Currently, many land managers use herbicides because of their effectiveness, ease of use and because herbicides can be relatively inexpensive. Although herbicide use may be an effective habitat management tool, a paucity of research exists on the effects of chemicals on reptiles and, specifically, to EMR. Therefore, it is strongly recommended that land managers consider specific biological factors and utilize a cautious approach when choosing an herbicide, application method, application rate, time of application, and time between applications.

Due to the unknown impacts of herbicides to EMR, broadcast applications in Managed Land is prohibited except when land managers are re-establishing suitable habitat at highly degraded sites (e.g. converting row crops to native grasslands or to control monocultures of invasive species). Land managers may use other herbicide treatments such as spot spraying or wicking to control invasive plant species in Managed Land.

Collection, Release, Relocation and Persecution

Collection of EMR for personal pets and commercial trade is an ongoing problem. Poachers have posed as researchers or collaborators of researchers to obtain information on where to find EMR. Pet EMR held in captivity will not be released into the wild because the potential for introducing diseases into an area is significant. Mixing stocks could also have undesirable genetic effects.

The following guidelines will be observed to minimize the potential negative impacts from the collection, release, relocation and persecution of rattlesnakes:

1. Details on specific locations of snakes or hibernacula will be treated with the same sensitivity as location of state or federally listed species. Collection or killing at hibernacula could devastate a population.
2. EMR legally maintained in captivity will not be released back into the wild. Those snakes that have been held temporarily for research purposes may be released where they were captured if they are in good health and have been held in isolation from other reptiles.
3. EMR will only be moved to protect the snake or people. EMR that must be moved should be moved less than 500 m and into the same wetland system but not across barriers (e.g., roads). If a snake is moved across property lines, permission will be obtained from the landowner. EMR lacking knowledge of their surroundings have elevated levels of mortality.
4. Staff will be routinely educated about EMR because they are in an excellent position to provide public education.
5. Priority will be given to placing snakes that cannot be released or are confiscated into the EMR Species Survival Plan population maintained by the Association of Zoos and Aquariums where they may have both an education benefit and contribute to the captive population and possible future assurance breeding.

Trails and Pathways

DNR owned and managed trails and pathways currently exist within Managed Land and Unmanaged Land. Trails and pathways are an important component of managing DNR owned land. For human safety, use and enjoyment of trails and pathways, it is necessary to perform maintenance on the trails, including grading, tree-trimming and other activities.

The following precautions will be observed when performing trail and pathway maintenance:

1. Set mower deck heights to maintain turf grass at <15 cm (6 inches) at all times.
2. In areas with known hibernacula, mowing and hydro-axing are not allowed at any time of year.
3. Management will follow the most recent rutting guidelines for the DNR.
4. Mowing or hydro-axing of grasses over 6 inches will occur only during the inactive season, except to control non-native vegetation in degraded habitats.
5. Development of new trails/pathways or substantive changes to existing trails/pathways within Managed Land must include consultation with the DNR Endangered Species Coordinator prior to initiation of construction and construction will be complete during the inactive season.

Management Strategies for Unmanaged Lands

On Unmanaged Lands other goals and mandates require that the management strategies outlined in Section 7.1 will not apply. The DNR will use the following guidelines on Unmanaged Land:

1. Possession of EMR will continue to be prohibited. This will be accomplished by maintaining the Director's Order (No. DFI-166.98, Regulations on the Take of Reptiles and Amphibians; Act 165 of the Public Acts of 1929, as amended, Sec. 302.1c(1) and 302.1c(2) of the Michigan Compiled Laws) which prohibits take of "special concern" reptiles and amphibians without a permit from the DNR.
2. Upon documentation of more than one individual, evidence of reproduction, and availability of suitable habitat on enrolled lands previously designated as Unmanaged Land, signatories may re-classify enrolled areas as Managed Land, but are not required to do so. Consideration will be given to whether the EMRs found are associated with a known and viable population nearby.
3. Management of Unmanaged Land where EMR are unwelcome will focus on management techniques that discourage EMR use. For example, grassy areas around buildings or campsites will be frequently mowed because tall vegetation could attract EMR.
4. To the extent possible do not restrict dispersal on between Managed Lands that are separated by less than 1 km on the Unmanaged Land. Activities that may limit dispersal may include paved roads or motorized vehicle trails. These activities will be reviewed by the MDNR Wildlife Division and USFWS prior to implementation to ensure they are consistent with the CCAA standard.

