

Poweshiek skipperling
Oarisma poweshiek

Status Review:
Summary and Evaluation

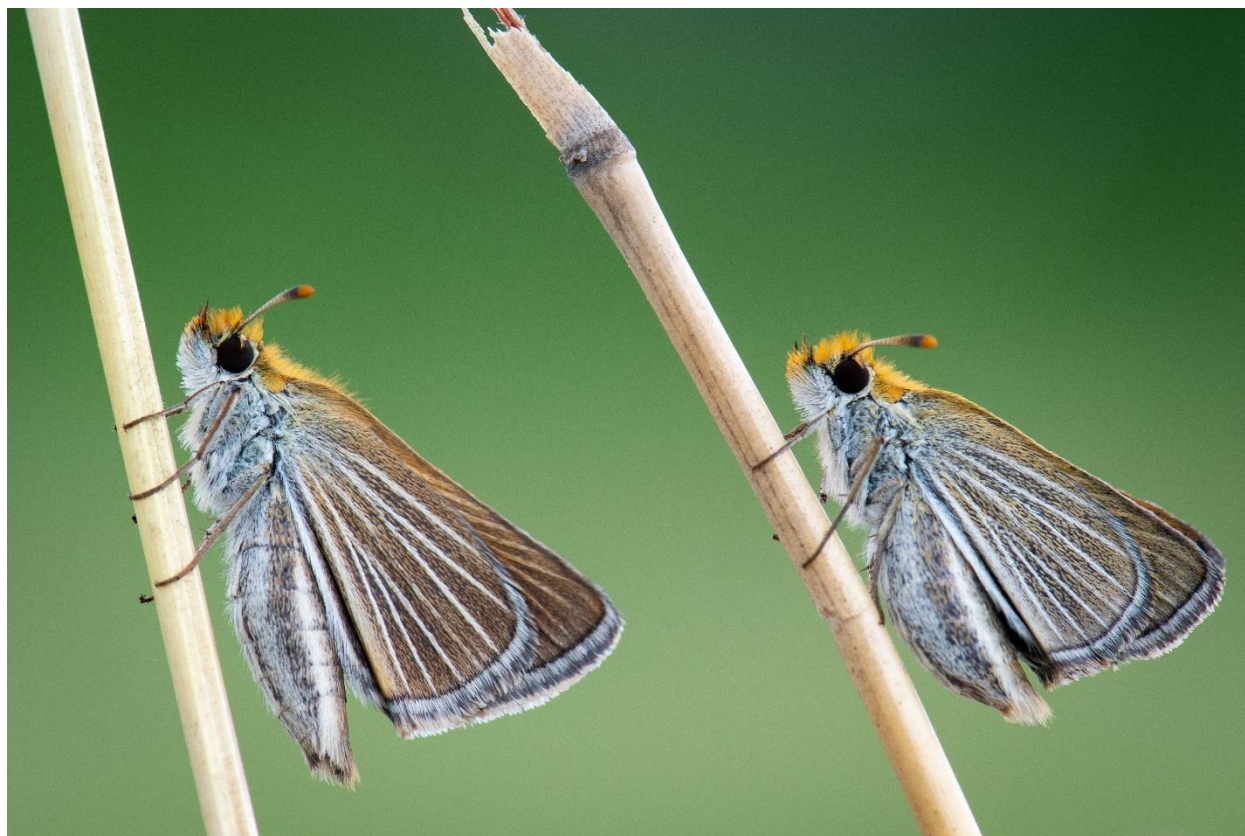


Photo of male (L) and female (R) Poweshiek skipperling butterflies by Assiniboine Park Zoo

U.S. Fish and Wildlife Service
Minnesota-Wisconsin Field Office
Bloomington, MN
August 6, 2024

STATUS REVIEW

Species reviewed:

Poweshiek skipperling (*Oarisma poweshiek*)

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STATUS REVIEW

Poweshiek skipperling (*Oarisma poweshiek*)

