

MICHIGAN'S COOPERATIVE ENDANGERED SPECIES PROGRAM

E-20-1 AMENDMENT 1

CESCF TRADITIONAL CONSERVATION GRANT

GRANT PROPOSAL AMENDMENT INCLUDING AMENDMENT TO SEGMENT 1
FOR THE PERIOD: SEPTEMBER 30, 2007 – SEPTEMBER 30, 2009

MICHIGAN DEPARTMENT OF NATURAL RESOURCES



SUBMITTED: MONDAY, AUGUST 18, 2008

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PURPOSE OF AMENDMENT:

The purpose of this amendment is to add funds to support the continuation of research and protection for nesting Piping Plovers. This research, covered in the second Project Statement of this Proposal, is part of a multi-year study being conducted by the University of Minnesota. There are no additional funds being added to the first Project Statement for prairie fen restoration and management. Support for these activities has been shifted to State Wildlife Grants.

This amendment also modifies project personnel as MDNR's Endangered Species Coordinator position is currently vacant with the departure of Todd Hogrefe. Until the position is filled, Sherry MacKinnon (Eastern Upper Peninsula Ecologist Planner) is serving as Acting Endangered Species Coordinator. All other aspects of this Grant Proposal and Segment 1 remain as previously approved.

PROJECT STATEMENT: Restoration, enhancement and management of prairie fens in Southern Michigan to aid in recovery of Mitchell's satyr, eastern massasauga rattlesnakes and associated species.

SUMMARY:

This project will provide support to restore, enhance and manage prairie fen habitat to aid in the recovery of Mitchell's satyr and eastern massasauga rattlesnake in Michigan. This project will provide support for these activities on Department of Natural Resources (Department) owned and administered lands in southern Michigan to complement similar work on private lands under the Department's Landowner Incentive Program (LIP). A variety of other rare species that depend on prairie fens for at least a portion of their life cycle will also benefit from these activities. The Department will use a variety of techniques including chemical treatment of invasive exotics and woody species, restoration of prairie plants and prescribed fire. Particular emphasis will be made to restore and protect groundwater hydrology necessary to support prairie fens.

NEED:

Prairie fens are geologically and biologically unique wetlands found only in the glaciated Midwest. They are distinguished from other calcareous fens by a tallgrass prairie flora and fauna component. In Michigan, prairie fens occur in the southern three to four tiers of counties (Figure 1), primarily in the glacial interlobate region (Spieles et al. 1999). Hydrological processes are very important in prairie fen vegetative structure. Saturated peat is maintained by a constant inflow of groundwater rich in calcium and magnesium from surrounding glacial deposits. Calcium and magnesium-rich groundwater often upwells through the peat and forms broad seeps or local springs. Once groundwater enters the prairie fen, drainage continues through the peat either in diffuse surface flow or in stream flow (Almendinger et al. 1994).

In the early 1800s, prairie fens were part of an ecosystem complex maintained by fire (Chapman 1988). Before European settlement, dry, open upland communities such as mixed oak barrens or white oak savannas were often adjacent to prairie fens (Comer et al. 1995). Native American or lightning strike fires burned uplands and likely spread into adjacent prairie fens. These fires burned surface vegetation, inhibited shrub invasion and maintained the open prairie fen community structure (Curtis 1959).

Fire suppression and hydrological alterations from agriculture and development have led to the conversion of fens in the Southern Michigan interlobate regions. Invasive, non-native species have also contributed to the decline of this habitat type. Glossy buckthorn (*Rhamnus frangula*), for example, can establish monocultures along wooded fen edges that often extend into the sedge meadow zone. Purple loosestrife (*Lythrum salicaria*) can also invade the inundated flat/depression and sedge meadow zones. Consequently, many of the remaining fens in the Southern Lower Peninsula are considered degraded or very degraded. The prairie fen natural community is now classified as rare in the State (Eagle et al. 2005).

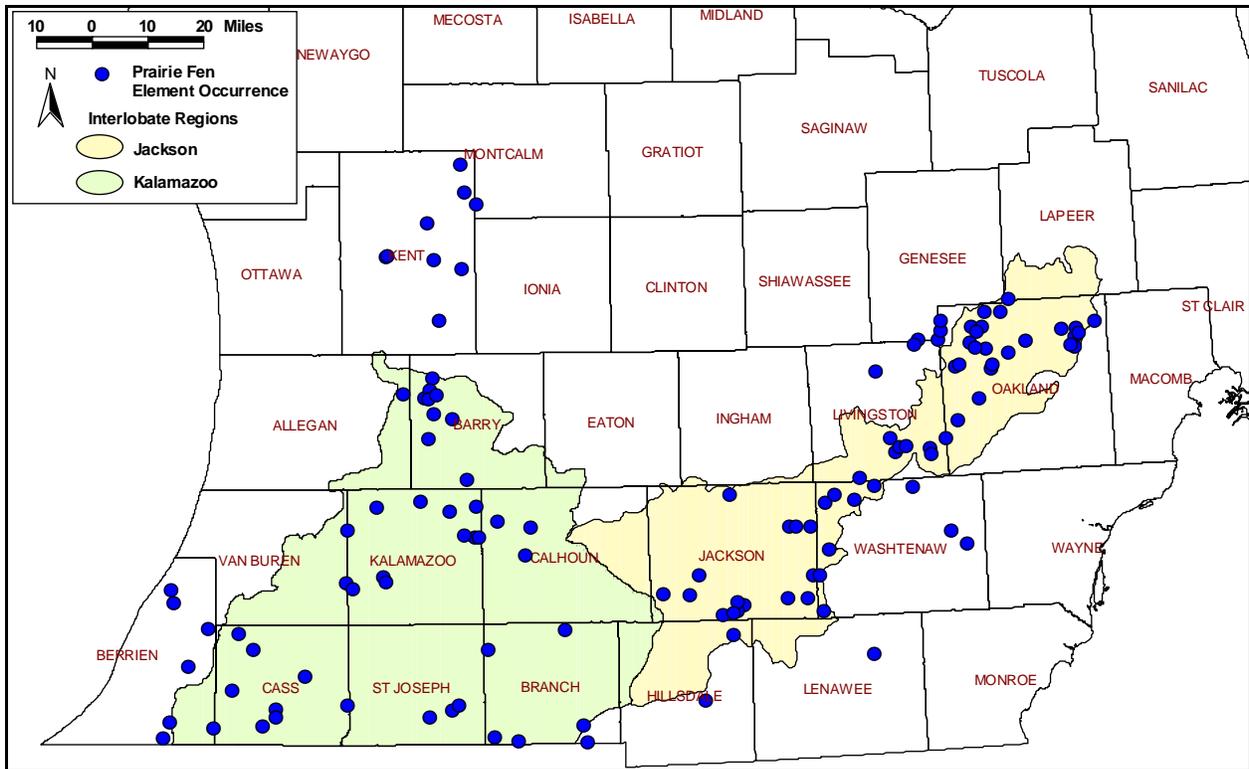


Figure 1: Southern Michigan counties and glacial interlobate regions with current element occurrences of prairie fens.

The decline in amount and quality of prairie fen habitat has led to a decline in species that depend on fen habitat for at least part of their life cycle. The federally endangered Mitchell’s satyr, a fen obligate, is the rarest North American lepidopteran, currently known from only 18 sites, 16 of which occur in Michigan. The eastern massasauga rattlesnake, a federal candidate species, also depends on fens for hibernacula and spring and fall foraging habitat.

The restoration, enhancement and management of prairie fens are needed to maintain rare species and ultimately contribute to their recovery. Michigan’s Wildlife Action Plan (WAP) includes the following conservation actions needed for prairie fens in southern Michigan:

- Manage to approximate natural disturbance regimes using prescribed fire, mowing and restoration of natural water flow patterns (grazing and mowing patterns, altered fire regime, altered hydrologic regimes).
- Institute invasive species monitoring, prevention and control programs (Invasive plants and animals).

Michigan’s LIP provides technical and financial support to conduct such activities on private lands. This grant is needed to provide similar assistance on state owned lands. A number of State Game Areas and Recreation Areas have degraded prairie fens, fens occupied by Mitchell’s satyr in need of management or sites suitable for recolonization of Mitchell’s satyr.

OBJECTIVES:

Objective 1. Prairie fen restoration

Annually restore up to 30 acres of prairie fens by restoring hydrology and native vegetation. Acreage includes restoration of upslope buffer areas to protect and enhance hydrology of groundwater recharge areas.

Objective 2. Prairie fen enhancement and management

Annually enhance and manage 100 acres of prairie fen by maintaining natural hydrologic cycles, providing adequate acreages of different vegetation zones (e.g., open herbaceous, shrub/scrub and forested portions of fens) and controlling exotic vegetation. Acreage includes management of upslope buffer areas as native prairies and savannas to filter runoff, increase groundwater infiltration and control exotic vegetation.