Management Strategies for Oil, Gas and Mineral Development

Should the EMR be listed as threatened or endangered under the ESA, authorization for

incidental take under the Section 10(a)(1)(A) Enhancement of Survival Permit will be applicable when it is determined that the measures proposed for the lease collectively meet the CCAA standards. Oil, gas and mineral development activities within EMR managed areas may be authorized as a form of incidental take if the DNR determines that the activities proposed for that lease will result in a clear conservation benefit for the EMR.

The goal for an oil, gas, or mineral Certificate of Inclusion is for leaseholders to avoid and minimize negative impacts to EMR and to voluntarily contribute funding or in-kind actions to benefit the EMR. The intent is to provide options that would insure measurable benefits to EMR conservation consistent with the purposes of the CCAA standard (i.e., preclusion or removal of the need to list). This will include compensating for any of the potential biological impacts associated with habitat loss or fragmentation for EMR as well as costs for EMR management in a more complex landscape (e.g., reduced ability to use prescribed fire or increased law enforcement costs).

Conservation measures will be site specific, but fall into general categories of habitat enhancement or avoidance of negative habitat impacts, implementing conservation measures, and addressing critical research needs. These activities will be assessed through leasing or the land use permitting processes and will consider well density, well location, access road surface, length and width, voluntary contributions to EMR conservation, and ongoing and future reclamation activities. It is the responsibility of the oil, gas, and mineral developer to contact the DNR and develop a plan for DNR review, and to sign a Certificate of Inclusion for incidental take coverage authorized under the CCAA when the proposed plan is determined to meet the CCAA standard. Without a signed Certificate of Inclusion the CCAA does not cover oil, gas, and mineral development activities on 'managed' lands.

Education and Outreach

Education and outreach efforts are needed to raise awareness and understanding about the species for all stakeholders, reduce persecution or indiscriminate killing and promote conservation of species. A general approach is to conduct research to identify appropriate content and delivery of education and outreach efforts, learn from other efforts, model after successful efforts such as the Ontario program, identify and recruit partners and target audiences, develop and distribute materials/provide resources, evaluate effectiveness of efforts, develop a volunteer network and ultimately, develop and maintain local, long-term presence/outreach effort in communities around the state within the species' range.

GRANT NARRATIVE

OAK SAVANNA RESTORATION AND MONITORING IN MICHIGAN AND OHIO FOR KARNER BLUE BUTTERFLY POPULATION RECOVERY

Michigan Objectives, Results, and Benefits
October 1, 2015 through September 30, 2018

OBJECTIVES

Objective 1. Restore or enhance at least 500 acres of habitat for Karner blue butterfly in Michigan

Specifically, MDNR will restore or enhance 500 acres of habitat for KBB. Approximately 250 and 250 acres of savanna management will occur on private and public land, respectively. Restoration and enhancement actions will focus on increasing occupied KBB patch size or improving connectivity among known occupied sites. Habitat management will focus on setting back succession and controlling invasive species. Specific techniques will include mechanical mowing of woody vegetation, prescribed burns, and application of herbicide treatments.

Objective 2. Develop and implement a monitoring framework to begin assessing the effects of prescribed fire and mowing on Karner blue butterfly in Michigan

Because monitoring is an essential component of adaptive management, we will build upon a new occupancy-based KBB survey in Michigan by augmenting the sample design to include an evaluation of habitat management actions. Our design will facilitate long-term evaluation of management, by allowing comparisons of KBB use of sites before and after management, and comparisons of KBB use among burned, mowed, and untreated sites over time. We will assess occupancy status (i.e., proportion of sites occupied) of habitat patches within burned, mowed, and untreated strata. We will also collect data on KBB relative abundance and distribution, and information on the presence of lupine and nectar sources. This new facet of Michigan's survey program will also provide improved data on the distribution and relative abundance of KBB beyond what is possible under current resource limitations. If proven successful, this survey approach will be shared with other conservation partners across the range of the species.

Expected Results and Benefits

By completing the objectives of this grant, progress will be made towards the conservation and recovery of Karner blue butterfly and the overall goal of the Michigan Wildlife Action Plan. Specific conservation actions are needed to provide short and long-term benefits to Karner blue butterfly (Table 1).

Table 1. Expected short and long-term benefits for KBB and its habitat.