GENERAL INFORMATION

Species: Poweshiek skipperling (*Oarisma poweshiek*)

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Date of listing publication: October 24, 2014

FR citation(s): 83 FR 18075

Classification: Endangered species

Critical habitat/4(d) rule/Experimental population designation/Similarity of appearance listing: Critical habitat final rule published on October 1, 2015 (80 FR 59247)

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the Poweshiek skipperling (*Oarisma poweshiek*) to inform this status review. Public notice was given in the Federal Register (89 FR 804) requesting new scientific or commercial data and information that may have a bearing on the Poweshiek skipperling classification of endangered status. Pertinent data was obtained from peer reviewed literature, recent reports of prairie butterfly surveys and monitoring, habitat management work, population management (ex-situ) work, a recent species needs assessment, information presented at meetings or webinars by researchers, and from data submitted by U.S. Fish and Wildlife Service Field Offices and State and Provincial natural resource agencies within the range of the species. This 5-year review was completed by Tamara Smith, Fish and Wildlife Biologist with the Minnesota-Wisconsin Ecological Services Field Office. The focus of this 5-year review is to summarize new information regarding the status of the Poweshiek skipperling,

in accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act).

FR Notice citation announcing the species is under active review: January 5, 2024, 89 FR 804

Review History:

The September 30, 2019 Status Review recommended no change in status.

REVIEW ANALYSIS

Recovery Criteria

Recovery Plan: U.S. Fish and Wildlife Service. 2022. Recovery Plan for the Poweshiek Skipperling (*Oarisma poweshiek*). Midwest Regional Office, Bloomington, MN.

Recovery criteria have not been met. Reclassification criteria in the Recovery Plan (U.S. Fish and Wildlife Service 2022, entire) include a minimum number of healthy populations in each of the 4 conservation units (Figure 1, Table 1). A healthy Poweshiek skipperling population is demographically, genetically, and physically robust and occupies large areas of high-quality remnant prairie habitat, as described in detail in the Recovery Plan. Delisting criteria state that the downlisting criteria are met and threats and causes of decline have been reduced or eliminated and mechanisms are in place that provide a high level of certainty that the downlisting criteria will continue to be met into the foreseeable future.

The recovery criteria are still appropriate based on our current level of understanding of the species.