EXPECTED RESULTS OR BENEFITS:

This grant will directly benefit the federally listed species already cited by providing more and enhancing existing prairie fen habitat. Additionally, this grant will provide support for the ongoing management needs of these fens in order to provide the natural disturbance regimes needed to ensure that a variety of vegetative zones remain in prairie fens. In addition to the species already cited, Michigan's Wildlife Action Plan (Eagle et al. 2005) lists the following Associated Species of Greatest Conservation Need that depend on prairie fens:

SNAILS

six-whorl vertigo (*Vertigo morsei*)

INSECTS

grey petaltail (*Tachopteryx thoreyi*)
spatterdock damer (*Aeshna mutata*)
ringed boghaunter (*Williamsonia lintneri*)
Hoosier locust (*Paroxya hoosieri*)
bog conehead (*Neoconocephalus lyristes*)
red-faced meadow katydid (*Orchelimum concinnum*)
tamarack tree cricket (*Oecanthus laricis*)
angular spittlebug (*Lepyronia angulifera*)
red-legged spittlebug (*Prosapia ignipectus*)
Huron River leafhopper (*Flexamia huroni*)
a leafhopper (*Flexamia reflexus*)
persius duskywing (*Erynnis persius persius*)
poweshiek skipperling (*Oarisma poweshiek*)
swamp metalmark (*Calephelis mutica*)
tawny crescent (*Phyciodes batesii*)
Mitchell's satyr (*Neonympha mitchellii mitchellii*)
Newman's brocade (*Meropleon ambifusca*)
blazing star borer (*Papaipema beeriana*)
golden borer (*Papaipema cerina*)

maritime sunflower borer (*Papaipema maritima*)
Culvers root borer (*Papaipema sciata*)
silphium borer moth (*Papaipema silphii*)
regal fern borer (*Papaipema speciosissima*)

AMPHIBIANS

Blanchard's cricket frog (*Acris crepitans blanchardi*)
pickerel frog (*Rana palustris*)
northern leopard frog (*Rana pipiens*)

REPTILES

Kirtland's snake (*Clonophis kirtlandii*)
blue racer (*Coluber constrictor foxii*)
copperbelly water snake (*Nerodia erythrogaster neglecta*)
eastern massasauga (*Sistrurus catenatus catenatus*)
spotted turtle (*Clemmys guttata*)
Blanding's turtle (*Emydoidea blandingii*)
eastern box turtle (*Terrapene carolina carolina*)

BIRDS

Sora (*Porzana carolina*)

Protecting hydrology is critically important for the maintenance of vegetative structure in prairie fens. Groundwater flow into prairie fens is often altered by agricultural and other land use practices. The underlying groundwater table is often lowered because of groundwater extraction and lack of recharge due to drained surface water. A lower groundwater table cannot supply the calcareous seepage which underlies prairie fen communities. Many of the existing prairie fens already have disrupted aquifer recharge areas and portions of these communities are slowly changing to shrub-carr. Healthy woodlands, savanna and prairies in uplands adjacent to fens allow infiltration of precipitation into the groundwater. Nutrient addition from adjacent agricultural fields can contribute to the dominance of invasives such as narrow-leaved cat-tail (*Typha angustifolia*), giant reed grass (*Phragmites australis*) and purple loosestrife in portions of several prairie fens (Panno, S.V. et al. 1999). Control of invasive and woody species invasion is necessary in these prairie fens to restore natural vegetative patterns of diversity. Fire and manual removal have proven effective in controlling exotics and native woody invasives (Kohring 1982, Zimmerman 1983). Bowles et al. (1996) determined that although fire did not significantly decrease woody species frequency, it increased graminoid dominance.

APPROACH:

For each site, the wetland area encompassing the fen as well as the upslope recharge areas will be delineated. All agricultural plantings, such as crops for wildlife food plots, will be converted to native prairie and savanna communities. If the recharge area occurs on neighboring private lands, coordination with Michigan's LIP will occur to encourage landowners to enter into cooperative management practices.

Approach 1. Prairie fen restoration

In most cases, restoration will require restoring the underlying hydrology to support the groundwater flow necessary for prairie fen. This will include restoring or enhancing native deep rooted prairie vegetation on the upslope recharge areas surrounding the fens. Activities will include clearing woody vegetation, controlling herbaceous vegetation with herbicides, mowing, prescribed fire and soil preparation activities to reestablish native plantings. Prairie vegetation will be established with a variety of techniques including no-till drill and frost seeding as well as planting plugs. Weed control during plant establishment will be conducted with herbicides.

Restoration activities within the wetland area will include treating invasive exotic species with herbicides, mowing and prescribed fire where applicable. Woody vegetation may be manipulated through mechanical clearing and timber sales where necessary. Native vegetation will be restored through seeding or planting of plugs.

Approach 2. Prairie fen enhancement and management

Enhancement of existing sites will include work within the fen and in the upslope recharge areas on surrounding uplands. Enhancement activities within the fen will include controlling invasive exotics with herbicides, hand clearing and/or prescribed fire based on site-specific conditions. Management activities within the fen will be designed to restore natural disturbance patterns to affect woody succession and maintain suitable patches of open herbaceous zones, woody shrub

zones and forested zones. Disturbance regimes will include prescribed fire and use of mechanical vegetation clearing and herbicides when necessary.

Enhancement and management of fens will include maintaining upslope recharge areas in native savanna and prairie habitat. Maintenance of the recharge area will include prescribed fire and mechanical clearing of woody vegetation along with herbicide use when necessary.

Activities supported by this grant may occur in occupied habitat of federally listed species. To avoid the potential to harm individuals, activities will be adjusted seasonally to minimize potential for take.

Prescribed fire in occupied Mitchell’s satyr habitat will likely result in the incidental take of some life stages of the butterfly. Fires will be conducted in late fall or early spring, avoiding any impact to adults that fly in early July. Eggs and larva, however, can still be harmed during these burns. Prescribed fire may also result in incidental take of eastern massasauga rattlesnakes. When conducting burns in occupied satyr or massasauga habitat, the Department will follow the same programmatic agreement developed with the East Lansing Field Office of Environmental Services Division of the US FWS for LIP.

The following project code will be used to track time and expenditures for these objectives:

Project Code	Project Title	Project Definition	Reporting Units
220810*	Prairie Fen Restoration and Maintenance	All aspects of restoring and maintaining prairie fen as suitable habitat for federally listed species. Includes activities to restore and maintain hydrology by restoring and maintaining surrounding buffer zones as native prairie and savanna. Activities include mechanical and chemical control of woody and invasive species as well as prescribed fire where appropriate. Activities also include soil preparation, seed bed preparation and planting, seedling planting, brush clearing and timber sales.	Acres Restored Acres Maintained

*This project code is used for any time and expenditures that are reimbursable under this objective, regardless if they are actually charged to this grant. This code is not used for any time or expenditures that are not reimbursable under this objective.

LOCATION:

Prairie fen restoration, enhancement and management activities will occur on Department owned lands in and around fens in the interlobate regions of the Southern Lower Peninsula. In particular, these areas may include portions of the State Game, Recreation and Fish and Wildlife Areas shown in Figure 2.

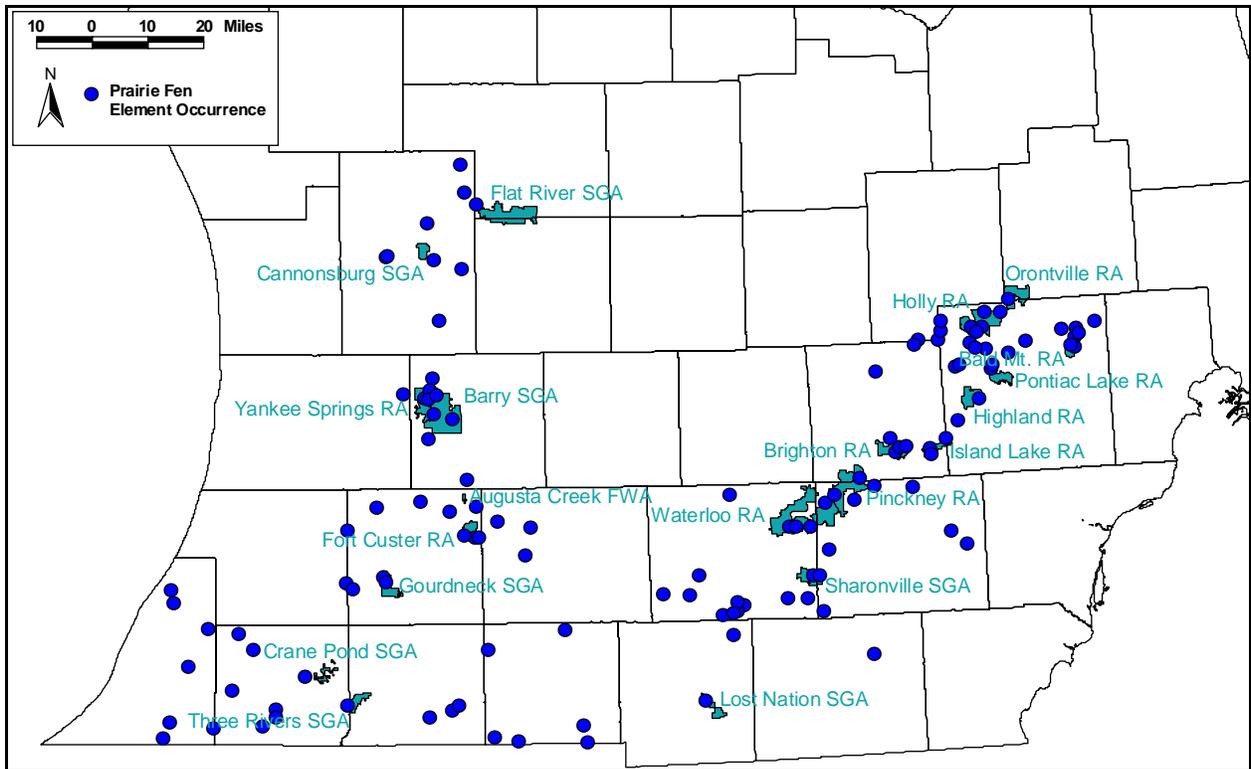


Figure 2: Department administered State Game Areas (SGA), Recreation Areas (RA) and Fish and Wildlife Areas (FWA) with prairie fen occurrences or sites suitable for prairie fen restoration in Southern Michigan.