Objectives ⇒	**Conservation Actions**	**Outputs** ⇒	**Short-Term Benefits**	**Long-Term Benefits**
Accomplishments that will improve the status of SGCN or their habitats	*Accomplishing these activities will result in the following measurable deliverables:*	*Accomplishing these activities will result in the following evidence of progress:*	*We expect the following measurable changes within a ten-year period:*	*We expect the following impacts / trends beyond ten years:*
Restore or enhance **at least 500 acres of oak savanna** to benefit KBB Implement **an occupancy-based survey to monitor KBB at 30 sites**	Conduct prescribed burns Remove exotic/invasive plants Treat mechanically to set back succession Reconnect fragmented habitat though corridors Work with private landowners Develop and implement an occupancy-based survey to assess management actions	Improve/restore suitable habitat on at least 500 acres at or near occupied sites New monitoring protocol to evaluate habitat management and KBB metapopulations	Expand and connect suitable habitat around occupied sites Increase number of landowners implementing State Wildlife Action Plans Provide managers with an additional tool to monitor KBB Provide new monitoring approach to assess KBB habitat manipulation	Increase viability of KBB populations Improve effectiveness and adaptability of habitat management for KBB Increase ability to detect trends in populations Increase the likelihood of downgrading species' listing status

APPROACHES

Approach 1. Restore or enhance at least 500 acres of habitat for Karner blue butterfly in Michigan

Specifically, MDNR will restore or enhance 500 acres of savanna. In Michigan, 250 acres of habitat management will be conducted on public and an additional 250 acres on private lands. For all habitat projects implemented in Michigan, biologists will follow the habitat management guidance identified in Michigan's KBB Habitat Conservation Plan (HCP) for sites that are known to or which may potentially harbor KBB. We have developed annual work organization sheets to inform field staff and organize annual work goals for this grant (Appendix A.). Information sheets and coordination meetings will be developed and conducted annually to facilitate efficient completion of committed on-the-ground work as outlined in the grant.

In Michigan, suitable habitat management projects will be identified by a MDNR biologist. Final project selection will be determined in partnership with MNFI to ensure coordination between on-the-ground restoration and enhancement activities and occupancy monitoring efforts. The MDNR has extensive experience working with private landowners to restore savanna. To ensure that our private lands restoration projects meet the proposal's objectives, the MDNR will develop a contract and project description for each landowner project. These documents will clearly identify KBB needs at each site and the necessary conservation actions to restore or connect suitable KBB habitat. The MDNR will communicate and coordinate grant activities with the U.S. Fish and Wildlife Service (FWS) and other conservation partners through the Michigan KBB Working Group and the KBB Recovery Team.

Conservation actions to be used in Approach 1

All partners will conduct consistent habitat management practices, such as invasive species control, prescribed burning, mowing, hydro-axing and working with private landowners. The Michigan population is spread out and acts like a true metapopulation, thus making monitoring and assessment of management practices more complex. Monitoring will encompass multiple sites and multiple management activities.

Exotic/invasive species control

Removal of invasive plants will be prioritized in areas where infestation poses a critical threat to KBB. Invasive plants that will likely be treated include shrubs such as glossy buckthorn (*Frangula alnus*), autumn-olive (*Elaeagnus umbellata*), thorny olive (*Elaeagnus pungens*), and Russian olive (*Elaeagnus angustifolia*), as well as herbaceous species like spotted knapweed (*Centaurea maculosa*), garlic mustard (*Alliaria petiolata*), sericea lespedeza (*Lespedeza cuneata*), and Japanese stiltgrass (*Microstegium vimineum*).

Removal of invasive plants will be conducted by the MDNR, OH TNC, our partners, the private landowner, or by a contactor that specializes in ecological restoration. Plants are controlled using one or more of the following techniques: manual, mechanical, chemical, biological and/or

prescribed burning. Landowners may conduct the work themselves or with the MDNR private lands biologist providing training and supplies.

Prescribed burning

Prescribed burning is an important management tool in fire-dependent ecosystems, including prairies, savannas, fens, and barrens. Decades of fire suppression has led to the loss of prairie grasses and forbs required by KBB, increased shrub invasion, and exacerbated the spread of invasive species. For the federally endangered KBB, the MDNR will follow guidance identified in their KBB HCP. Prescribed burns will be conducted by MDNR's Forest Resources Division staff, our partners, or professional contractors, depending on land ownership. On all other private lands, MDNR biologists will work with the private landowner to review management objectives, identify burn units, manage a burn plan, hire a professional burn contactor, and monitor results. Cost-share is occasionally provided by the private landowner through in-kind match for site preparation activities (e.g., establishing fire breaks). The MDNR biologists have reviewed over 100 burn plans, taken prescribed fire training, and funded over 100 burns through MDNR's private lands program.

