



**Oak Savanna, Pine Barrens and Jack Pine Forest
Restoration in Michigan and Ohio for Species of
Greatest Conservation Need
2012—2014**

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Michigan Natural Features Inventory
Report No. 2014-14

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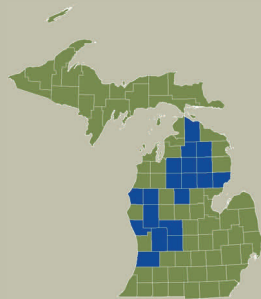
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MICHIGAN NATURAL FEATURES INVENTORY

COMPETITIVE SWG FINAL REPORT



Counties where surveys
or monitoring occurred.



HIGHLIGHTS

- Total of 55 sites surveyed
- Surveys conducted in 17 counties.
- 29 new or updated EO records.
- Partnered with 13 different landowners.



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Introduction

In 2010, Michigan Department of Natural Resources Wildlife Division (WLD) submitted a proposal to the United States Fish and Wildlife Service State Wildlife Grant Program to identify and manage oak and oak-pine barrens and jack pine barrens and forests for the federally endangered Kirtland's warbler (*Dendroica kirtlandii*), federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*), and 118 other species identified by the WLD as species of greatest conservation need (SGCN), in addition to several game species such as white-tailed deer (*Odocoileus virginianus*) and wild turkey (*Meleagris gallopavo*).

These savanna and barrens habitats and the species that depend on them are particularly vulnerable due to previous exploitation and conversion to agriculture and development, fire suppression leading to the development of forest, and the preponderance of these habitats, at least regionally, on private land. The goal of this proposal was to restore or enhance 400 hectares (1,000 acres) of oak savanna, pine barrens, and jack pine forest over the course of three years to benefit the aforementioned species.



Photo provided by Brad Slaughter

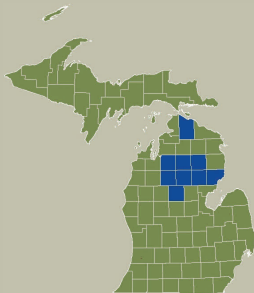
Discussion of pine barren habitats with partner groups. 2012.

To assist the WLD with these project goals, Michigan Natural Features Inventory (MNFI) staff implemented a multi-pronged monitoring approach to assess the various impacts of habitat management activities on ecological structure and populations of rare, threatened, and endangered species. Among these strategies were the establishment of permanent photo monitoring points to document changes in vegetation structure associated with management (or lack of management), meander surveys for rare species, distance surveys and meander surveys for Karner blue butterfly at key sites, and singing male counts and occupancy surveys for Kirtland's warbler in northern Lower Michigan. The following write-ups document our project activities between 2012—2014.

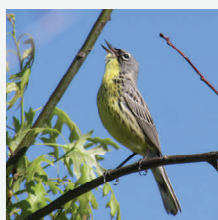


MICHIGAN NATURAL FEATURES INVENTORY

COMPETITIVE SWG FINAL REPORT



Multiple counties,
Northern Lower Michigan



HIGHLIGHTS

- 30 sites surveyed.
- Partnered with DNR, FWS, and NGOs.
- Surveys conducted in nine counties.



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Kirtland's Warbler Monitoring

Over the course of three years, MNFI participated in annual singing male surveys (2012, 2013) and occupancy surveys (2014) for Kirtland's warbler (*Dendroica kirtlandii*) in northern Lower Michigan. Singing male surveys occurred under the supervision of Michigan DNR Wildlife Division personnel. Singing male surveys were conducted at 10 survey sites in six counties (Clare, Crawford, Missaukee, Ogemaw, Oscoda, and Roscommon) over the course of two years; and occupancy surveys were conducted at 20 sites in five counties in 2014. During singing male surveys, MNFI staff conducted a total of 16 survey transects over the course of two years.

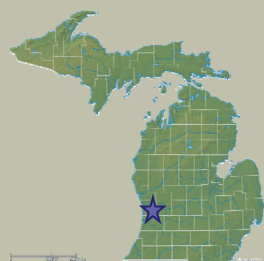
Since the Kirtland's warbler recovery plan was developed in 1976, singing male counts have been conducted annually. Because of the effectiveness of habitat management of jack pine barrens for Kirtland's warbler conducted by the Michigan DNR, in 2014 it was determined that broad scale singing male counts were no longer needed across the entirety of the warbler's range due to the consistent increase in the Kirtland's warbler population. MNFI took part in this change by assisting with occupancy surveys of Kirtland's warbler. This change in methodology allowed for a greater number of sites to



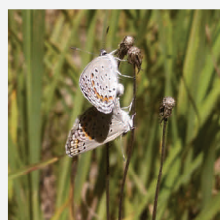
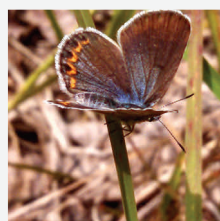
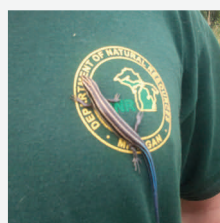
Male Kirtland's warbler in managed jack pine habitat. 2013.

be surveyed in a shorter time period. Occupancy survey sites were selected by DNR personnel based on relative suitability for the warblers. Young stands, approximately four to five years old that had previously not been occupied, and old stands, greater than twenty years old, were selected to determine if warblers were currently using them for breeding purposes.

