Globally Rare and Declining Prairie Fen Butterflies:
Population Status and Ecological Risk Assessments

Final Performance Report: October 2015-December 2018

Assistance Agreement Number: No F16AC00099

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MNFI Report No. 2018-23

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Cover: Prairie fen and three species of rare butterflies that occur in these habitats (top-bottom) Poweshiek skipperling, Mitchell's satyr, and swamp metalmark. All photos by D. Cuthrell

Final Performance Report to U.S. Fish and Wildlife Service/Endangered Species Program

Recipient Name: Michigan State University
Michigan Natural Features Inventory
PO Box 13036, Lansing, MI 48901-3036

Assistance Agreement Number: No F16AC00099

Project Description: Globally Rare and Declining Prairie Fen Butterflies: Population Status and Ecological Risk Assessments.

MNFI shall

1. Conduct standardized transect surveys for Poweshiek skipperling for two years at a minimum of four sites in Michigan.
2. Conduct standardized transect surveys for Mitchell's satyr for two years at a minimum of four sites in Michigan.
3. Conduct standardized transect surveys for swamp metalmark for two years at a minimum of four sites in Michigan.
4. Produce high resolution land-use maps for a minimum of eight prairie fens to be determined in consultation with the Service, in Michigan.
5. Ground-truth land-use maps and conduct landowner questionnaires;
6. Collect plant and water samples to submit for laboratory analysis of pesticide residues. Study sites and sample locations/numbers will be determined in consultation with the Service;
7. Assist with completion of ecological risk assessments for four Poweshiek skipperling sites in Michigan by characterizing the landscape setting of the sites, helping to compile information about the status and trends of the Poweshiek skipperling, pesticide use at Poweshiek skipperling sites, pesticide sources and exposure pathways, and toxicity values, and helping to evaluate the risk of specific pesticides to Poweshiek skipperling; and
8. Complete ecological risk assessments for four Mitchell's Satyr sites in Michigan.

Additional modifications:

1. Design and populate a GIS layer database (with land managers) used for management prioritization at the four remaining Poweshiek skipperling (PS) sites. A GIS layer database will be provided to the USFWS.
2. Develop and implement a new PS survey to augment the existing standardized approach. The new protocol will be used to determine the flight beginning and ending dates, seasonal peaks, daily activity patterns, and behavioral time budgets. If possible, we will also collect information on adult sex ratios and oviposition plants. A final report and presentation will be provided upon completion to the USFWS.
3. Provide assistance in all aspects of current PS ex-situ activities in Michigan, including the release of head-started individuals, and better refine the best times to collect gravid females for future captive rearing and head-starting activities.

4. Place temperature and relative humidity data loggers at all Michigan PS sites as well as one site in Wisconsin and four sites in Manitoba. A final report will be submitted to the USFWS at the project completion.
5. Enhance and restore occupied habitat at Brandt Road Fen and Halstead Lake Fen by conducting invasive species management and possibly small prescribed fires.
6. Conduct range-wide occurrence modeling to explore potential reasons for the rapid shrinking of PS distributions and populations. A final model will be provided to FWS and a thesis and/or peer-reviewed publication will be produced.
7. Conduct Mitchell's satyr surveys at four additional sites and produce a management plan for Park Lyndon. The management plan and a brief report will be submitted to USFWS.

Report Type: Final Performance Report

Period Covered: October 1, 2015 – December 31, 2018

Project Narrative: (documents progress made in achieving the objectives of project work plan(s) approved in application)

Provide the following information:

1. Comparison of actual accomplishments (outputs, outcomes) with the anticipated outputs/outcomes.

2016 Accomplishments

- We continue to work with the ELFO on Poweshiek skipperling work group activities including the Propagation Subgroup, the Pesticide Risk Assessment work group, and the Michigan Poweshiek Skipperling work group. Several conference calls and workgroup meetings have been attended over the course of this project period.

- We currently have a draft of the sections we have been assigned responsibility on for the Risk Assessment and are making modifications assembling the final white paper. We helped write and provided comments on the "Plan for the Controlled Propagation, Augmentation, and Reintroduction of Poweshiek Skipperling" which was completed by Tam Smith, USFWS.

- During May and July all pesticide residue samples were collected as planned in collaboration with Lisa Williams and others from, ELFO, USFWS and have been sent off to the Gastonia lab for analysis. Samples were taken from eight prairie fens including: Brandt Road Fen, Halstead Lake, Big Valley, Long Lake Fen, Grand River, Goose Creek, Park Lyndon, and Coldwater Fen. In addition, during May, July, and August we ground-truthed the agricultural crops around each of these fens to provide the most current information to the risk assessment document.

- We completed the field surveys for adult butterflies at four Mitchell Satyr fens, the four remaining Poweshiek skipperling fens, and four fens that once contained the Swamp

metalmark butterfly. A minimum of two, timed meander surveys per site were completed.

Figure 1. Tameka Dandridge and Barb Hosler, USFWS, helping to conduct timed-meander surveys for Poweshiek Skipperling at Big Valley, Oakland County, Michigan.