Setting back succession

Mechanical shrub control (mowing and hydro axing) is used where shrub invasion is so severe that other management tools such as prescribed fire are not effective. Shrubs have invaded many formerly open areas in savannas due to fire suppression, virtually eliminating KBB habitat in Michigan. Shrub control will be conducted by the MDNR, OH TNC, our partners and qualified professional contractors. Techniques used will be based on shrub density and size, cost efficiency, and sensitivity of the site.

Support private landowner programs to foster conservation

The MDNR is committed to conserving wildlife on private lands and has successfully operated a private lands program over the past 20 years. Over the last 12 years, the MDNR's private lands program has successfully applied for and implemented four other competitive State Wildlife Grants that have conserved, protected, and enhanced habitat for hundreds of SGCN. Michigan's private lands program has a proven record of providing sound technical and financial assistance to private landowners to further the conservation of SGCN.

Approach 2. Develop and implement a monitoring framework to begin assessing the effects of prescribed fire and mowing on Karner blue butterfly in Michigan

We will design a survey to compare KBB use (i.e., occupancy, relative abundance) among untreated, burned, and mowed sites both before and after management (Figure 1). We will work with MDNR field staff to identify sites for the three strata, with a goal of having at least 10 sites within each stratum (minimum of 30 sites total). During the first field season, all sites will be surveyed for KBB prior to initiation of any management. Burning and mowing will take place in the winter or spring prior to the first flight of the second season. During the second and third field seasons, we will conduct post-management surveys at the burned and mowed sites, as well as continue surveys at the untreated sites (Figure 1). Because it may take multiple years for KBB

populations to respond to management and the effects of management will decrease over time, we aim to continue monitoring these sites beyond the three years of this project to better understand the long-term influence of management on KBB.

We will conduct surveys using a systematic-transect approach (Pollard 1977, 1982), which is a commonly employed butterfly survey method that has been recommended over unrestricted meander surveys (Royer et al. 1998). We will conduct two surveys of each habitat patch within the second KBB flight period. A survey will consist of a series of transects paralleling the outer boundary of the identified habitat patch. At a given site, the first transect will begin 5 m inward from the outer boundary of the habitat patch. The surveyor will slowly walk along the first transect until the entire periphery of the site has been surveyed. The second transect will then be located 10 m inward from the first transect and the observer will survey that transect until complete. Then a new transect will be started 10 m inward from the second, and so on, until the entire patch is surveyed. The surveyor will count butterflies within an area 5 m to either side of the transect, 5 m forward along the transect, and 5 m above the transect (i.e., a 10 m x 5 m x 5 m, box-shaped, survey area). The observer will walk at a steady, slow speed of approximately 35 m/min. Butterflies flying ahead of an observer will be ignored if the surveyor is certain that the

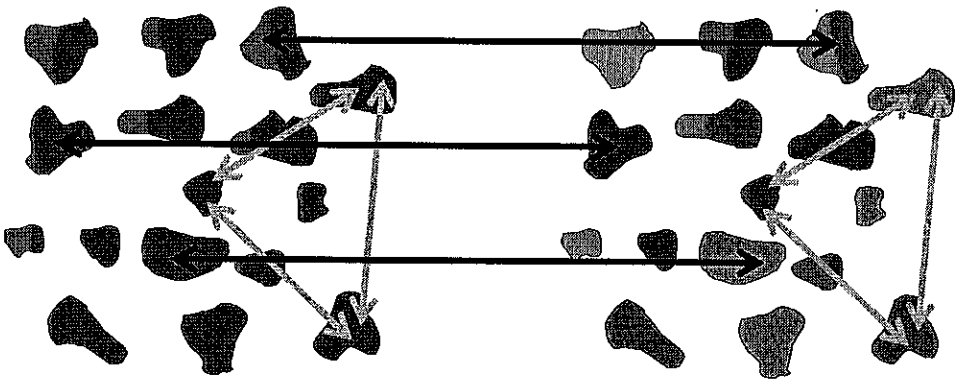

Figure 1. Conceptual sample design for a monitoring program to compare Karner blue butterfly use of burned, mowed, and untreated sites in Michigan. Shading color indicates management stratum (blue = untreated, red = burned, and green = mowed). Black arrows indicate comparisons to be made within each stratum before and after management. Orange arrows indicate comparisons to be made among the three strata both before and after management.

individual was already counted. If an observer is uncertain as to whether or not a butterfly was counted, it will be recorded and considered a new individual. We will gather geospatial information using GPS receivers on the transect locations and points where KBB individuals or groups of individuals are detected to examine the distribution of butterflies in relation to where management activities occurred. A list of other butterfly species detected within each habitat patch will also be recorded.