ESTIMATED COST:

Costs may vary by Grant Segment. The estimates provided below may include salaries and wages, contractual services, expenses and equipment. Specific work activities and direct cost categories may vary from year to year as detailed in each individual Grant Segment.

Objectives	FY 2008 Segment 1	FY 2009 Segment 1
1. Prairie fen restoration	\$4,200	\$0
2. Prairie fen enhancement and management	\$20,320	\$0
Totals	\$24,520	\$0

COMPLIANCE:

National Environmental Policy Act (NEPA)

The activities supported by this grant for this project statement will not have a significant impact on the quality of the human environment. These activities are completely covered by categorical exclusions 1.4B(2-6) in 516 DM 8.5 as follows:

1.4B(2) The operation, maintenance, and management of existing facilities and routine recurring management activities and improvements, including renovations and replacements which result in no or only minor changes in the use, and have no or negligible environmental effects on-site or in the vicinity of the site.

1.4B(3) The construction of new, or the addition of, small structures or improvements, including structures and improvements for the restoration of wetland, riparian, instream, or native habitats, which result in no or only minor changes in the use of the affected local area. The following are examples of activities that may be included.

- (a) The installation of fences.
- (b) The construction of small water control structures.
- (c) The planting of seeds or seedlings and other minor revegetation actions.
- (d) The construction of small berms or dikes.
- (e) The development of limited access for routine maintenance and management purposes.

1.4B(4) The use of prescribed burning for habitat improvement purposes, when conducted in accordance with local and State ordinances and laws.

1.4B(5) Fire management activities, including prevention and restoration measures, when conducted in accordance with Departmental and Service procedures.

1.4B(6) The reintroduction or supplementation (e.g., stocking) of native, formerly native, or established species into suitable habitat within their historic or established range, where no or negligible environmental disturbances are anticipated.

Section 7, Endangered Species Act (ESA)

Activities supported by this grant that may affect Mitchell's satyr or eastern massasauga rattlesnake will be conducted in accordance with the programmatic agreement for managing occupied habitat concluded from previous consultations with Ecological Services. Additional consultation will occur if management of Department owned sites differs from the private lands included in the previous consultation and agreement. No other federally listed species occur within the potential action areas.

National Historic Preservation Act (NHPA)

A site-specific Section 106 review will be conducted with the State Historic Preservation Officer for any sites where there has not been active row crop farming within the past 50 years and activities will disturb soil below four inches in depth. As long as no structures are present on a site, the activities of prescribed fire, no-till drill and frost seeding and mechanical and chemical clearing of vegetation that does not impact soil below four inches will not have the potential to affect sites eligible for listing on the National Register of Historic Places if such a site exists and consequently no Section 106 review will be conducted..

Other Federal Compliance Issues

The activities supported by this grant for this project statement do not involve any other federal compliance issue. The Department will comply with all applicable Federal laws, regulations and policies including but not limited to Coastal Zone Management Act of 1972, Executive Order 11987 Exotic Organisms, Floodplains and Wetlands Protection, Animal Welfare Act of 1985 and Coastal Barriers Resources Act of 1982.

PROJECT PERSONNEL:

Federal Aid Coordinator	Eric Sink Department Federal Aid Coordinator Financial Services Division (517) 335-1064
Grant Coordinator	Stephen Beyer Wildlife Division Federal Aid Coordinator Wildlife Division (517) 241-3450
Project Leader and Objectives Coordinator	Sherry MacKinnon Acting Endangered Species Coordinator Wildlife Division (517) 373-3337

REFERENCES AND LITERATURE CITED:

- Almendinger, J., J. Anderson, J. Bell, E. Berglund, R. Dana, S. Eggers, E. Gorham, J. Janssens, S. Komor, G. Larson, J. Leete, N. Sather, and S. Verry. 1994. Technical criteria for identifying and delineating calcareous fens in Minnesota. Minn. DNR.
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PROJECT STATEMENT: Research and recovery of the Great Lakes Piping Plover population.

PROJECT SUMMARY:

The purpose of the proposed project is to address three research objectives key to recovery of the endangered Great Lakes Piping Plover (*Charadrius melodus*) population. Research outlined in this proposal will be conducted to: 1) derive estimates of adult and juvenile survival and sex-specific population age structure, 2) derive estimates of individual and population levels of genetic diversity 3) and rank nest-site productivity. Refined estimates of survival and population age structure will help predict population changes and time to recovery. Genetic analysis will inform management strategies aimed at minimization of inbreeding and persistence of genetically unique lineages. Comparison of productivity at different breeding sites will improve recommendations for site-based protection and management strategies. Research and recovery activities will be conducted at all sites occupied by Piping Plovers in Michigan.

PROJECT NEEDS:

The Great Lakes population is the smallest and most imperiled of the three breeding populations of the Piping Plover, a shorebird endemic to North America (Wemmer et al. 2001). A majority of breeding pairs nests in Michigan (89% of 2007 breeding pairs), but the population has shown recent signs of expansion, with pairs nesting in Wisconsin and Ontario; the 2007 estimate of breeding pairs was 63 (Cuthbert & Roche 2007). This population was listed as endangered in 1986 (USFWS 1985). Despite recent increases in size since it was listed, this population remains extremely vulnerable to predation, demographic and environmental stochasticity, depleted genetic diversity, public recreation and continued shoreline development. However, breeding pair estimates from summer 2007 demonstrate that long-term research, management and protection are having a positive impact on the population. Research to understand plover habitat use, movements, survival and fledging rates has been conducted since the mid-1980s and continues to be critical for the recovery of the species. The purpose of the proposed project is to address three research objectives key to recovery of this population in Michigan and elsewhere in the Great Lakes.

PROJECT OBJECTIVES:

Objective 1. Piping Plover Population Study

To determine Great Lakes Piping Plover population dynamics, genetic diversity and nest-site productivity in Michigan to better conserve the species.

PROJECT EXPECTED RESULTS OR BENEFITS:

This project will produce the following deliverables upon completion:

- Estimates of adult and juvenile survival and sex-specific population age structure.
- A preliminary progress report on the first two years of genetic analysis (A final report will be provided upon completion of the multi-year project).
- Ranking of nest-site productivity and recommendations for site-specific protection and management to improve productivity.
- Model results of years needed to recover the population (100 breeding pairs in Michigan, 50 pairs in other Great Lakes states/Ontario).

PROJECT APPROACH:

Approach 1. Piping Plover Population Study

The following study will be conducted to address this project objective:

- 2.1. Population dynamics, genetic diversity and nest-site productivity research on Great Lakes Piping Plovers in Michigan.

PROJECT PERSONNEL:

Federal Aid Coordinator

Eric Sink
Department Federal Aid Coordinator
Financial Services Division
(517) 335-1064

Grant Coordinator

Stephen Beyer
Wildlife Division Federal Aid Coordinator
Wildlife Division
(517) 241-3450

Project Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

STUDY 2.1: Population dynamics, genetic diversity and nest-site productivity research on Great Lakes Piping Plovers in Michigan.

STUDY NEED:

The Great Lakes population is the smallest and most imperiled of the three breeding populations of the Piping Plover, a shorebird endemic to North America (Wemmer et al. 2001). A majority of breeding pairs nests in Michigan (89% of 2007 breeding pairs), but the population has shown recent signs of expansion, with pairs nesting in Wisconsin and Ontario; the 2007 estimate of breeding pairs was 63 (Cuthbert & Roche 2007). This population was listed as endangered in 1986 (USFWS 1985). Despite recent increases in size since it was listed, this population remains extremely vulnerable to predation, demographic and environmental stochasticity, depleted genetic diversity, public recreation and continued shoreline development. However, breeding pair estimates from summer 2007 demonstrate that long-term research, management and protection are having a positive impact on the population. Research to understand plover habitat use, movements, survival and fledging rates has been conducted since the mid-1980s and continues to be critical for the recovery of the species.

The purpose of this study is to address three research objectives key to recovery of the endangered Great Lakes Piping Plover population. Research outlined in this proposal will be conducted to: 1) derive estimates of adult and juvenile survival and sex-specific population age structure, 2) derive estimates of individual and population levels of genetic diversity 3) and rank nest-site productivity. Refined estimates of survival and population age structure will help predict population changes and time to recovery. Genetic analysis will inform management strategies aimed at minimization of inbreeding and persistence of genetically unique lineages. Comparison of productivity at different breeding sites will improve recommendations for site-based protection and management strategies. Research and recovery activities will be conducted at all sites occupied by Piping Plovers in Michigan.

STUDY OBJECTIVES:

The following objectives will be achieved through a contract developed between the Michigan Department of Natural Resources and an external research entity.

Objective 1. Population Data

To continue to derive estimates of adult and juvenile survival and sex-specific population age structure.

Objective 2. Genetic Analysis

To conduct the second year of a multi-year research project to derive estimates of individual and population levels of genetic diversity.

Objective 3. Comparative Breeding-site Productivity Analysis

To continue to rank nest-site productivity and offer recommendations for site-specific protection and management to improve productivity.

STUDY EXPECTED RESULTS OR BENEFITS:

Population Data

Researchers at the University of Minnesota (UMN) maintain a database on individual birds from the time of banding as a chick until their death. This database now has records spanning approximately 15 years (maximum lifetime of an adult plover). Based on reading the bands of returning birds, researchers are able to estimate annual adult and juvenile survival. These estimates, along with productivity, are needed to model population recovery. In 2007, field staff made a significant effort to band all adults and most chicks. At the end of the season, 82% of adults were identifiable by color bands (none were unbanded) and 95% of the chicks that fledged were banded. Additionally, the field staff has instituted a new banding scheme that facilitates identification of banded individuals. The goal for this study is to use the updated database and data from returning plovers to refine older estimates of survival as well as obtain new information on age structure of the population. Additional years of data collection will significantly increase confidence in survival estimates because larger numbers of birds are returning now that the population has increased. Refined estimates of survival and population age structure will help predict population changes and time to recovery.