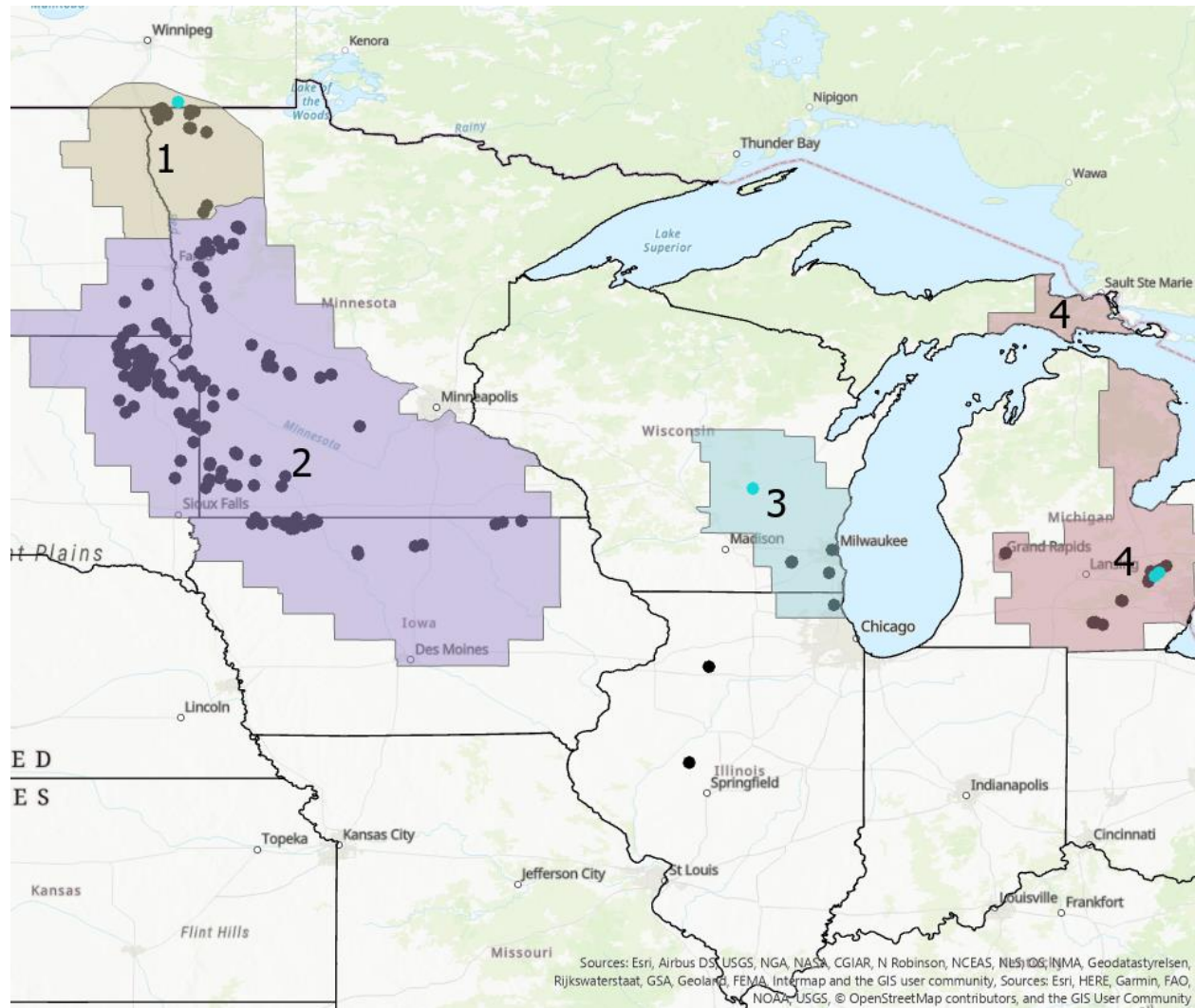


Figure 1. Conservation Units as delineated in the 2022 Recovery Plan for the Poweshiek Skipperling. Blue dots represent areas where the species is still considered extant as of 2023, except for the blue dot in Wisconsin, where the status is unknown. Black dots indicate historical records of the species.

Table 1. Number of healthy populations distributed throughout each unit as of 2023.

Conservation Unit	Target Number of Healthy Populations (per the Recovery Criteria)	Current Number of Extant Populations (not currently healthy)	Current Number of Healthy Populations
1: Southeastern Manitoba, Northwestern Minnesota, and Northeastern North Dakota	6 (At least 2 populations in Canada and 2 in the United States)	Canada: 2 U.S.: 0	0
2: Southeastern North Dakota, Central and Southwestern Minnesota, Northeastern South Dakota, and Central and Northern Iowa	23	0	0
3: Southeastern Wisconsin and Northeastern Illinois	2	0	0
4: Michigan	5	2	0

Updated Information Relevant to the Current Species' Status

Biology and Habitat:

Substantive new information on the Poweshiek skipperling biology and habitat, abundance and population trends, genetics, spatial distribution, and habitat or ecosystem conditions published since the previous 5-year review (U.S. Fish and Wildlife Service 2019, entire) is summarized below.

Range and distribution:

Out of the 298 historically documented Poweshiek skipperling sites, there are currently 3 sites (Springfield Township (Michigan), Rose Valley (Michigan), and Tallgrass Prairie Reserve (Manitoba)) where the species is considered present¹ (Figure 1; at the time of listing, 12 sites

¹ We updated the years used for the status definitions from the listing rule (79 FR 63671); six years were added to the definitions since six years have passed since they were developed (in the proposed listing rule). We consider the Poweshiek skipperling to be “present” (extant) at sites where the species was detected during the most recent survey, if the survey was conducted in 2008 or more recently and there is no evidence to suggest the species is now

were considered to have Poweshiek skipperling present). The status of the species in one location in Wisconsin is unknown.