The effective management of jack pine barrens has not only positively impacted the Kirtland's warbler, but also many other game and non-game species. White-tailed deer are provided with improved winter cover in managed jack pine stands and sub-canopy plant species provide good forage during the spring and summer. Increased winter survival, in turn, provides for more hunting opportunities in surrounding areas. Spruce grouse (*Falcipennis canadensis canadensis*; state special concern) may also benefit in managed jack pine stands with improved cover and foraging in man-made openings.



T02N, R14W, Secs. 27 & 28
T02N, R15W, Sec. 11



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Allegan State Game Area

During 2013 and 2014, two separate sites in the Allegan SGA were surveyed for Karner Blue Butterfly (*Lycaeides melissa samuelis*) using the distance sample method. Horseman's North (T02N, R15W, Sec. 11) and 42nd Ave (T02N, R14W, Secs. 27 & 28) both have historically supported substantial KBB populations, and butterflies were detected at both sites both years.

Horseman's North (A8)

This is an approximately 50 acre site which is very open and dominated by Pennsylvania sedge (*Carex pensylvanica*) with interspersed pockets of black cherry (*Prunus serotina*) and oaks (*Quercus* spp.) mostly along the edges of the site. There is a single campsite in the northwest corner of the site with a two-track leading through it. Many KBB were found along the two track, often nectaring on the spotted knapweed (*Centaurea stoebe*) that dominates the margins. In addition to the two-track, the many horse trails that run through the site also support spotted knapweed along their margins. KBB were often seen nectaring in these edgy micro-habitats as well. The area along 120th Ave. (the southern boundary of the site) is forested with oak. However, there is one opening along the road that supports the majority of butterflies found at this site. This opening provides many nectar sources, including spotted



Photo by Brad Slaughter

Male Karner blue butterfly. 2013.

knapweed, wild lupine (*Lupinus perennis*), butterfly weed (*Asclepias tuberosa*), and rough blazing star (*Liatris aspera*), among others.

There are 19 established transects on this site, and surveys for KBB were conducted weekly until the flight ended. In 2013 and 2014 four and five weeks of surveys were conducted, respectively. Total numbers were higher in 2014, with a high of six and 79 in one day in 2013 and 2014, respectively. Total number of KBB observed throughout the flight in 2013 was 11 and 146 in 2014.

42nd Ave (A4)

This is an approximately 60 acre site which is much more wooded than the previous site. Both the overstory and the shrub layer are dominated by oak. Within is a matrix of smaller openings, generally associated with ant mounds. The majority of wild lupine is found within these openings, and at the margins of the forested area, although some

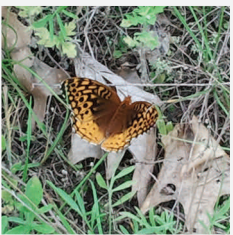


plants are also found in more shady areas. The majority of KBB were observed in a large opening along 42nd Ave, which dissects the site. This opening is much larger than the smaller openings found within the forest matrix. Plants found within this opening include lupine, sand coreopsis (*Coreopsis lanceolata*), rough blazing star, wild bergamot (*Monarda fistulosa*), spotted knapweed, and little bluestem (*Schizachyrium scoparium*), among others.

This site has 25 established transects, and following distance sampling protocol, surveys were conducted weekly until the flight ended. In 2013 and 2014 three and five weeks of surveys were conducted, respectively. Total numbers were higher in 2014, with a high of 16 and 58 in one day in 2013 and 2014, respectively. Total number of KBB observed throughout the flight in 2013 was 21 and 120 in 2014.

Woodcock have a major presence here and are frequently flushed upon traversing the forest and openings.

The nature of the forest matrix at this site allows for a multitude of species to thrive. American woodcock (*Scolopax minor*) have a major presence here and were frequently flushed upon traversing the forest and openings. Discussions with local residents passing by convey an interest in upland game bird and small mammal hunting in the area. White-tailed deer are commonly observed, along with a multitude of other species, including various woodland and grassland song birds, such as scarlet tanager (*Piranga olivacea*), and indigo bunting (*Passerina cyanea*), as well as a variety of warbler species indicative of both wooded and open landscapes.



HIGHLIGHTS

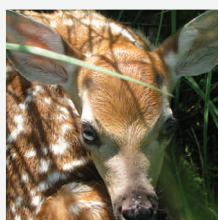
- Distance sampling done at two sites.
- 298 total KBB observed over two years.
- 110 acres surveyed

Photo by Becky Norris





T12N, R16W, Sec. 10
Newaygo County



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Clawson Property

This privately owned 36 acre site is located in T12N, R16W in Newaygo County, approximately 5 miles east of the city of Newaygo. It is a relatively open, secondary (previously tilled) dry sand prairie site with a few large oaks and pines within. The dominant vegetation is northern dewberry (*Rubus flagellaris*), Pennsylvania sedge (*Carex pensylvanica*), June grass (*Koeleria macrantha*), wild lupine (*Lupinus perennis*), rough blazing star (*Liatris aspera*), spotted knapweed (*Centaurea stoebe*), prickly pear (*Opuntia humifusa*), black-eyed susan (*Rudbeckia hirta*), and horse mint (*Monarda punctata*).