- Our research team has also published the partial results of Clint Pogue's research and is near completion of a second publication. The first publication is available, clink links below:


Articles
Habitat Suitability Modeling of the Federally Endangered Poweshiek Skipperling in Michigan

2017 Accomplishments

- We continue to work with the ELFO on Poweshiek skipperling work group activities including the Propagation Subgroup, the Pesticide Risk Assessment work group, the PS Outreach group, and the Michigan Poweshiek Skipperling work group. Several conference calls and workgroup meetings have been attended over the course of this project period. We currently have a draft of the sections we have been assigned responsibility on for the Risk Assessment and are making modifications assembling the final white paper.

- We have completed the GIS layer database and land manager partners are currently using this to prioritize habitat management at all four sites that still contain PS. Habitat work (invasive species removal/control) work was conducted at Brandt Road and Halstead Lake Fen.

- Through the efforts of CMU graduate student Michael Belitz, designed and implemented a new transect based, point count survey for PS and associated fen butterfly species. All four PS sites in Oakland County were surveyed daily from mid-June to mid-July. Count numbers have been compiled and submitted to USFWS with additional analysis to follow as part of Michael's MS project. Michael will be presenting his final committee meeting on Friday, May 11 at Central Michigan University.

- Field work and logistical support was provided for 3 weeks during late June through mid-July for the ex-situ Poweshiek skipperling work. This included providing support in the collection of PS females, help with husbandry and egg collection, assistance with and monitoring of the female releases, and support with landowner contact and permissions.

- Field work and logistical support was provided for 3 weeks during late June through mid-July for the ex-situ Poweshiek skipperling work. This included providing support in the collection of PS females, help with husbandry and egg collection, assistance with and monitoring of the female releases, and support with landowner contact and permissions. The management plan for Park Lyndon has been completed and submitted to staff at Park Lyndon for review. Once we receive comments back the plan will be submitted to the USFWS.

- We have purchased data loggers (Fig. 2) and distributed them to our partners in WI and Manitoba. Loggers were placed in the field during late March at all remaining occupied sites in Michigan (5 locations), Wisconsin (1 location), and Manitoba (4 locations). We plan to leave them in the field over the course of the next two years gathering temperature and relative humidity readings every hour, at two locations within the fens (ground level, elevated 1 meter).

Figure 2. Photo of data logger placement (ground level and 1 meter elevated) at Eaton Road, Long Lake Fen, March of 2017 (Mike Losey, Springfield Township in background.

- Finally, we completed the field surveys for adult butterflies at four Mitchell Satyr fens, the four remaining Poweshiek skipperling fens, and four fens that once contained the Swamp metalmark butterfly. A minimum of two, timed meander surveys per site were completed. We are currently assembling data points and routes for report out at the associated working group meetings to be held this winter (February 2018).

2018 Accomplishments

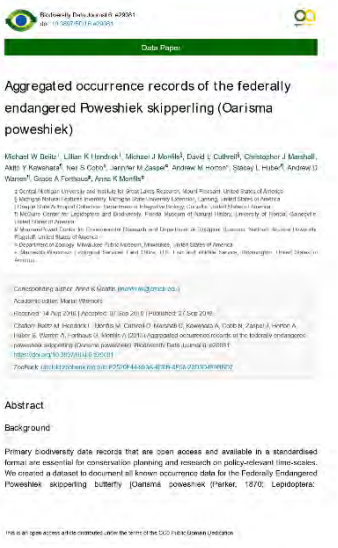
Poweshiek related activities

- We continue to work with the ELFO on Poweshiek skipperling work group activities including the Ex-situ and Propagation Subgroup, the Pesticide Risk Assessment work group, the Research group, the PS Outreach group, and the Michigan Poweshiek Skipperling work group. Several conference calls and workgroup meetings have been attended over the course of this project period.

- We currently have a final draft of the sections we have been assigned responsibility on for the Risk Assessment and have submitted this to Sarah Warner and Dave Warburton, USFWS, who are assembling the final parts from Canada and updating the information from the pesticide sampling from last season. Available here: https://docs.google.com/document/d/1EETjHbNrvv1vaTBYcu4jFU1a7aqcIsYnkLtQMbnof0I/edit

- All four PS sites in Oakland County were surveyed multiple times from mid-June to mid-July. Count numbers have been compiled and submitted to USFWS with additional analysis to follow by Michael Monfils.

- Through the lead of CMU graduate student Michael Belitz, three peer-reviewed publications have been produced. The first "Aggregated occurrence records of the federally endangered Poweshiek skipperling (*Oarisma poweshiek*)" has been accepted and is already available (see link below). The second publication ""Life history and ecology of the endangered Poweshiek skipperling *Oarisma poweshiek* in Michigan prairie fens" has recently been submitted to the Journal of Insect Conservation. A third manuscript dealing with range-wide Maxent modeling is being revised and will be submitted early in 2019.