Michigan

Two Michigan sites are currently classified as present, out of the nine that had present status at the time of listing and 3 at the time of the last five-year status review. The numbers of individuals detected at these remaining present sites have been variable since the last status review, with high daily counts of 19 individuals in 2023 at Rose Valley site, which was higher than any count since listing. Two additional fens with relatively recent records were not surveyed in 2023, because no Poweshiek skipperlings were observed the previous three survey years. The stronghold of the Springfield Township site (3 sub-sites) has not had a high daily count above 76 since listing, with a high daily count of 58 in 2023 (compared to multiple counts in the hundreds in the five years preceding listing). Similarly, the maximum number of Poweshiek skipperlings observed per minute at these sites are down relative to the years just prior to listing, however there was a slight uptick in 2023 (Figure 2).

Furthermore, no additional sites have been found, even though a habitat model identified approximately 33 sites that may have significant potential to be inhabited by Poweshiek skipperling. Another similar habitat suitability model to find other potential sites, used species occurrence records combined with a larger set of environmental barriers (Belitz et al. 2020). Of the potential sites surveyed thus far (approximately 10 sites), no new Poweshiek skipperling sites have been found (D. Cuthrell, MNFI, pers.comm. 2024).

extirpated from the site. A status of “unknown” is assigned if the species was found in 1999 or more recently, but not in the most recent one to two sequential survey year(s) since 1999 and there is no evidence to suggest the species is now extirpated from the site. A species is considered to be “possibly extirpated” at sites where it was detected at least once prior to 1999, but not in the most recent one to two sequential survey years(s). “Possibly extirpated” is also assigned as a status to sites where Poweshiek skipperling was found prior to 1999 and no surveys have been conducted in 1999 or more recently. In order to be considered “extirpated” a site must have had at least three sequential years of negative surveys, because of the difficulty of detecting these species. A species is also considered “extirpated” at sites where habitat for the species is no longer present.