Genetic Analysis

Greater knowledge of the Great Lakes population genetic structure will inform management strategies aimed at minimization of inbreeding and persistence of genetically unique lineages. Research to date (Roche, University of Minnesota, unpublished data) suggests continued population viability and recent, observed growth may be partly explained by the reproductive success of unbanded adults. The origins of these individuals are currently unknown. If they are immigrants from beyond the Great Lakes, the current view of the population as demographically and genetically 'closed' will be challenged. To date, no research has addressed questions specific to Great Lakes population genetic structure, inbreeding levels or gene flow. Researchers will examine whether the Great Lakes plover population is a closed, randomly mating population by conducting a phylogeographic analysis of microsatellite genotypes and mitochondrial DNA haplotypes sequenced from individuals in the current Great Lakes and Great Plains populations. The research will also: assess the genetic diversity and correlated inbreeding levels of the current Great Lakes population relative to the current Great Plains population and historical Great Lakes population (represented by museum specimens), evaluate the extent of inbreeding depression and establish an origin for unbanded nesting adults.

Comparative Breeding-site Productivity Analysis

In recent years, plovers have annually nested at approximately 30 different sites. Multiple pairs use some sites for nesting. Not all sites produce young each year. Site-specific productivity is

highly variable and depends on predator diversity and density, Great Lakes water levels and site-related management activities. Productivity is also variable from year to year. We need a solid understanding of productivity at different sites to reliably identify specific protection and management needs. Researchers will use the current database and information collected during this study to evaluate productivity on a site-by-site basis. Additionally, researchers will determine whether chicks hatched at specific sites return more often to breed than those from other sites. This research will help explain the extent to which site quality influences population recovery. Estimates of site-specific productivity will be used to inform a Great Lakes metapopulation model which will project the long-term viability of the population given variable nest-site conditions.

STUDY APPROACH:

Approach 1. Population Data

During the breeding season, individuals will be captured and uniquely marked using U.S. Fish and Wildlife Service (USFWS) bands. Birds will be subsequently monitored, and nesting success and habitat selection will be tracked. As part of monitoring activities, all individual nests will be protected from predators. Reports from band recoveries made from off the breeding grounds will be collected and analyzed.

The following jobs will be conducted to address this study objective:

- 2.1.1. Piping Plover banding
- 2.1.2. Nest site protection
- 2.1.3. Resighting and band recovery

Approach 2. Genetic Analysis

All individuals captured as part of this study on the breeding ground will have DNA samples taken and analyzed. Genetic diversity of the Michigan population will be determined and compared to profiles of Snowy and Mountain Plovers.

The following job will be conducted to address this study objective:

- 2.1.4. DNA sampling, extraction, amplification and sequencing

Approach 3. Comparative Breeding-site Productivity Analysis

From data collected from other jobs in this study, breeding-site productivity will be determined. Habitat characteristics that contribute to breeding-site productivity will be identified. Metapopulation models will be developed to predict recolonization potentials into suitable habitat and to predict outcomes of different management scenarios.

The following jobs will be conducted to address this study objective:

2.1.5. Breeding-site productivity and metapopulation modeling

In addition to the jobs listed above by objective, the following job will be done to summarize work on all objectives:

2.1.6. Preparation of final report

The following state project code will be used to track time and expenditures for this study:

Project Code	Project Title	Project Definition	Reporting Units
220816	Piping Plover Research	All aspects of conducting research on the population dynamics, genetic diversity and nest-site productivity of Great Lakes Piping Plovers including preparation of final report detailing findings and providing management recommendations.	Hours and Final Report with Management Recommendations

STUDY LOCATION:

Research and recovery activities will be conducted at all sites occupied by Piping Plovers in Michigan (sites occupied in 2007 are shown in Figure 3). Parallel data on distribution, population size and reproductive success will be obtained from investigators in other parts of the breeding range where plovers are discovered breeding.



Figure 3. Sites where Great Lakes Piping Plovers were observed in 2007. Red dots indicate nesting locations. Crosses indicate observations of non-nesting birds.

STUDY SCHEDULE OF WORK:

Jobs will be completed according to the following schedule; some minor modifications may be necessary and will be documented in each year's grant agreement.

Objectives	FY 2008 Segment 1	FY 2009 Segment 1
1. Population Data	Jobs 2.1.1-2.1.3, 2.1.6	Jobs 2.1.1-2.1.3, 2.1.6
2. Genetic Analysis	Jobs 2.1.4, 2.1.6	Jobs 2.1.4, 2.1.6
3. Comparative Breeding-site Productivity Analysis	Jobs 2.1.5, 2.1.6	Jobs 2.1.5, 2.1.6

STUDY ESTIMATED COST:

Costs may vary by Grant Segment. The estimates provided below may include salaries and wages, contractual services, expenses and equipment. Specific work activities and direct cost categories may vary from year to year as detailed in each individual Grant Segment.

Objectives	FY 2008 Segment 1	FY 2009 Segment 1
1. Population Data	\$61,700	\$61,744
2. Genetic Analysis	\$9,241	\$9,248
3. Comparative Breeding-site Productivity Analysis	\$8,241	\$8,247
Totals	\$79,182	\$79,239

STUDY COMPLIANCE:

National Environmental Policy Act (NEPA)

The activities supported by this grant for this project statement will not have a significant impact on the quality of the human environment. These activities are completely covered by categorical exclusions 1.5 in 516 DM 2 Appendix 1 and 1.4B(1 and 3) in 516 DM 8.5 as follows:

1.5 Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.

1.4B(1) Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources which involve negligible animal mortality or habitat

destruction, no introduction of contaminants, or no introduction of organisms not indigenous to the affected ecosystem.

1.4B(3) The construction of new, or the addition of, small structures or improvements, including structures and improvements for the restoration of wetland, riparian, instream, or native habitats, which result in no or only minor changes in the use of the affected local area. The following are examples of activities that may be included.

- (f) The installation of fences.
- (g) The construction of small water control structures.
- (h) The planting of seeds or seedlings and other minor revegetation actions.
- (i) The construction of small berms or dikes.
- (j) The development of limited access for routine maintenance and management purposes.

Section 7, Endangered Species Act (ESA)

Protection of Piping Plover nesting sites may affect, but is not likely to adversely affect Piping Plovers. The psychological fencing is erected to help exclude people before plovers begin incubating eggs and has been conducted successfully for years in Michigan and other states without impacting the use of the beaches by nesting pairs. Constructing nest enclosures does keep incubating adults off of the eggs for a brief period. These enclosures, however, are constructed by trained and experienced crews and adults are off the nests for less than 15 minutes. All nests will be monitored after enclosures are constructed to ensure the adults can and do return to the nest and continue incubating. These enclosures are beneficial and data have shown a dramatic increase in hatching success of enclosed versus unprotected nests.

The Piping Plover banding activity has the potential to adversely impact individuals that are captured either through trauma from the capture or from the bands themselves. Although adverse impacts may occur to individuals, this activity has been ongoing for several years with funding from Federal Endangered Species Section 6 accounts. Banding activities have been a critical part of the recovery efforts for Piping Plovers. Several of the recovery tasks listed in the Recovery Plan for the Great Lakes Piping Plover cannot be completed without banding activities. Previous banding activities have helped in determining wintering grounds, nest-site fidelity of nesting pairs and their offspring, mixing of Great Lakes and Northern Great Plains populations, population expansion and they have facilitated the development of a pedigree of the current population and pair bonding. This information has been essential in understanding the dynamics of the Great Lakes plover population. Similarly, collecting feathers and blood for genetic analysis also has the potential to injure or kill animals, but the risks are considered to be small, and application of the resulting information will enhance recovery of the species.

The monitoring and fencing activities within designated critical habitat of Piping Plovers has no potential to alter the habitat or have any effect, positive or negative, on the suitability of the habitat for plovers.

National Historic Preservation Act (NHPA)

The research activities supported under this project statement do not have the potential to affect any sites that are listed on or potentially eligible for listing on the National Register of Historic Places. Consequently, no consultation with the State and Tribal Historic Preservation Officers as part of a Section 106 process is necessary nor will be completed.

Other Federal Compliance Issues

The activities supported by this grant for this project statement do not involve any other federal compliance issue. The Department will comply with all applicable Federal laws, regulations and policies including but not limited to Coastal Zone Management Act of 1972, Executive Order 11987 Exotic Organisms, Floodplains and Wetlands Protection, Animal Welfare Act of 1985 and Coastal Barriers Resources Act of 1982.

STUDY PERSONNEL:

Principle Investigator

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

JOB 2.1.1: Piping Plover banding.

JOB NEED:

Uniquely identifying individuals by banding is a necessary precursor to collecting biological, distributional and habitat-use data needed for other portions of this study.

JOB OBJECTIVES:

Objective 1. Banding Adults and Chicks

To uniquely band each individual chick and unbanded adult Piping Plover on nesting territories in Michigan during the breeding season.

JOB EXPECTED RESULTS OR BENEFITS:

Data obtained as a result of banding will be used to refine estimates of survival as well as obtain new information on age structure of the population. Banding activities will help determine wintering grounds, nest-site fidelity of nesting pairs and their offspring, mixing of Great Lakes and Northern Great Plains populations and they will allow updates to the pedigree of the current population and pair bonding. This information is essential for understanding the dynamics of the Great Lakes plover population. Refined estimates of survival and population age structure and other information obtained through banding will help predict population changes and time to recovery.