The site has previously been managed by The Nature Conservancy (TNC). Management consisted of prescribed burns, spot burning of invasive plant species, maintenance of a deer enclosure, and seed collection. In recent years, however, the intensity of TNC's management at this site has subsided.

The majority of the monitoring that occurred on this site was Karner blue butterfly (*Lycaeides melissa samuelis*) distance sampling. There are 14 established transects and distance sampling was conducted from 2012-2014 weekly during the second flight. Consistent with other sites, the number of KBB observed at the Clawson property in 2014 was dramatically higher than in the



Photo by Becky Norris

Author participating in a prescribed fire at the Clawson Property. 2006.

previous two years. For the years 2012-14, 20, 32, and 128 were the total number of KBB observed over the course of the flight, respectively. In 2012, four weekly surveys were conducted, followed by five in 2013, and six in 2014.

Along with KBB distance sampling, rare plant surveys were also conducted at this site, resulting in updates of the MNFI records for the state threatened prairie-smoke (*Geum triflorum*) and state special concern false boneset (*Brickellia eupatorioides*)



T09N, R08W, Secs. 03 & 27
Montcalm and Ionia
Counties



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Flat River State Game Area

The Flat River SGA historically has had multiple sites that supported Karner blue butterfly (*Lycaeides melissa samuelis*), and while some of these areas are no longer active, there are several sites with substantial populations. Distance sampling was conducted at two sites within the SGA, and occupancy surveys were conducted at historically occupied sites. Rare plant surveys were also conducted at several sites within the SGA.

Snows Lake Road Karner Trail (F4)

This 30 acre site is located in T09N, R08W, sec. 27 in Montcalm County. It is predominantly wooded with several openings toward the east end of the site. The two eastern most transects run along a powerline corridor, and it is in this area that the majority of KBB were observed. Wild lupine (*Lupinus perennis*) occurs in pockets within the corridor, along with butterfly weed (*Asclepias tuberosa*), big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), common spiderwort (*Tradescantia ohiensis*), rough blazing-star (*Liatris aspera*), and northern dewberry (*Rubus flagellaris*), along with autumn olive (*Elaeagnus umbellata*) and spotted knapweed (*Centaurea stoebe*). Ant mounds are a noticeable feature at this site, and most certainly play a role in maintaining openings within the forest. Distance sampling for KBB was



Ant mound at Flat River State Game Area. 2009.

conducted at this site in 2012 with 18 butterflies observed over a four week period. All but two of these butterflies were observed in the power line corridor.

Ranney Road Megasite (F5)

This site is located in T08N, R08W, sec. 03 in northern Ionia County. It is the most densely KBB- populated site within the Flat River SGA. At approximately 30 acres, this site also runs along a powerline corridor. The powerline marks the southern boundary of the site and 24 established transects run perpendicular to the corridor, with most of the transects also going into the wooded area north of the powerline. Within this wooded area, there are multiple several-acre sized openings, along with a number of smaller openings, as well. Most of these openings are occupied by KBB, as is the power line corridor. The plant community of this site is similar to that of the Snows Lake Road site. Spotted knapweed, butterfly weed, common spiderwort, big and little



bluestem and wild bergamot dominate the herbaceous layer of the open areas. Additionally, hazelnut (*Corylus americana*) and small black cherry (*Prunus serotina*) trees comprise most of the shrub layer within open areas. The wooded component of the site is mostly oak and cherry with white pine (*Pinus strobus*) mixed in, as well as a several acre planted red pine (*Pinus resinosa*) stand. The soils are sandy and well drained with some bare ground exposed within the openings.

MNFI staff conducted distance sampling for KBB at this site in 2014 only. Six weeks of surveys were conducted and a total of 296 KBB were observed over the course of the second flight period. Week 2 yielded the highest KBB observed in one day with 127 KBB observed.

Ant mounds are a noticeable feature at this site, and most certainly play a role in maintaining openings within the forest.

Other activities

Rare plant surveys were conducted at both KBB distance survey sites in 2012. Prairie buttercup (*Ranunculus rhomboides*) was observed at both Snows Lake Road and Ranney Road. These two sites support two of the most viable documented populations of the species remaining in Lower Michigan.

Seven historic KBB sites were surveyed for occupancy during the second flight in 2013. The majority of these sites have undergone major hydrologic or plant community changes and no longer provide suitable habitat for KBB. At two sites, wild lupine was noted, but no KBB were observed at any of the historically occupied sites.



HIGHLIGHTS

- KBB distance sampling at two sites
- 314 total KBB observed.
- Two plant EOs updated.
- 150 acres surveyed.

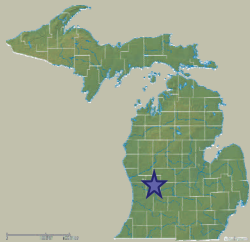


Photo by Becky Norris

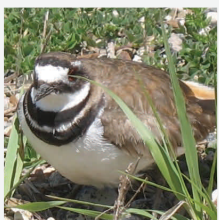


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T09N, R11W, Sec. 24
Kent County



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Maas Family Preserve

This 17 acre preserve is owned by the Land Conservancy of West Michigan (LCWM) and is located in T09N, R11W, Sec. 24 in Kent County. The Maas family preserve is predominantly a previously tilled sandy, well-drained, old field supporting barrens vegetation such as wild lupine (*Lupinus perennis*), wild bergamot (*Monarda fistulosa*), prickly pear (*Opuntia humifusa*), butterfly weed (*Asclepias tuberosa*), spotted knapweed (*Centaurea stoebe*), Pennsylvania sedge (*Carex pensylvanica*), and big and little bluestem (*Andropogon gerardii*, *Schizachyrium scoparium*).