Data Paper

Aggregated occurrence records of the federally endangered Poweshiek skipperling (Oarisma poweshiek)

Abstract

Background

Primary biodiversity data records that are open access and available in a standardised format are essential for conservation planning and research on policy-relevant time-scales. We created a dataset to document all known occurrence data for the Federally Endangered Poweshiek skipperling butterfly [Oarisma poweshiek (Parker, 1870); Lepidoptera:

- Through the lead of former CMU graduate student Clint Pogue, a peer-reviewed publication has been submitted to the Journal of Fish and Wildlife Management, "Local and landscape level variables related to Poweshiek skipperling presence in Michigan, USA prairie fens."

- MNFI staff continue to readout data loggers gathering temperature and relative humidity readings every hour, at two locations within the fens (ground level, elevated 1 meter).

- Provided oversight of cut and chemical treatment management of buckthorn in occupied habitat at Halstead Lake Fen with staff from Michigan DNR Parks Division in July, during the adult flight, to reduce any potential impacts to the species. We continue to work with local land managers at all occupied PS sites to implement best management practices to help maintain and restore high-quality prairie fen habitat important to PS and other rare species.

- Through the efforts of the Prairie Fen Research Collaborative a couple of YouTube videos highlighting Prairie fens and Poweshiek skipperling were produced:

https://www.youtube.com/watch?v=1sEhqZrjiCY

https://www.youtube.com/watch?v=J6pX2QvyxlA

2018 Mitchell's Satyr related activities

- We conducted 10 Mitchell's satyr surveys at five known sites (2 visits each)
    - Grand River Fen (7/2 and 7/7)
    - Coldwater Fen (6/26, 7/3)
    - Mill Creek East (7/8, 7/11)
    - Blue Creek Fen (7/5, 7/13)
    - Watkins Lake S. P. (7/6, 7/12)

- Daria Hyde, MNFI, facilitated visits to five MS sites for five staff ((Ralph Grundel, Johanna Nifosi, Noel Pavlovic, Gia Wagner and Randy Knutson) from the National Park Service (Indiana Dunes N.P.) and USGS who were interested in learning more about MSB habitat at the different sites, so they could better identify suitable habitat in the Indiana Dunes National Lakeshore. She provided training on standard survey protocol, so they could assist with MS monitoring during their visits and provided information on microhabitat variables important to MS. She also provided maps, so they could visit two sites on their own as well as site conservation plans for a couple of occupied sites. Assisted Ryan Walsh (Toledo Zoo) with collection of MS for captive rearing purposes at 2 sites.

- Daria coordinated with Jeremie Wilson, MDOT, to conduct surveys at Blue Creek Fen at the location on Berrien County property where MS was last observed as well as on adjacent MDOT property which was historically occupied. We did not observe any MS and it is believed that this site is extirpated after not documenting MSB at this site for four consecutive years. Daria and AmeriCorp member Dan Earl assisted Ryan Walsh and Jake Schoen from Toledo Zoo with collection of MS for rearing purposes at Coldwater Fen and Grand River Fen on several occasions during the flight. It was unfortunate that the number of MS observed at these sites was so low and it was difficult to find appropriate numbers of butterflies to meet the requirements of the permit for collection purposes.

- Daria and Dan Earl assisted Nathan Herbert and John Shuey, Indiana TNC, with surveys for MS at the introduction site at Swamp Angel Fen following standard survey protocol. Unfortunately, no MS were observed in the thorough survey of the release site and surrounding suitable habitat and it was learned that subsequent surveys by Nathan and John also did not document MS.

- Daria and Dan also conducted a survey of Fay Lake Fen with Rodolfo Villegas, and his seasonal staff, TNC, to determine if MS may be present, due to its proximity to the newly discovered MSB population at Watkins Lake Fen. No MS were documented at Fay Lake Fen and only one male MS was observed during the survey they conducted that same day at Watkins Lake Fen. It is possible that numbers of MS at Watkins Lake Fen declined due to very high water levels that decreased fen habitat significantly in 2018.

- Finally, Daria and Dan assisted Allison Krueger and her staff from Washtenaw County Parks with photo monitoring of the proposed MS introduction site at Park Lyndon Fen using standardized monitoring protocol.

- Participated in Mitchell's Satyr Working Group Activities
    - Met with USFWS and DNR to discuss reintroduction/augmentation strategies
    - Met with FWS and DNR to strategize approach for updating conservation plan
    - Provided information to USFWS as needed (e.g. landowner info, MS status, etc.)

- After the flight, the MNFI database was updated with 2018 MS survey data and a summary of survey results was compiled for the MS Working Group. Daria provided a presentation showing maps of MS sites to the MS Working Group through a conference call to depict areas that were surveyed as well as survey results.

- MNFI staff participated in Mitchell's Satyr Working Group Activities throughout the year and provided information to USFWS as needed (e.g. landowner information, MS status, etc.). They met with USFWS and DNR to discuss reintroduction/augmentation strategies and then updated this portion of the MS Conservation Strategy. They also met with USFWS and DNR to strategize an approach for updating the remaining portions of the MS Conservation Strategy at the upcoming MS Working Group meeting.