JOB APPROACH:

Approach 1. Banding Adults and Chicks

Field staff will capture and band adults and chicks during the breeding season according to Federal and State permit protocols (Dingledine et al. 2005). Banding activities will occur throughout the breeding range of the Great Lakes population to the extent that permits and travel schedules allow.

Banding of Great Lakes Piping Plover currently occurs in two steps or phases. Approximately 4 to 20 days after hatching attempts will be made to capture and band all chicks in the population. Capture of chicks is by hand. Following capture, each chick will be examined, weighed and banded. Bands will be placed around the leg(s) of each individual using banding pliers. Each chick will receive one Davic UV-stable plastic band and one metal USFWS band, containing a

unique band number. Bands may be placed on either leg, or both on one leg. If bands are stacked on one leg, the plastic band will always be placed on top of the metal band. All chicks within the same brood will receive the same color of plastic band. Color bands will be “sealed” with a portable soldering iron.

Efforts will be made to capture adults banded in previous years as chicks which have returned to the breeding grounds for the purpose of adding two additional plastic color bands. With a full set of three plastic bands and one metal USFWS band, each bird in the population will be uniquely identifiable. An orange Darvic band has been selected as a unique identifier for the Great Lakes population, and at least one of the plastic bands will be orange or some combination of orange and other colors. Adults will be captured on the nest during the incubation period using a wire Potter trap. Trapping typically occurs during the middle two weeks of incubation. During the trapping process, real eggs will be replaced with clay eggs to avoid the potential for egg damage. Once in the trap, adults will be removed by hand, weighed and banded within 10 minutes of capture. Banders will take many safety precautions to minimize disruption of nesting plovers. Attempts to capture adults will occur only after the first week of incubation and during fair weather (temperatures 16°-32°C, (60-90°F), no precipitation). Banders will carefully observe Piping Plover behavior during capture and banding and after release until the bird returns to the nest to incubate.

Piping Plover monitoring following banding will often continue until the returning adult switches incubation duties with its mate. At most sites, nest monitoring will occur every day and will allow detection of any significant negative effects of banding. Monitoring will occur less frequently at nests that are logistically difficult to visit (e.g., island nests) and therefore discerning banding effects at these sites will be more difficult. Following the banding of the chicks, banders will observe Piping Plover families from a distance (at least 100 m (330 ft) depending on the site) to verify that chicks and adults reunite. At most sites, monitors will continue to observe Piping Plover broods frequently until they disappear or fledge.

JOB LOCATION:

Banding activities will occur in all occupied breeding areas in Michigan. Known breeding areas in Michigan occur on Lake Michigan and Lake Huron shores in the Northern Lower and Upper Peninsulas as well as Lake Superior shores in the Upper Peninsula (see Figure 1 under Study 2.1 Location Section). Unhatched eggs and chick and/or adult carcasses will be sent to the U.S. Fish and Wildlife East Lansing Field Office for contaminant or genetic analysis and necropsy.

JOB PERSONNEL:

Job Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

JOB 2.1.2: Nest-site protection.

JOB NEED:

The fine scale approach of protecting each nest from predators during the egg and egg hatching stage needs to be continued to protect as many offspring as possible to continue to expand the population.

JOB OBJECTIVES:

Objective 1. Predator Exclosures

To erect predator exclosures around each known nest within two days of the clutch being completed during the breeding season.

JOB EXPECTED RESULTS OR BENEFITS:

Without predator exclosures, a high proportion of Piping Plover nests would likely be lost to predation from animals such as gulls, crows, opossums, skunks, raccoons, foxes, coyotes and domestic dogs. Predator exclosures reduce one of the primary sources of chick mortality and their use over the past two decades has helped increase Piping Plover hatching and fledging rates. Continuation of their use will help the plover population continue to recover and allow analysis of population dynamics through time based on similar levels of predation threats.

JOB APPROACH:

Approach 1. Predator Exclosures

Staff will construct exclosures to protect eggs from predation. At most nesting sites staff will erect a lower profile mini-exclosure approximately 1 m square and 0.6 m tall of 2"x 4" (5 x 10 cm) galvanized welded mesh to protect each nest before clutch completion. Predator exclosures, similar to those described by Rimmer and Deblinger (1990), will be erected around most nests upon clutch completion. Staff will use three or four corner posts and 50" (15m) of 2" x 4" (5 x 10 cm) galvanized welded mesh to create a large exclosure. The tops of exclosures will be covered with ¾" Bird-X netting or clear 20 lb. test monofilament (strung at intervals of approximately 2"x 4"). After exclosures are erected, pairs will be observed until one bird returns to incubate and often until a pair completes a nest exchange. Nesting areas will be posted with Michigan DNR "Unlawful to Enter" signs, USFWS "Closed Area" signs and/or modified Piping

Plover signs for use on private or township properties. Nesting areas will be closed with psychological fencing (twine and signs) where possible.

JOB LOCATION:

Construction of nest exclosures will occur in all occupied breeding areas in Michigan. Known breeding areas in Michigan occur on Lake Michigan and Lake Huron shores in the Northern Lower and Upper Peninsulas as well as Lake Superior shores in the Upper Peninsula (see Figure 1 under Study 2.1 Location Section).

JOB PERSONNEL:

Job Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

JOB 2.1.3: Resighting and band recovery.

JOB NEED:

Resighting data is needed to assemble pedigrees of individual Piping Plovers, determine intra- and inter-seasonal movements and assess site and mate fidelity. Band recovery data is needed to refine survival estimates and determine the sex-based age structure of the population. Band reports from migration and on the wintering grounds are needed to provide important information on species distribution and habitat use and help track mortality in the non-breeding season.

JOB OBJECTIVES:

Objective 1. Band Report Compilation and Coordination

To annually compile reports and observations from the Great Lakes Basin and into the migration and wintering range during each year of the grant period.

Objective 2. Banded Bird Observations

To observe each banded pair and subsequently their offspring every 1-2 days while they are on the breeding/nesting beaches.

JOB EXPECTED RESULTS OR BENEFITS:

Band reports received during migration and on the wintering grounds will provide important information on species distribution and habitat use and help track mortality during the non-breeding season.

JOB APPROACH:

Approach 1. Band Report Compilation and Coordination

During the non-breeding season, researchers will coordinate band reports and observations throughout the Great Lakes Basin and into the migration and wintering range. These voluntary reports are often submitted to USFWS, which will forward them to the University of Minnesota for entry into the plover population data base.

Approach 2. Banded Bird Observations

Field staff will be responsible for regular visits (once every 1-2 days) to nest sites to collect data on reproductive parameters (e.g., number of eggs laid, number of eggs hatched and number of fledglings that survive to flying stage). This information will be used to calculate productivity. When possible, field staff will record factors that cause or lead to egg, chick or adult mortality.

Plovers will be observed through binoculars or a spotting scope for signs of breeding behavior or nesting activity. Each pair will be monitored periodically from nest initiation (or from when the nest was first located) until the chicks fledge or the pair leaves the site after the nest is destroyed or offspring disappear. As in the past, close communication with landowners and agency personnel will be important for documenting plover movements and fate of chicks before and after fledging. GPS locations of nests will be recorded at time of enclosure construction, banding or after plover families move from their immediate nesting areas.

JOB LOCATION:

Compilation of reports and band data analyses will occur at the University of Minnesota. Observation activities of banded birds will occur in all occupied breeding areas in Michigan. Known breeding areas in Michigan occur on Lake Michigan and Lake Huron shores in the Northern Lower and Upper Peninsulas as well as Lake Superior shores in the Upper Peninsula (see Figure 1 under Study 2.1 Location Section).

JOB PERSONNEL:

Job Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

JOB 2.1.4: DNA sampling, extraction, amplification and sequencing.

JOB NEED:

DNA analyses are needed to determine the genetic diversity of the Great Lakes population in Michigan. These analyses are necessary to determine whether the population has experienced severe genetic bottlenecks and excessive inbreeding which could present challenges to the long-term recovery of the species. It is also necessary to help identify and preserve genetically unique lineages.

JOB OBJECTIVES:

Objective 1. Feather Collection

To collect feather and blood samples from Piping Plovers when they are captured for banding during the breeding seasons in each year of this study.

JOB EXPECTED RESULTS OR BENEFITS:

Greater knowledge of the Great Lakes population genetic structure will inform management strategies aimed at minimization of inbreeding and persistence of genetically unique lineages. Research to date (Roche, University of Minnesota, unpublished data) suggests continued population viability and recent, observed growth may be partly explained by the reproductive success of unbanded adults. The origins of these individuals are currently unknown. If they are immigrants from beyond the Great Lakes, the current view of the population as demographically and genetically 'closed' will be challenged. To date, no research has addressed questions specific to Great Lakes population genetic structure, inbreeding levels or gene flow. Researchers will examine whether the Great Lakes plover population is a closed, randomly mating population by conducting a phylogeographic analysis of microsatellite genotypes and mitochondrial DNA haplotypes sequenced from individuals in the current Great Lakes and Great Plains populations. The research will also: assess the genetic diversity and correlated inbreeding levels of the current Great Lakes population relative to the current Great Plains population and historical Great Lakes population (represented by museum specimens), evaluate the extent of inbreeding depression and establish an origin for unbanded nesting adults.

JOB APPROACH:

Approach 1. Feather Collection

During 2008, field staff will collect feather samples from each banded Great Lakes Piping Plover and blood samples from each unbanded adult Great Lakes Piping Plover according to Federal permit conditions (see USFWS permit issued to University of Minnesota researchers). Samples will be collected incidental to capturing and banding birds as described in Job 2.1.1. Two to three contour feathers or retrices will be collected per adult bird and deposited in a plastic bag or vial (Haig protocol, unpubl., Haig 1988). Two to three contour blood feathers per chick will be removed and placed in a vial (Haig protocol, unpubl., Haig 1988). Microsatellite primers will be developed from Snowy Plover (*Charadrius alexandrinus*) and Mountain Plover (*Charadrius montanus*) sequences published on GenBank. DNA extraction, amplification and sequencing will be performed at the University of Minnesota.