Distance sampling for Karner blue butterfly (*Lycaeides melissa samuelis*) was conducted in 2012 on eight established transects. Only three KBB were observed over four survey weeks. Due to relatively low numbers of KBB observed, it was decided that meander surveys would be a more efficient means of sampling at this particular site. Three meander surveys were conducted in both 2013 and 2014 and no KBB were observed in either year.

The low KBB numbers and reported sporadic presence over the years imply that most butterflies observed at this site moved in from a larger, adjacent population. The relatively small site size and low KBB population combined with a series of harsh summers likely pre-



Photo: Land Conservancy of West Michigan

Lupine in bloom at the Maas family preserve.

vented continued KBB presence at this site. Long-term, stable, active management of this site is likely, and with this continued management via prescribed fire and shrub thinning, a viable KBB population may eventually establish.

This site provides local residents with a series of trails connecting to a larger trail system. These trails provide exposure to remnant oak-pine barrens systems that are largely non-existent in the area. Educational signs which describe habitat management of oak-pine barrens, and information on the life cycle and ecology of KBB are also present on site. Although a small in size, LCWM has provided a user friendly site which offers educational information to local residents and outdoor recreationists that many other sites do not present.

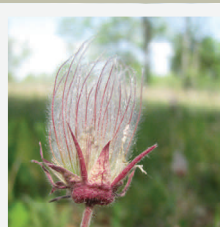


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T12N, R12W, Sec. 15
Newaygo County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Karner Blue Nature Sanctuary

Owned and managed by the Michigan Nature Association (MNA), this 60 acre site is located in T12N, R12W, Sec. 15. In 2012, MNFI staff conducted KBB distance sampling at this site, and in 2013 and 2014, meander surveys for KBB were conducted. Rare plant surveys were also conducted at this site, resulting in the identification of new populations of prairie-smoke (*Geum triflorum*) in 2012 and furrowed flax (*Linum sulcatum*) in 2013.

This site is very open with few oaks (*Quercus spp.*) and black cherry (*Prunus serotina*) throughout. The soils are very sandy and dry with many patches of mineral soil exposed. The vegetation consists mainly of spotted knapweed (*Centaurea stoebe*), flowering spurge (*Euphorbia corollata*), hoary alyssum (*Berteroa incana*), butterfly weed (*Asclepias tuberosa*), prickly pear (*Opuntia humifusa*), Pennsylvania sedge (*Carex pennsylvanica*), and wild lupine (*Lupinus perennis*). The majority of the wild lupine at this site occurs near the wooded edges or in shady areas within the site provided by overstory oaks.

MNA actively manages this site, and conducted an early spring prescribed burn in 2013 in the north-western quarter of the site. Wild lupine was much more vigorous in the burned area than it was in the unburned portion of the site in both 2013 and 2014. Anecdotally, KBB

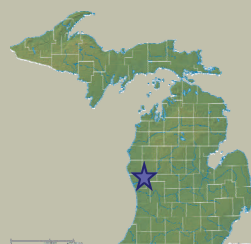


Photo by Becky Norris

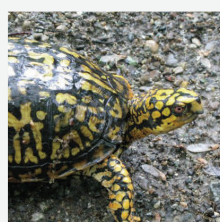
Female Karner blue butterfly. 2010.

seemed much more prevalent in the burned area than in the unburned area. Pre-burn, KBB were relatively evenly scattered throughout the site. This change indicates a positive response by KBB as a result of the burn. Along with prescribed burns, MNA also performed tree girdling to the majority of the larger trees within the open area, leaving only a few large oaks intact. While this act will ultimately open up the site, much of the wild lupine grew in the shade of many of these trees. The impacts of reduced woody cover on the lupine population should be monitored into the future.

KBB numbers at this site are generally lower than at other sites surveyed by MNFI. Because of the relatively low KBB population, there was a change from distance sampling to meander surveys in 2013. In 2012, four weeks of distance surveys were completed with 15 total KBB observed over the course of the flight. In 2013 and 2014, 12 and 15 KBB were observed during meander surveys, respectively.



T12N, R16W
Muskegon County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Owasippe Scout Reservation

Founded in 1911, this 4800 acre site is owned by the Chicago Area Council of the Boy Scouts of America, and is located in T12N, R16W in Muskegon County, approximately 6.5 mi ENE of Whitehall. Camp Owasippe is comprised of a multitude of ecosystem types, including oak-pine barrens, dry sand prairies, coastal plain marsh, floodplain and upland forests, and various wetland types, among others. As an active campground and scout reservation, Camp Owasippe is home to two Boy Scout section camps, a resident camp, a family camp and a High Adventure base. The camp also offers hiking, fishing, canoeing and general recreation facilities for scouts and non-scouts alike.

MNFI field activities at this site consisted of the establishment and monitoring of permanent photo points (2013) to monitor coarse changes in vegetation structure associated with management (a portion of the site was burned in 2013) and surveys for rare species (all years), focusing on the southeastern portion of the property. These surveys resulted in four Eastern box turtle (*Terrapene carolina carolina*; state special concern) element occurrence updates and new element occurrences for the state threatened water-parsnip (*Berula erecta*), state threatened beak-rush (*Rhynchospora scirpoides*), state threatened eastern blue-eyed grass



Pine barrens at Camp Owasippe with prickly pear in foreground. 2013.