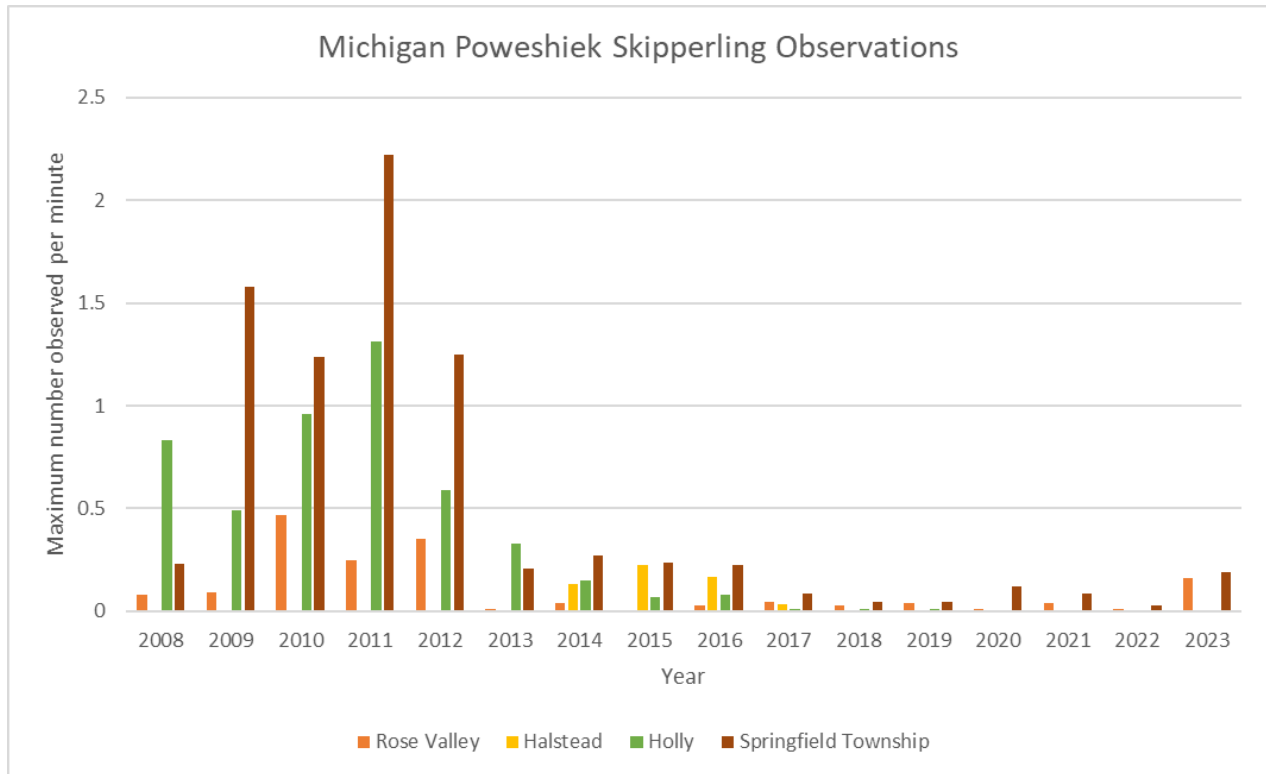


Figure 2. Maximum number of Poweshiek skipperling individuals observed per minute by year for the Michigan sites where the species is currently considered present. Note that 3 sub-sites are grouped within the Springfield Township site.

Manitoba

One prairie complex in Manitoba is still considered present. Since the last five-year review in 2019, distance sampling surveys have detected between 28 and 141 total Poweshiek skipperlings (28 in 2019, 57 in 2020, 117 in 2021, 41 in 2022, and 141 in 2023) within the North Block of the Tallgrass Prairie Preserve in Manitoba per year (Burns et al. 2021, 2022, 2024, Westphal et al. 2023, Figure 3). Population estimates ranged from 0 to 241.67 at the sub-sites within the prairie complex (Burns et al. 2024), with observations at one where the species hadn't been observed since 2014 (site 12). For the first time, reintroductions occurred at one of the sub-sites that had historical, but not recent, records of the species (Burns et al. 2024, see Conservation Measures section for more details).