We will also gather information about the habitat conditions at each survey site during each visit, which could be used as covariates in occupancy model analyses. Observers will rank the occurrence of lupine, invasive plant species, woody vegetation, and potential nectar sources. Plant species or groupings will be ranked as dominant (D), abundant (A), frequent (F), occasional (O), or rare (R) (i.e., DAFOR scale).

We will develop occupancy models to estimate occupancy probabilities that incorporate imperfect detection (MacKenzie et al. 2002, 2003) using the program PRESENCE (J. Hines, U.S. Geological Survey, Patuxent Wildlife Research Center, Laurel, Maryland). We will develop a candidate set of models that include covariates for detection probability (e.g., survey period, weather conditions) and occupancy (e.g., management type, abundance of lupine, nectar plants, etc.). The model best supported by our data will be identified using Akaike's Information Criterion (Burnham and Anderson 2002). We will also compare relative abundance of KBBs before and after management and among the three management strata (i.e., untreated, burned, and mowed) using mixed models (PROC MIXED; SAS Institute, Cary, North Carolina).

Estimated Costs and Accomplishments by Objective in Michigan

The estimated total cost and planned accomplishments by objectives are as follows:

Objectives	Planned accomplishments	Reporting units	Estimated cost
1. Habitat management	500	Acres	$333,676
2. Occupancy-based survey	30	Monitoring sites	$189,000
Project Total			**$522,676**

This grant proposal covers salaries and wages, contractual services, travel (in-state and out-of-state), supplies and equipment. These estimated costs will be expended according to the following direct cost categories:

Salaries and wages		$173,933
Fringe benefits (48%)		$97,403
	Salary sub-total	**$271,336**
Indirect rate (13.92%)		$45,340
	Total salaries	**$316,676**
Contracts		$161,000
Travel		$5,000
Equipment		$0
Supplies, services, and materials		$40,000
	TOTAL PROJECT COST	**$522,676**
	Federal funds requested:	$384,500
	State share (26%):	$138,176

APPENDIX A. INFORMATION COORDINATION WORK SHEETS FOR FIELD STAFF

COMPETITIVE STATE WILDLIFE GRANT PROJECT REQUEST FOR ASSISTANCE

Oak Savanna Restoration and Monitoring in Michigan and Ohio for Karner blue butterfly population recovery
October 1, 2015 – September 30, 2018

Project Information

Objectives:

1. **Restore or enhance at least 800 acres of habitat for Karner blue butterfly in Michigan and Ohio**
   - **Work to be conducted by MDNR**
   - **Michigan—250 acres on public lands and 250 acres on private lands**

2. **Develop and implement a monitoring framework to begin assessing the effects of prescribed fire and mowing on Karner blue butterfly in Michigan**
   - **Work to be conducted by MNFI**

FY 2016 Regional Information

Southwest Region	**Southeast Region**

Deliverables:
• Develop habitat management plans for monitoring sites
• Habitat management must occur on MNFI monitoring sites
  o Exotic/invasive species control
  o Prescribed burning
  o Setting back succession (i.e., mowing and hydro axing)
• Coordinate management (MDNR) with KBB monitoring (MNFI)
• 2 with MNFI (1 pre- and 1 post-survey)
• First meeting should occur prior to start of field work
	Deliverables:
	• Develop habitat management plans for monitoring sites
	• Habitat management must occur on MNFI monitoring sites
	  o Exotic/invasive species control
	  o Prescribed burning
	  o Setting back succession (i.e., mowing and hydro axing)
	• Coordinate management (MDNR) with KBB monitoring (MNFI)
	• 2 with MNFI (1 pre- and 1 post-survey)
	• First meeting should occur prior to start of field work

Estimated hours: 480 hrs	**Estimated hours: 100 hrs**
Estimated acres: at least 180 acres • 100 on public lands • 80 on private lands	**Estimated acres: at least 20 acres** • 0 on public lands • 20 on private lands
Estimated funding: • Wages—$45,000 • CSS&M—$100,000	**Estimated funding:** • Wages—$9,000 • CSS&M—$10,000

Coding:
• **PCA:**
  o 83632 (Turkey match)
  o 83630 (G&F match)
  o 83631 (Nongame match)
• **Project code:**
  o 221021
	Coding:
	• **PCA:**
	  o 83632 (Turkey match)
	  o 83630 (G&F match)
	  o 83631 (Nongame match)
	• **Project code:**
	  o 221021

Reporting Location, acres, number of sites, and type of habitat management work completed for both public and private lands	**Reporting** Location, acres, number of sites, and type of habitat management work completed for both public and private lands