(*Sisyrinchium atlanticum*), and state special concern tall beak-rush (*Rhynchospora macrostachya*).

Extensive surveys for Eastern Massasauga rattlesnake (*Sistrurus catenatus catenatus*; state special concern) were conducted in both 2012 and 2013. Despite efforts, none were detected, although suitable habitat does exist within the site boundaries. Eastern massasauga have been recorded in close proximity of the camp; so it seems likely that they may inhabit the site. The federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*) is also known from adjacent properties, but has not been documented from the Owasippe Scout Reservation.

Site Highlight – SW Michigan Private Lands Biologist Ken Kesson

In the fall of 2013, the Michigan DNR Wildlife Division organized a prescribed burn at



Camp Owasippe. As the Private Lands Biologist for SW Michigan, Ken Kesson was instrumental in getting a prescribed burn accomplished. Working with local fire officials, MDNR Fire, and Owasippe council members, Ken was able to organize a large burn (190 acres) in the oak-pine barrens ecosystem in the southern portion of the property. The burn was contracted out to Blue Heron Ministries and was a great success. Post burn planting of native forbs in select areas was also conducted to promote nectar sources for a wide variety of insect species. These plantings may also provide a seed source for possible future plantings in the area.

The coordination between MNFI and the Wildlife Division of pre and post burn survey efforts along with the burn itself, allow for an increased understanding of the ecosystem response to a prescribed burn at this particular site.

“This was the first prescribed burn in the history of this scout camp...and was very successful over much of the burned area.”

-Ken Kesson; SW MI Private Lands Biologist

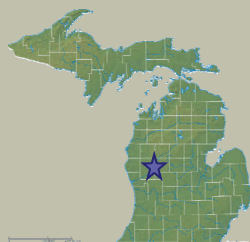
HIGHLIGHTS

- Over 600 acres surveyed by MNFI
- 190 acre prescribed burn.
- Four updated EO records.

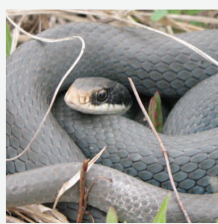


Photo provided by Ken Kesson





T12N, R12W, Secs. 2 & 11
Newaygo County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Newaygo Prairie Nature Sanctuary

This well-known complex of dry sand prairie and associated communities comprises approximately 110 acres in T12N R12W Secs. 2 and 11, Newaygo County, approximately 4.5 mi NE of Newaygo and is owned and managed by the Michigan Nature Association (MNA). Of primary interest are an approximately 40-acre dry sand prairie bowl in the southern portion of the property and a 15-acre sandy old field in the northern portion of the property that supports many of the same prairie and savanna species. Common plant species include Pennsylvania sedge (*Carex pensylvanica*), dewberry (*Rubus flagellaris*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), three-awned grass (*Aristida purpurascens*), June grass (*Koeleria macrantha*), goats-rue (*Tephrosia virginiana*), sky-blue aster (*Schizachyrium oolentangiense*), and sheep sorrel (*Rumex acetosella*).

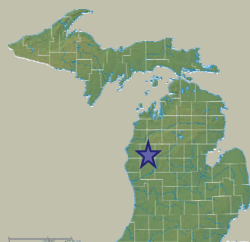
At the inception of the Competitive SWG grant in 2011, MNFI staff conducted rare insect surveys at this site, resulting in an updated record for the state special concern Great Plains spittlebug (*Lepyronia gibbosa*) and new records for the state special concern pine-tree cricket (*Oecanthus pini*) and the state special concern piglet bug (*Fitchiella robertsoni*).



Photo by Becky Norris

Prairie smoke (*Geum triflorum*) in flower. 2012.

In 2013, MNFI staff conducted rare plant surveys on this site and updated element occurrence records for the state threatened Western silvery aster (*Symphyotrichum sericeum*), and state endangered side-oats grama grass (*Bouteloua curtipendula*). Along with rare plant surveys, MNFI staff, along with Wildlife Division personnel, visited the site to discuss dry sand prairie biology, ecology, management, and the rare species that occur in such communities. MNA burned portions of this site over the course of the grant.



T17N, R12W, Sec. 04
T17N, R11W, Sec. 30
Lake County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Lake County Sites

Gonzalez and Bouma Properties

These privately owned tracts are located in T17N, R12W in Lake County, approximately two miles east of Idlewild. Together, they comprise approximately 95 acres of oak-pine barrens habitat notable for its species-rich ground layer. Characteristic species here include Hill's oak (*Quercus ellipsoidalis*), jack pine (*Pinus banksiana*), sand cherry (*Prunus pumila*), hazelnut (*Corylus americana*), Pennsylvania sedge (*Carex pensylvanica*), smooth aster (*Symphyotrichum laeve*), hoary puccoon (*Lithospermum canescens*), little bluestem (*Schizachyrium scoparium*), Hill's thistle (*Cirsium hillii*), and sand violet (*Viola adunca*).