JOB LOCATION:

Samples will be taken from all occupied breeding areas in Michigan. Known breeding areas in Michigan occur on Lake Michigan and Lake Huron shores in the Northern Lower and Upper Peninsulas as well as Lake Superior shores in the Upper Peninsula (see Figure 1 under Study 2.1 Location Section). DNA analyses will be conducted at the University of Minnesota.

JOB PERSONNEL:

Job Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

JOB 2.1.5: Breeding-site productivity and metapopulation modeling.

JOB NEED:

Breeding site productivity is needed to determine whether some sites have higher quality brood-rearing habitat than others and what factors contribute to that quality. This information is needed to make habitat-management and nest-protection recommendations. Metapopulation modeling is needed to predict the effects of a range of different productivity levels at specific nesting sites and ascertain the relative importance of such sites to continued population viability. This analysis is needed to improve recommendations for site-based protection and management strategies and it may also identify sites where protection efforts have low potential for success.

JOB OBJECTIVES:

Objective 1. Breeding-site Productivity

To rank nest-site productivity and offer recommendations for site-specific protection and management to improve productivity.

JOB EXPECTED RESULTS OR BENEFITS:

In recent years, plovers have annually nested at approximately 30 different sites. Multiple pairs use some sites for nesting. Not all sites produce young each year. Site-specific productivity is highly variable and depends on predator diversity and density, Great Lakes water levels and site-related management activities. Productivity is also variable from year to year. We need a solid understanding of productivity at different sites to reliably identify specific protection and management needs. Researchers will use the current database and information collected during this study to evaluate productivity on a site-by-site basis. Additionally, researchers will determine whether chicks hatched at specific sites return more often to breed than those from other sites. This research will help explain the extent to which site quality influences population recovery. Estimates of site-specific productivity will be used to inform a Great Lakes metapopulation model which will project the long-term viability of the population given variable nest-site conditions.

JOB APPROACH:

Approach 1. Breeding Site Productivity

Researchers will use the long-term database and data collected during the study to relate breeding productivity to breeding sites. They will examine productivity on an annual basis as well as determine long-term averages for sites. Additionally, they will determine whether birds return from specific nesting locations at a greater rate than from other sites. If so, this will suggest that some sites have higher-quality brood-rearing habitat than others. Researchers will also develop site productivity as a layer in the Great Lakes Piping Plover population GIS database so that visual products can be produced. This information will be used to rank sites in terms of long-term productivity and variability. We expect some sites will have a consistent history of high productivity, others will be mixed and another group will show consistently low productivity. Researchers will conduct metapopulation modeling to predict the effects of a range of different productivity levels at specific nesting sites and ascertain the relative importance of such sites to continued population viability. This analysis will improve recommendations for site-based protection and management strategies and it may also identify sites where protection efforts have low potential for success.

JOB LOCATION:

Data compilation, analyses and modeling activities will take place at the University of Minnesota.

JOB PERSONNEL:

Job Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

JOB 2.1.6: Preparation of final report.

JOB NEED:

This job reserves the time and other resources to prepare a report of the findings. The findings are needed by the agency to address the needs of this study. The report will serve to disseminate the findings to the appropriate field personnel for use in management decisions. Additionally, the report will be disseminated to other state and federal agencies so that they may benefit from the findings. The final report and a performance report on accomplishments at the study level are required by implementation guidance of Federal Assistance provided by the USFWS.

JOB OBJECTIVES:

Objective 1. Final report

To prepare a final report containing the findings of this study, including management recommendations and implications, and disseminate to appropriate staff and cooperators at the completion of this study.

Objective 2. Annual performance report

To prepare and submit a performance report annually comparing work planned by study objective with actual accomplishments. The report will also include a comparison of the total estimated expenditures planned with an estimate of the total expenditures incurred.

JOB EXPECTED RESULTS OR BENEFITS:

This job will make the results of this study available to field staff, management practitioners, other agencies and organizations as necessary to ensure the management implications and recommendations resulting from this study are incorporated into management activities. This job will also ensure the federal assistance requirements for reporting are met and will provide accountability that funds are being spent correctly.

JOB APPROACH:

Approach 1. Final report

A final report will be submitted to USFWS at the completion of this study or project. This report will provide notice to the federal grant administrator that the project or study is concluded, no further work will be conducted after this point. This report will serve as the record of accomplishments that provides a summation of the findings and conclusions for the entire project or study. This report will include:

- Identification of the research effort that will show state, project/study title and number and period covered.
- A creditable report of the results of the research.
- A description of how the results will be used that will include management implications and guidelines.
- A signature of responsible state official

The purpose of this report is to provide the following deliverables to be used to advance Piping Plover management:

- Estimates of adult and juvenile survival and sex-specific population age structure.
- A preliminary progress report on the first-year of genetic analysis (A final report will be provided upon completion of the multi-year project).
- Ranking of nest-site productivity and recommendations for site-specific protection and management to improve productivity.
- Model results of years needed to recover the population (100 breeding pairs in Michigan, 50 pairs in other Great Lakes states/Ontario).

Approach 2. Annual performance report

Within 90 days from the end of the annual anniversary of this study a performance report will be submitted to the UFWFS. The performance report will document the accomplishments by study objective for that year. The accomplishments will be compared with the planned work set forth in the grant segment. Any slippages of ten percent or greater will be explained. Estimated total expenditures by study objective will also be reported. These too will be compared with the planned expenditures set forth in the grant segment. Any slippages of ten percent or greater will be explained. Should the grant segment last for more than one year, the requirement for an interim performance report (due 90 days after one calendar year from the start of the agreement period) may be requested to be waived in the grant segment.

JOB LOCATION:

Activities supported under this job may occur at Wildlife Division offices in Lansing, MI and at University of Minnesota offices in Minnesota.

JOB PERSONNEL:

Job Leader

Sherry MacKinnon
Acting Endangered Species Coordinator
Wildlife Division
(517) 373-3337

REFERENCES AND LITERATURE CITED:

- Cuthbert, F.J. and E.A. Roche. 2007. Piping plover breeding biology and management in the state of Michigan. Michigan Department of Natural Resources, Lansing, MI.
- Dingledine, J, F. Cuthbert, and J. Stucker. 2005. Great Lakes piping plover banding program summary and status report. Draft report, U.S. Fish and Wildlife Service, East Lansing, MI.
- Lincoln, F. C. 1947. Manual for Bird Banders. U.S. Fish and Wildlife Service.
- U.S. Fish and Wildlife Service. 1985. Determination of endangered and threatened status for the piping plover. Federal Register 50:50720.
- Rimmer, D. W. and R. D. Deblinger. 1990. Use of predator exclosure to protect Piping Plover nests. Journal of Field Ornithology 61(2):217-223.
- Wemmer, L.C., U. Özesmi, and F. J. Cuthbert. 2001. A habitat-based model for the Great Lakes population of the piping plover (*Charadrius melodus*). Biological Conservation 99:169-181.

APPENDIX A: Segment 1 Accomplishment and Budget Detail for the Expenditure Period 1
October 2007 through 30 September 2009

SUMMARY:

This amendment adds a second year of funds to the previously approved Segment 1. This Segment includes two Project Statements to provide support for restoring and managing prairie fen habitat and research on Piping Plover population dynamics and nesting habitat selection. No new funds are being added to the first Project Statement. The planned accomplishments and estimated costs for prairie fen restoration and maintenance are as originally submitted to support activities during fiscal year 2008 only. Funds and accomplishments are being added to the second Project Statement for Piping Plover research. The activities conducted for each Project Statement are detailed in the grant proposal. The planned accomplishments and estimated costs by objectives for this Segment are listed in the table below.

PLANNED ACCOMPLISHMENTS AND ESTIMATED COSTS BY PROJECT STATEMENT OBJECTIVES:

Project Statement and Objectives	Planned Accomplishments	Reporting Units	Estimated Cost ¹
Restoration, enhancement and management of prairie fens Southern Michigan to aid in recovery of Mitchell's satyr, eastern massasauga rattlesnakes and associated species.			
1. Prairie Fen Restoration	5	Acres restored	\$4,200
2. Prairie Fen Enhancement and Management	30	Acres maintained	\$20,320
Project Statement Total:			\$24,520

Project Statement, Study, and Objectives	Jobs to be Conducted	Estimated Cost ¹
Research and recovery of the Great Lakes Piping Plover population. Study 2.1. Population dynamics, genetic diversity and nest-site productivity research on Great Lakes Piping Plovers in Michigan.		
1. Population Data	2.1.1-2.1.3, 2.1.6	\$123,444
2. Genetic Analysis	2.1.4, 2.1.6	\$18,489
3. Comparative Breeding-site Productivity Analysis	2.1.5, 2.1.6	\$16,488
Project Statement Total:		\$158,421

Segment Total:	\$182,941
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¹The costs provided are for grant evaluation purposes only. These values will not be included in Financial Status Reports nor are they subject to financial audits. Actual grant expenditure tracking with supporting documentation necessary for audit purposes will not be maintained by the Department at the objective level. All financial tracking and reporting for the purposes of audits is at the grant level only.