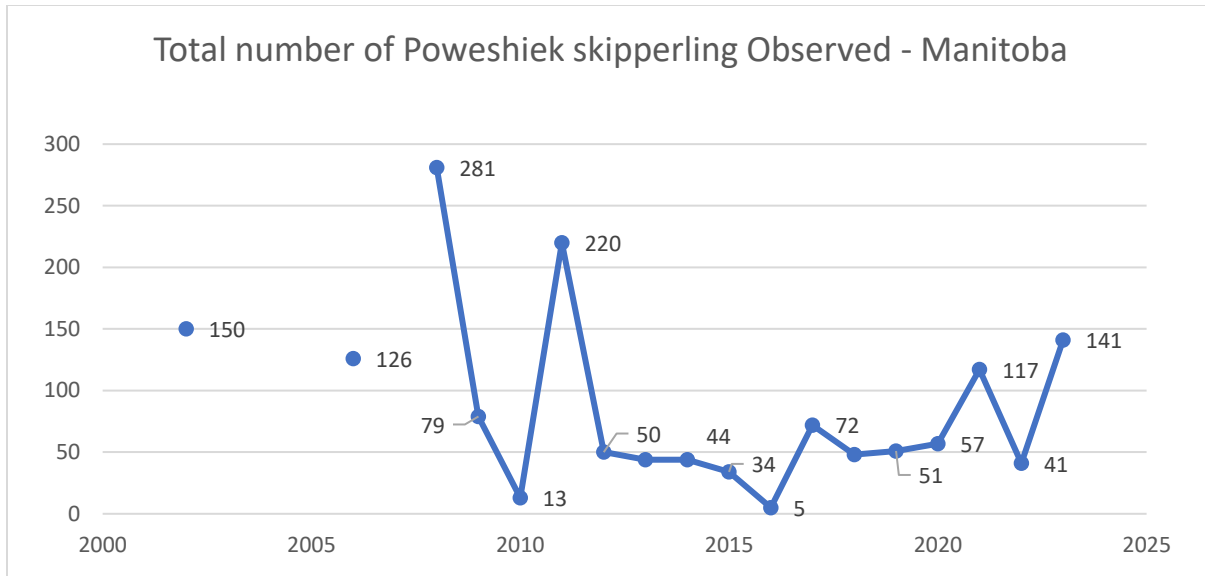


Figure 3. Total number of Poweshiek skipperling individuals seen per year in Manitoba during distance sampling surveys conducted by the Assiniboine Park Zoo, as of 2023.

Wisconsin

At the time of listing, there were three sites with unknown occupancy and one site where Poweshiek skipperling were present. The three sites with previously unknown occupancy are now all considered extirpated. The site with Poweshiek skipperling presence, Puchyan Prairie, is unknown. Since 2012, no more than three Poweshiek skipperlings have been observed in a given year at that site. There was one individual sighted in the years 2017, 2018, 2020, and 2022, however no photo documentation confirms these sightings. No sightings were reported in 2023.

Minnesota, Indiana, Illinois, Iowa, North Dakota, South Dakota

Since the time of listing, there have been no sightings in Minnesota, Indiana, Illinois, Iowa, North Dakota, and South Dakota. There are no sites where the Poweshiek skipperling is currently considered present in those states.

Genetics:

Genomics – Michigan - In 2023, Michigan State University (MSU, Fitzpatrick Lab) carried out population genomic characterizations of extant Michigan Poweshiek skipperling populations using 35 individuals collected in years 2021-2022.

Genomics – Manitoba - In 2022, Assiniboine Park Zoo (APZ) in Manitoba, Canada, completed a reference genome of the Poweshiek skipperling (Westphal et al. 2023). All samples contained Wolbachia sequences. These data are used to look at the Wolbachia infection between years and sites. In 2023, APZ developed a data-share agreement with the Fitzpatrick Lab at Michigan State University (MSU) and transferred the entirety of their Poweshiek genomic sequencing data them for analysis. These data, along with the genomic data from the Michigan population will inform decision-making about the potential for cross-border breeding and translocations (Burns et al. 2024).

Taxonomic and nomenclature:

There has been no change in taxonomic classification or changes in nomenclature for the species since the species was listed in 2014.

Habitat:

Poweshiek skipperling inhabit native untilled prairies, of which few still exist within the species range (U.S. Fish and Wildlife Service 2014). Since the last five-year review, all occupied Michigan sites have had encroachment of invasive species, although see the Conservation Measures section for information on habitat restoration, including invasive species control measure, in Michigan, Wisconsin, and Manitoba. In 2021 Michigan Nature Association (MNA) protected 33 acres approximately 1,000 feet east of the occupied habitat, with a conservation easement. Additionally, in 2021, MNA acquired 14 acres approximately 1,000 feet to the northwest of the occupied habitat (A. Bacon, Michigan Nature Association, pers. comm. 2024). We are not aware of any land acquisitions in Wisconsin or Manitoba.

Additional information:**Threats Analysis (threats, conservation measures, and regulatory mechanisms):****Threats:**

Present or threatened destruction, modification or curtailment of its habitat or range:
No new information since listing.

Overutilization for commercial, recreational, scientific, or educational purposes:
To discourage trampling and potential destruction of habitat (see U.S. Fish and Wildlife Service 2019), signage was installed to stop entrance into sensitive habitats in Springfield Township, Michigan. No further trampling from photographers has since been noted.