MNFI field activities at these sites consisted of the establishment and monitoring of permanent photo points (2012—2013) to monitor coarse changes in vegetation structure associated with management (the site was burned in 2013) and surveys for rare species (all years) and the bird community (2014). Field surveys resulted in updates of known element occurrences of two rare plants (Hill's thistle and prairie-smoke). Hill's thistle experienced a significant population increase in 2014 following the 2013 prescribed burn. Thousands of rosettes were documented in May 2014, and 192 flowering individuals were counted in July 2014. Due to the prolific response of Hill's thistle to the



Photo by Brad Slaughter

Hill's thistle flower at the Gonzales property. 2014.

prescribed fire, this site was visited by Hillsdale College biology professors Ranessa Cooper and Jeffrey VanZant, who are conducting research on the genetic diversity of the species across its Michigan range.

A new population of prairie-smoke was documented on the Gonzalez property. In addition, a new population of the state special concern blue-eyed-grass (*Sisyrinchium strictum*) was documented. In 2014, several birds on the list of SGCN were documented in the oak-pine barrens: northern flicker (*Colaptes auratus*), eastern kingbird (*Tyrannus tyrannus*), brown thrasher (*Toxostoma rufum*), blue-winged warbler (*Vermivora pinus*), eastern towhee (*Pipilo erythrophthalmus*), field sparrow (*Spizella pusilla*), and Vesper sparrow (*Pooecetes gramineus*).

These sites are among the highest quality private land barrens sites identified and managed by WLD private lands biologists over the past decade.



Machasik Property

This approximately 20-acre site is located in T17N R11W in Lake County, approximately 4.5 mi SW of Chase. The open powerline corridor along State Rd. at the western margin of the property supports barrens vegetation, including wild lupine (*Lupinus perennis*) and the lupine-dependent, federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*). East of the powerline corridor, the property consists of narrow openings in a dry-mesic northern forest matrix. Common species here include black cherry (*Prunus serotina*), white pine (*Pinus strobus*), low sweet blueberry (*Vaccinium angustifolium*), sweet-fern (*Comptonia peregrina*), Pennsylvania sedge (*Carex pensylvanica*), bracken fern (*Pteridium aquilinum*), and poverty grass (*Danthonia spicata*).

MNFI field activities at this site consisted of the establishment and monitoring of permanent photo points (2012—2013) to monitor coarse changes in vegetation structure associated with management and surveys for rare species (all years) and the bird community (2014). No rare species were documented by MNFI at the barrens site over this period, although Karner blue butterflies were observed by WLD staff in spring 2014. In 2014, four birds on the list of SGCN were noted from this site: northern flicker (*Colaptes auratus*), golden-winged warbler (*Vermivora chrysoptera*), eastern towhee (*Pipilo erythrophthalmus*), and field sparrow (*Spizella pusilla*).

“Hill’s thistle experienced a significant population increase in 2014 following the 2013 prescribed burn.”

Site Highlight – Northern Lower Michigan Private Lands Biologist Brian Piccolo

The MDNR Wildlife Division, working with the Machasik family, organized a 10 acre prescribed burn on this site in 2013. The goals of this burn were to set back woody succession and stimulate native prairie plant growth. This, in turn, would benefit the KBB that occupy the site. The majority of the burn focused on removal of dense cherry brush which would allow for larger openings in the site. Post-burn treatment of stump sprouts with herbicide was also initiated to diminish the re-growth of brush.



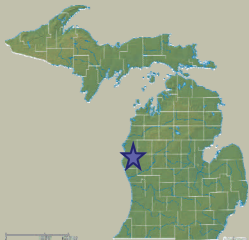
HIGHLIGHTS

- Surveyed over 100 acres
- Prescribed burn impact documented via photo point monitoring
- Three new or updated EO records.



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T18N, R15W, Secs. 18, 19, &
28
Mason County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Mason County Sites

Elliott Property

This privately owned site in supports ca. 50 acres of dry northern forest, dry-mesic northern forest, and oak-pine barrens in T18N R15W in Mason County, approximately 1.5 mi south of Walhalla. The plant communities in this site exhibit low species richness and diversity. Forested areas are dominated by Hill's oak (*Quercus ellipsoidalis*), white oak (*Q. alba*), and black cherry (*Prunus serotina*), with jack pine (*Pinus banksiana*) locally dense, especially around the margins of a frost pocket.

The barrens understory is thickly covered by Pennsylvania sedge (*Carex pennsylvanica*), associated with the sedge *C. siccata*, sheep sorrel (*Rumex acetosella*), bracken fern (*Pteridium aquilinum*), hair grass (*Avenella flexuosa*), little bluestem (*Schizachyrium scoparium*), and big bluestem (*Andropogon gerardii*). Low sweet blueberry (*Vaccinium angustifolium*) and sweet-fern (*Comptonia peregrina*) are common in the barrens.

MNFI field activities at this site consisted of the establishment and monitoring of permanent photo points (2012—2013) to monitor coarse changes in vegetation structure associated with management (the site was burned in 2013) and surveys for rare species (all years) and the bird community (2014).



Photo by Brad Slaughter

Wild lupine flowering at the Bengel property. 2014.

No rare species were documented at the barrens site over this period, although a new element occurrence of the state-threatened water-parsnip (*Berula erecta*) was documented from wetlands on the northern section of the property in 2012. In 2014, two birds on the list of SGCN were noted from this site: northern flicker (*Colaptes auratus*) and field sparrow (*Spizella pusilla*).