BUDGET SUMMARY: Expenditure Period: 1 October 2007 – 30 September 2009

Salaries and Wages	\$16,606
Fringe Benefits (38%)	\$6,310
Salary Sub-total	\$22,916
Indirect Rate (18.11%)	\$4,150
Total Salaries	\$27,066
Contracts	\$139,182
Travel	\$14,000
Equipment	\$0
Supplies, Services and Materials	\$2,000
Project Sub-total	\$182,248
Indirect for Audit (0.38%)	\$ 693
TOTAL COST	\$182,941
Federal Share:	\$137,206
Other Share:	\$0
State Share:	\$45,735

SEGMENT CONDITIONS REQUEST

1. MNDR requests that expenditures for Segment 1 not be subject to the prior written approval requirements of 43 CFR 12.70(c)(1)(ii), the “10 percent rule.”

REGION 3 FEDERAL ASSISTANCE SECTION 7 DOCUMENTATION

PHASE I: COMPLETED BY GRANTEE

(See Phase I Instructions for completing this form)

For federal assistance programs administered by the USFWS (Division of Federal Assistance)

State: Michigan

Grantee: Natural Resources

Grant Program(s): Cooperative Endangered Species Conservation Fund

Grant Proposal (GP), GP Amendment, Grant Segment (GS), GS Amendment

Title and Number (add amendment no.): Michigan's Cooperative Endangered Species Program: E-20-1 Amendment 1

I. Species/Critical Habitat: List species or critical habitat (or attach list) that are and/or may be present within the action area.

There are 22 species in Michigan on the Federal List of Threatened and Endangered Species (see attached table). These include 14 animal species and 8 plant species. In addition, the eastern massasauga rattlesnake and rayed bean mussel are candidates for listing and will be taken into consideration during the proposed implementation activities. This form also considers potential impacts to gray wolf in the event it is relisted as threatened or endangered. The only designated critical habitat in Michigan is for Piping Plover (see attached figure) and gray wolf on Isle Royale (if gray wolf is relisted). This form also considers potential impacts to the currently proposed Hine's emerald dragonfly critical habitat.

This amendment to the Grant Proposal and Segment 1 is to extend the Segment period through fiscal year 2009 and add additional funds to continue Piping Plover research and nest site protection. No additional funds are being added to conduct activities for the restoration and management of prairie fens. Consequently, no work in prairie fens will be conducted under this amendment other than what had already been approved and completed during fiscal year 2008.

II. Description of Proposed Action: Describe the action(s) in sufficient detail so that the potential effects of the action can be identified and fully evaluated.

PROJECT 1: Restoration, enhancement, and management of prairie fens in Southern Michigan to aid in recovery of Mitchell's satyr, eastern massasauga rattlesnakes, and associated species

No activities will occur on any of the objectives for this Project Statement under this amendment.

PROJECT 2: Research and Recovery of the Great Lakes Piping Plover Population

There are no changes to the previously approved activities supported by this Project Statement. This amendment only adds an additional year of support to the field work necessary to complete the research. All other aspects remain exactly as previously approved.

Population Data

To continue important population demographic studies of the Great Lakes Piping Plover (*Charadrius melodus*), field staff will capture and band adults and chicks during the breeding season according to Federal and State permit protocols. Resighting data will be used to assemble pedigrees of individual Piping Plovers, determine intra- and inter-seasonal movements, and assess site and mate fidelity. Band recovery data will be used to refine survival estimates and determine the sex-based age structure of the

population. Banding activities will occur throughout the breeding range of the Great Lakes population to the extent that permits and travel schedules allow. During the non-breeding season, researchers will coordinate band reports and observations throughout the Great Lakes Basin and into the migration and wintering range. Field staff will be responsible for regular visits (once every 1-2 days) to nest sites to collect data on reproductive parameters (e.g., number of eggs laid, number of eggs hatched, and number of fledglings that survive to flying stage). This information will be used to calculate productivity. When possible, field staff will record factors that cause or lead to egg, chick or adult mortality. Unhatched eggs and chick and/or adult carcasses will be collected under Federal and State permit protocols and sent to the U.S. Fish and Wildlife East Lansing Field Office for contaminant or genetic analysis and necropsy. Staff will also construct exclosures to protect eggs from predation at all nest sites in the study area.

Genetic Analysis

Field staff will collect feather samples from each banded Great Lakes Piping Plover and blood samples from each unbanded adult Great Lakes Piping Plover according to Federal and State protocols. Developing feathers (i.e., blood feathers) will be collected from Piping Plovers during banding. Incubating adults will be trapped using a single-chamber Potter trap. During trapping, eggs will be replaced with ceramic replicas as a precaution against breakage. Two to three contour feathers or retrices will be collected per adult bird and deposited in a plastic bag or vial. Chicks will be hand-caught prior to fledging. Two to three contour blood feathers per chick will be removed and placed in a vial. Microsatellite primers will be developed from snowy plover (*Charadrius alexandrinus*) and mountain plover (*Charadrius montanus*) sequences published on GenBank. DNA extraction, amplification and sequencing will be performed.

Comparative Breeding-site Productivity Analysis

Researchers will use a long-term database and data collected during the study to relate breeding productivity to breeding sites. They will examine productivity on an annual basis as well as determine long-term averages for sites. Additionally, they will determine whether birds return from specific nesting locations at a greater rate than from other sites. Researchers will also develop site productivity as a layer in the Great Lakes Piping Plover population GIS database so that visual products can be produced. This information will be used to rank sites in terms of long-term productivity and variability. Researchers will conduct metapopulation modeling to predict the effects of a range of different productivity levels at specific nesting sites and ascertain the relative importance of such sites to continued population viability. This analysis will improve recommendations for site-based protection and management strategies and it may also identify sites where protection efforts have low potential for success.

III. Description of Effects: Describe the effects, including beneficial, of the project actions on Species/Critical Habitat.

PROJECT 1: Restoration, enhancement, and management of prairie fens Southern Michigan to aid in recovery of Mitchell's satyr, eastern massasauga rattlesnakes, and associated species

No activities will occur on any of the objectives for this Project Statement under this amendment.

PROJECT 2: Research and Recovery of the Great Lakes Piping Plover Population

Pitcher's thistle, dwarf lake iris, Houghton's goldenrod and Piping Plover may occur within the action area. With the exception of Piping Plover, the project will have no effect on any of these species. The project does not impact individuals or habitat of those plant species. Care will be taken to avoid trampling the species during plover-related work.

All Piping Plover activities conducted under this project are designed to benefit Piping Plover and are detailed in the Piping Plover Great Lakes Population Recovery Plan. Protection of nests involves the placement of predator exclosures over nests, which can cause temporary disturbance of nesting adults. These exclosures, however, are constructed by trained and experienced crews and adults are off the nests for less than 15 minutes. All nests will be monitored after exclosures are constructed to ensure the

adults can and do return to the nest and continue incubating. Many years of data show that the vast majority of birds are not adversely affected, yet the possibility exists that nest abandonment could occur. Nest protection has resulted in a positive population benefit by decreasing the frequency of nest depredation and increasing the frequency of egg hatching.

The Piping Plover banding activity has the potential to adversely impact individuals that are captured either through trauma from the capture or from the bands themselves. Although adverse impacts may occur to individuals, this activity has been ongoing for several years with funding from Federal Endangered Species Section 6 accounts. Banding activities have been a critical part of the recovery efforts for Piping Plovers. Several of the recovery tasks listed in the Recovery Plan for the Great Lakes Piping Plover cannot be completed without banding activities. Previous banding activities have helped in determining wintering grounds, nest-site fidelity of nesting pairs and their offspring, and mixing of Great Lakes and Northern Great Plains populations, population expansion, and they have facilitated the development of a pedigree of the current population and pair bonding. This information has been essential in understanding the dynamics of the Great Lakes plover population. Similarly, collecting feathers and blood for genetic analysis also has the potential to injure or kill animals, but the risks are considered to be small, and application of the resulting information will enhance recovery of the species.

Piping plover critical habitat occurs within the action area. However, no habitat will be modified due to actions conducted under this grant; thus, there will be no effect on Piping Plover critical habitat.

IV. 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

a) *“No Effect”*

List species for which this recommendation is applicable (or attach list): All listed and candidate species except Piping Plover.

b) *“May Affect, but is Not Likely to Adversely Affect”*

List species for which this recommendation is applicable (or attach list): _____

c) *“May Affect, and is Likely to Adversely Affect”*

List species for which this recommendation is applicable (or attach list): Piping Plover.

B. Designated and Proposed Critical Habitat

a) *“No Effect”* to Critical Habitat

List critical habitat(s) for which the recommendation is applied. All designated and 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: Stephen Beyer