Bengel Property

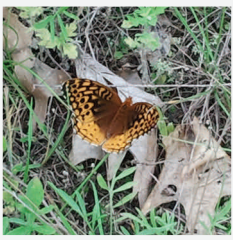
This approximately 40-acre, privately owned tract is located in T18N R15W in Mason County, approximately 3.5 mi ESE of Custer. The site supports oak-pine barrens and open dry-mesic northern forest and dry northern forest, and is notable for supporting a large population of wild lupine (*Lupinus perennis*) that has in recent history supported a colony of the federally endangered Karner blue butterfly (*Lycaeides melissa samuelis*). Other common species in this area include Hill's oak (*Quercus ellipsoidalis*),



red pine (*Pinus resinosa*; mostly planted), white pine (*P. strobus*), black cherry (*Prunus serotina*), low sweet blueberry (*Vaccinium angustifolium*), dewberry (*Rubus flagellaris*), Pennsylvania sedge (*Carex pensylvanica*), bracken fern (*Pteridium aquilinum*), Canada bluegrass (*Poa compressa*), hair grass (*Avenella flexuosa*), birdfoot violet (*Viola pedata*), spotted knapweed (*Centaurea stoebe*), and common St. John's-wort (*Hypericum perforatum*).

MNFI field activities at these sites consisted of the establishment and monitoring of permanent photo points (2012—2013) to monitor coarse changes in vegetation structure associated with management (the site was burned in 2013) and surveys for rare species (all years) and the bird community (2014).

No rare species were documented at the barrens site over this period. In 2014, four birds on the list of SGCN were documented: great blue heron (*Ardea herodias*), northern flicker (*Colaptes auratus*), eastern towhee (*Pipilo erythrophthalmus*), and field sparrow (*Spizella pusilla*).



HIGHLIGHTS

- 90 acres surveyed.
- Four photo monitoring points established.
- Two private landowners.



T28N, R01W, Sec. 07
T25N, R03W, Sec. 03
Crawford County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Crawford County Sites

Jaskot Property

This approximately 40-acre, privately owned property is located in T25N R03W in Crawford County, approximately 4.7 mi SE of Grayling. The site supports cleared, managed dry northern forest with significant pine barrens elements. Common species include Hill's oak (*Quercus ellipsoidalis*), jack pine (*Pinus banksiana*), sand cherry (*Prunus pumila*), sweet-fern (*Comptonia peregrina*), low sweet blueberry (*Vaccinium angustifolium*), Pennsylvania sedge (*Carex pensylvanica*), poverty grass (*Danthonia spicata*), hair grass (*Avenella flexuosa*), the state threatened rough fescue (*Festuca altaica*), harebell (*Campanula rotundifolia*), and smooth aster (*Symphyotrichum laeve*).

In 2013, photo points were established at several locations within this property to document recent habitat management efforts. The state threatened rough fescue was noted throughout the tract.

Brand Property

This approximately 40-acre privately owned tract is located in T28N R02W in Crawford County, just north of Shupac Lake. The area consists primarily of cut-over jack pine barrens. Characteristic plants include black cherry (*Prunus serotina*), jack pine (*Pinus banksiana*), sand cherry (*Prunus pumila*), low



Photo by Brad Slaughter

Hoary puccoon in flower. 2011.

sweet blueberry (*Vaccinium angustifolium*), Pennsylvania sedge (*Carex pensylvanica*), and poverty grass (*Danthonia spicata*).

MNFI field activities at these sites consisted of the establishment and monitoring of permanent photo points (2012—2013) to monitor coarse changes in vegetation structure associated with management (the site was burned in 2013) and surveys for rare species (all years). No rare species were documented from the property in 2012 or 2013, although the state threatened common loon (*Gavia immer*) nested and fledged two young on Shupac Lake in 2012.



T28N, R02E, Secs. 25 & 36
T28N, R04E, Sec. 29
Oscoda County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Oscoda County Sites

Mio Big Frost Pocket – Au Sable State Forest

This complex of pine barrens, dry sand prairie, and dry northern forest occurs in T28N R02E Secs. 25 and 36, Oscoda County, approximately 9 mi N of Mio. The northern portion of this tract supports a large, open expanse of pine barrens, now resembling dry sand prairie due to the removal of pines. This area is characterized by jack pine (*Pinus banksiana*), black cherry (*Prunus serotina*), sweet-fern (*Comptonia peregrina*), bearberry (*Arctostaphylos uva-ursi*), little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), fescue (*Festuca saximontana*), poverty grass (*Danthonia spicata*), early goldenrod (*Solidago juncea*), northern blazing-star (*Liatris scariosa*), harebell (*Campanula rotundifolia*), smooth aster (*Symphyotrichum laeve*), and the state threatened pale agoseris (*Agoseris glauca*).

This site was visited in 2013 to update records for three state-listed plant species. Pale agoseris, the state special concern Hill's thistle (*Cirsium hillii*), and the state threatened rough fescue (*Festuca altaica*) were all redocumented from the site. In addition, portions of this area were identified and processed as an element occurrence for pine barrens by MNFI ecologists.



Photo by Brad Slaughter

Pine barrens on the Mark Clark Property. 2013.

Mark Clark Property

This approximately 120-acre property is located in T28N R04E in Oscoda County, approximately 3 mi ESE of Comins. The site consists primarily of cut-over dry-mesic northern forest with some oak-pine barrens elements, with a few areas of rich conifer swamp dominated by northern white-cedar (*Thuja occidentalis*). The barrens are characterized by Hill's oak (*Quercus ellipsoidalis*), white oak (*Q. alba*), black cherry (*Prunus serotina*), jack pine (*Pinus banksiana*), low sweet blueberry (*Vaccinium angustifolium*), sweet-fern (*Comptonia peregrina*), Pennsylvania sedge (*Carex pensylvanica*), little bluestem (*Schizachyrium scoparium*), poverty grass (*Danthonia spicata*), big bluestem (*Andropogon gerardii*), bracken fern (*Pteridium aquilinum*), and weedy forbs such as common St. John's-wort (*Hypericum perforatum*) and hawkweeds (*Hieracium* spp.).



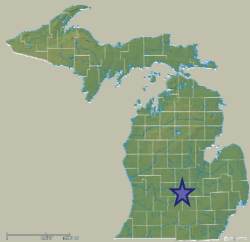
In 2013, photo points were established at several locations within this property to document recent habitat management efforts. The state special concern Hill's thistle (*Cirsium hillii*) has been noted from this site, but was not observed in 2013. In addition, the state special concern dusted skipper (*Atrytonopsis hianna*) has been documented from this property.





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T04N, R02W, Sec. 16
Ingham County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Other Activities

From 2012-2014, MNFI staff attended the annual KBB working group meeting hosted by the U.S. Fish and Wildlife Service in East Lansing, MI. This meeting is comprised of representatives from MI DNR Wildlife Division, USFWS, universities, The Nature Conservancy and other NGOs, county conservation districts, Park Service, and researchers. Topics discussed include population sizes and trends at various sites, sampling techniques, reintroduction efforts, habitat management and relevant research on KBB populations and responses to climate change.

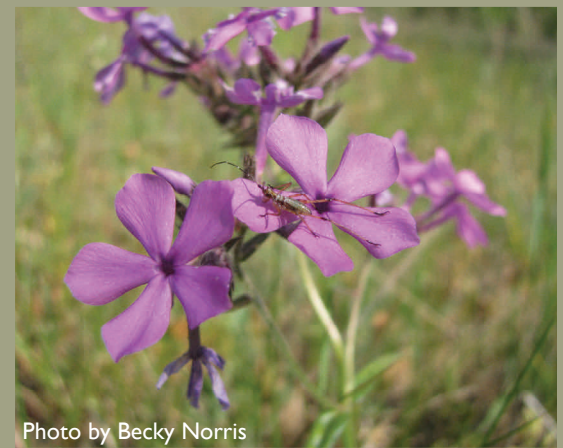
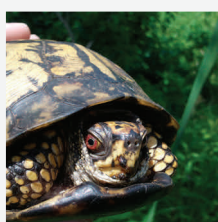


Photo by Becky Norris

Prairie phlox (*Phlox pilosa*) with insect. 2012.



T04N, R02W, Sec. 16
Ingham County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

Future Recommendations

We recommend the identification of high priority pine barrens and savanna sites for future conservation and management efforts. Potential criteria to consider for this process include (1) ownership and/or management by and individual or organization with the interest and ability to manage the site long-term; (2) habitat condition and size, including consideration of successional trajectories based on current and potential future disturbance and fire regimes; and (3) the presence of significant populations of target species or concentrations of target species. Following are some specific recommendations for different aspects of possible future work.

Habitat monitoring

- Conduct reconnaissance surveys prior to the implementation of management, and discuss management goals prior to the establishment of photo monitoring points. This will ensure placement in the most beneficial areas.
- Establish photo monitoring points only in those areas that are expected to be consistently managed for at least 10 years.
- Photo points may be effective at sites where short-term management focuses on eradicating dense stands of invasive species such as autumn



Photo by Brad Slaughter

Pine barrens at the Mio Frost Pocket. 2013.

olive (*Elaeagnus umbellata*) or the installation of a prescribed fire regime.

- -Reduce the frequency of photo monitoring point visits to ensure significant management activity takes place in between visits.

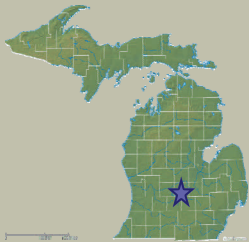
Rare species monitoring

- Reevaluate the effectiveness of Karner blue butterfly monitoring to determine if distance sampling is the best monitoring practice at all sites.
- Continue to survey for additional KBB occupied habitat as resources allow.
- Maintain participation in the annual Kirtland's warbler monitoring program.
- Coordinate survey plans with land managers to best utilize survey effort.
- Focus management on priority sites for target species and SGCN.



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T04N, R02W, Sec. 16
Ingham County



Oak Savanna, Pine Barrens and Jack Pine Forest Restoration in Michigan and Ohio for Species of Greatest Conservation Need.

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Without the agreement and support of the many private landowners who signed up for land management on their properties, this work would not have been possible. Last, we thank Brian Klatt, Nancy Toben, Sue Ridge, Dave Cuthrell, John Paskus, Yu Man Lee, Steve Thomas, Andrew Monks, Joann Jeplawy, and Helen Enander of MNFI for administrative and field support.



Photo by Becky Norris

Prairie buttercup (*Ranunculus rhomboideus*) in flower.
2012.