Signature:  _____ Date: 08/13/2008

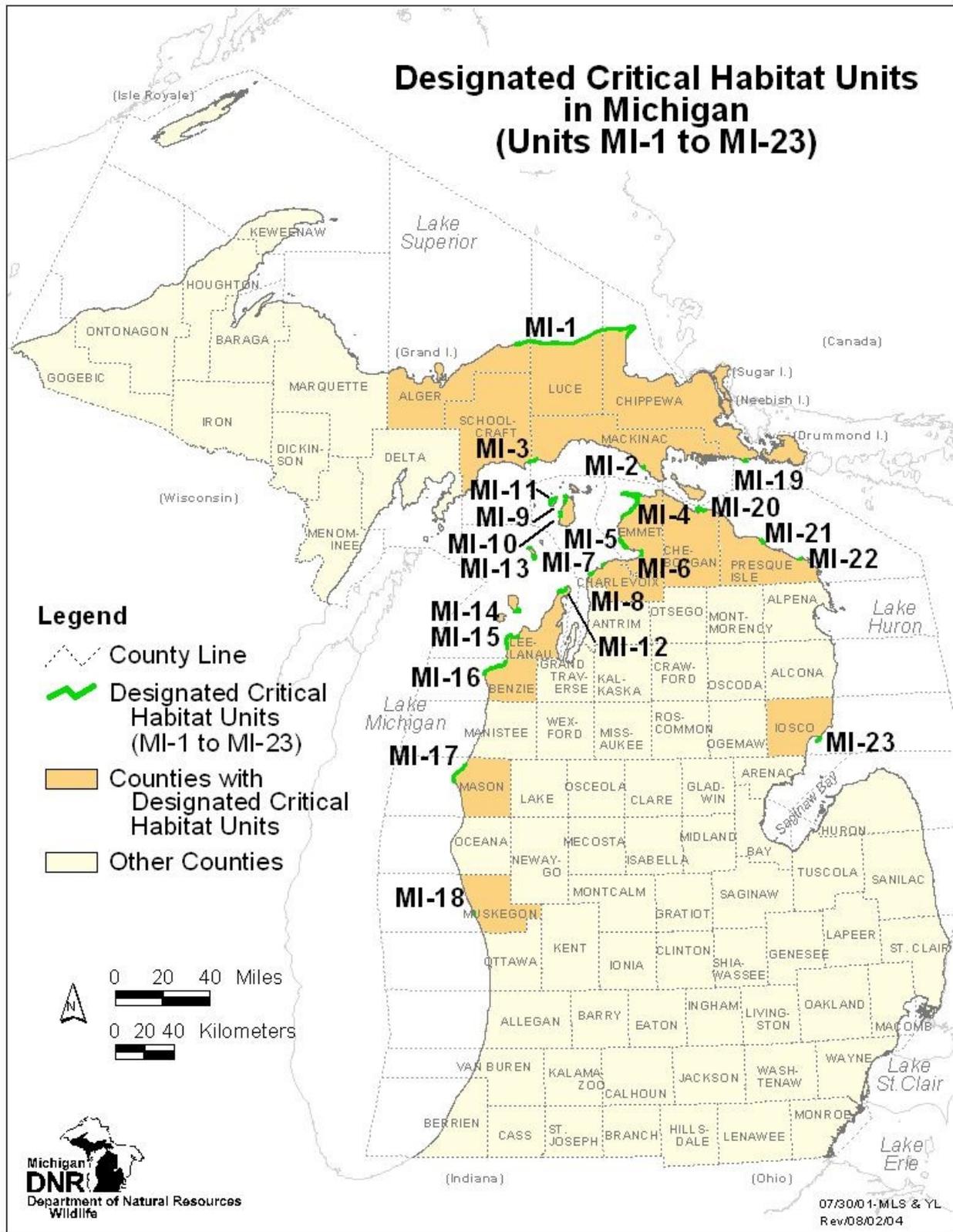
Telephone No. (517) 241-3450 email: beyersm@michigan.gov

**FEDERALLY LISTED THREATENED, ENDANGERED AND CANDIDATE SPECIES
IN MICHIGAN**

Scientific Name	Common Name	Federal Status
Plants		
<i>Asplenium scolopendrium americanum</i>	American Hart's-tongue	Threatened
<i>Cirsium pitcheri</i>	Pitcher's Thistle	Threatened
<i>Hymenoxys herbacea</i>	Lakeside Daisy	Threatened
<i>Iris lacustris</i>	Dwarf Lake Iris	Threatened
<i>Isotria medeoloides</i>	Small Whorled Pogonia	Threatened
<i>Mimulus glabratus michiganensis</i>	Michigan Monkey-flower	Endangered
<i>Platanthera leucophaea</i>	Eastern Prairie Fringed Orchid	Threatened
<i>Solidago houghtonii</i>	Houghton's Goldenrod	Threatened

Animals		
<i>Myotis sodalis</i>	Indiana Bat	Endangered
<i>Lynx canadensis</i>	Canada Lynx	Threatened
<i>Puma [Felis] concolor</i>	Eastern Puma	Endangered
<i>Charadrius melodus</i>	Piping Plover	Endangered
<i>Dendroica kirtlandii</i>	Kirtland's Warbler	Endangered
<i>Epioblasma obliquata perobliqua</i>	White Catspaw Mussel	Endangered
<i>Pleurobema clava</i>	Clubshell Mussel	Endangered
<i>Epioblasma torulosa rangiana</i>	Northern Riffleshell	Endangered
<i>Nerodia erythrogaster neglecta</i>	Copperbelly Water Snake	Threatened
<i>Sistrurus catenatus catenatus</i>	Eastern Massasauga Rattlesnake	Candidate
<i>Somatochlora hineana</i>	Hine's Emerald Dragonfly	Endangered
<i>Nicophorus americanus</i>	American Burying Beetle	Endangered
<i>Brychius hungerfordi</i>	Hungerford's Crawling Water Beetle	Endangered
<i>Lycaeides melissa samuelis</i>	Karner Blue Butterfly	Endangered
<i>Neonympha mitchellii mitchellii</i>	Mitchell's Satyr Butterfly	Endangered
<i>Villosa fabalis</i>	Rayed Bean	Candidate

Figure 1: Piping Plover designated critical habitat in Michigan.





Michigan Department of Natural Resources
Findings of NEPA Compliance for Federal Assistance
Grant Approval Action

August 13, 2008

Dear Mr. Bryant:

The Michigan Department of Natural Resources is requesting approval of the Select one - AFA and Grant Proposal Narrative/AFA Amendment/Proposal Narrative Amendment/Amendments to both AFA and Proposal Narrative for the following federal assistance grant:

Federal ID: E-20-1 Amendment Number: 1 for Segment 1

Grant Name: Michigan's Cooperative Endangered Species Program

This document has been prepared to serve as part of the administrative record for compliance with the National Environmental Policy Act (NEPA). Concerning the federal action requested above, I have reviewed the actions included in this grant for NEPA compliance and have found that the activities supported by this grant:

- Will not have a significant impact on the quality of the human environment and are completely covered by the following categorical exclusion(s) 1.5 in Appendix 1 to 516 DM Chapter 2 and/or 1.4B(1-6) in 516 DM Chapter 8.5. The definitions of the categorical exclusions used are as follows:

516 DM 2, Appendix 1 – Department of the Interior Categorical Exclusions revised in the Federal Register: March 8, 2004 (Volume 69, Number 45)

1.5 Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.

516 DM 8.5 – US Fish and Wildlife Service Categorical Exclusions – Effective Date 5/27/2004

1.4B(1) Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources which involve negligible animal mortality or habitat destruction, no introduction of contaminants, or no introduction of organisms not indigenous to the affected ecosystem.

1.4B(2) The operation, maintenance, and management of existing facilities and routine recurring management activities and improvements, including renovations and replacements which result in no or only minor changes in the use, and have no or negligible environmental effects on-site or in the vicinity of the site.

1.4B(3) The construction of new, or the addition of, small structures or improvements, including structures and improvements for the restoration of wetland, riparian, instream, or native habitats, which result in no or only minor changes in the use of the affected local area. The following are examples of activities that may be included.

- (a) The installation of fences.
- (b) The construction of small water control structures.
- (c) The planting of seeds or seedlings and other minor revegetation actions.
- (d) The construction of small berms or dikes.
- (e) The development of limited access for routine maintenance and management purposes.

1.4B(4) The use of prescribed burning for habitat improvement purposes, when conducted in accordance with local and State ordinances and laws.

1.4B(5) Fire management activities, including prevention and restoration measures, when conducted in accordance with Departmental and Service procedures.

1.4B(6) The reintroduction or supplementation (e.g., stocking) of native, formerly native, or established species into suitable habitat within their historic or established range, where no or negligible environmental disturbances are anticipated.

Additionally, none of the following extraordinary circumstances applies that would disallow the use of the Categorical Exclusions listed above:

1. Have significant impacts on public health or safety.
2. Have significant impacts on such natural resources and unique geographic characteristics as historic or cultural resources; park, recreation or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands (Executive Order 11990); floodplains (Executive Order 11988); national monuments; migratory birds; and other ecologically significant or critical areas.
3. Have highly controversial environmental effects or involve unresolved conflicts concerning alternative uses of available resources [NEPA Section 102(2)(E)].
4. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks.
5. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects.
6. Have a direct relationship to other actions with individually insignificant but cumulatively significant environmental effects.
7. Have significant impacts on properties listed, or eligible for listing, on the National Register of Historic Places as determined by either the bureau or office.
8. Have significant impacts on species listed, or proposed to be listed, on the List of Endangered or Threatened Species, or have significant impacts on designated Critical Habitat for these species.
9. Violate a Federal law, or a State, local, or tribal law or requirement imposed for the protection of the environment.
10. Have a disproportionately high and adverse effect on low income or minority populations (Executive Order 12898).

11. Limit access to and ceremonial use of Indian sacred sites on federal lands by Indian religious practitioners or significantly adversely affect the physical integrity of such sacred sites (Executive Order 13007).
12. Contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or actions that may promote the introduction, growth, or expansion of the range of such species (Federal Noxious Weed Control Act and Executive Order 13112).

However, one or more Extraordinary Circumstances applies and consequently an EA/EIS will be completed.

Are not completely covered by Categorical Exclusions and an EA/EIS will be completed.

Are completely covered by and will be conducted in accordance with the selected alternative of the following approved and published Environmental Assessment with a corresponding Finding of No Significant Impact (FONSI): _____

Are completely covered by and will be conducted in accordance with the selected alternative approved and published in the following EIS: _____

MDNR requests concurrence with our finding and recommends USFWS adopt this finding to serve as the administrative record of compliance with the spirit and intent of NEPA.

Prepared by:  Date: 08/13/2008
 Stephen Beyer, Wildlife Division Federal Aid Coordinator

USFWS Federal Assistance Concurrence	Federal Assistance Program Staff	Date: _____
	Federal Assistance Chief	Date: _____