Disease or predation:
Wolbachia was found in all analyzed genomic samples (also, see the Genetics section below). In 2022, three Poweshiek skipperling with wing deformities in the captive population in Manitoba showed low levels of *Pseudomonas fluorescens* group and *Pantoea* sp. as well as higher levels of *Enterococcus mundtii* (Westphal et al. 2023), which effects continue to be studied.

Inadequacy of existing regulatory mechanisms:
No new information, although see the “Overutilization for commercial, recreational, scientific, or educational purposes” section for information regarding signage and entrance to Poweshiek skipperling sites.

Other natural or manmade factors affecting its continued existence:
A gravel mine (and possibly extraction of other materials) is proposed approximately 1.75 miles south of Springfield Township complex, which, if approved, may adversely

affect the hydrology of the fragile fen habitat (M. Losey, Springfield Township, pers. comm. 2024).

Conservation Measures:

Internal Partnership:

In 2022, the Poweshiek Skipperling International Partnership (PSIP) finalized its charter, which describes the conservation partnership between the U.S. and Canada. Since 2021, an internal PSIP newsletter (The Poweshiek Post) has been issued approximately 3 times per year to enhance PSIP communications and collaboration among the PSIP working groups. See the *Outreach and Communications* section for more on partnership-wide communications.

Funding:

Partners have secured various sources of funds for Poweshiek skipperling conservation work, including but not limited to funds from Legislative-Citizen Commission on Minnesota Resources (LCCMR), Minnesota Environment and Natural Resources Trust Fund as recommended by the Legislative-Citizen Commission on Minnesota Resources, Great Lakes Restoration Initiative (GLRI) Threatened and Endangered Species Template, Association of Zoos and Aquariums (AZA), USFWS station funds, and National Geographic Society's "Species on the Brink" fund. Much of the captive rearing, population surveys, habitat management, decision support, and outreach work in the U.S. was provided from the Great Lakes Restoration Initiative (GLRI) through the U.S. Fish and Wildlife Service's Threatened and Endangered Species Template.

Captive Rearing Work:

Implementation of the plan to head-start Poweshiek skipperling began in 2016 (Smith et al. 2016), with the first successful releases back to the wild occurring in 2018. Our understanding of the species needs in a captive setting has advanced significantly since the last five-year review.

In 2018, 2019, and 2020, Minnesota Zoo researchers reliably bred Garita skipperlings (*Oarisma garita*), a closely related surrogate species for Poweshiek skipperling (Runquist 2019, 2020). In 2020, the Minnesota Zoo successfully bred two Poweshiek skipperling pairs resulting in viable eggs (Runquist 2020). Captive rearing work began to shift away from the head-start programs to focus on breeding with insurance populations maintained. An updated population viability analysis (Miller 2020) suggested that head-starting alone, regardless of how successful the *ex situ* survivorship, would not be enough to get the augmented populations out of an 'extinction vortex' and reach suitability thresholds. It took several years to understand how to successfully breed adults, however through breeding more individuals are produced than solely through head-starting.

The John Ball Zoo in Grand Rapids, Michigan, joined the partnership and received the first Poweshiek skipperling pupae from the Minnesota Zoo in 2021. Breeding operations at the John Ball Zoo resulted in eight pairs of successful breeding, to establish the first cross-generation insurance program of the species (Pavlik et al. 2021, Runquist et al. 2021).

Wild collected eggs and eggs from zoo-bred Poweshiek skipperlings are split between the Minnesota Zoo and John Ball Zoo, to ensure that each lineage is represented at each zoo. This

also provides lineage redundancy at both facilities and the butterflies are functionally managed as a single population.

The emphasis on captive breeding (Table 2), as compared to solely head-starting (Table 3), has increased egg production for the Michigan population *Table 2*. Subsequently, the number of releasable adults the last two years has also risen (*Table*). No augmentations occurred in 2021 and 102 Poweshiek skipperling were released in 2022, which marked the last year of releases of solely head-started animals. Five females were caught for wild egg collections in 2022 and only two produced viable eggs. Because of the comparably larger zoo-based populations and the likelihood of closely-related future collections, head-starting from wild eggs was discontinued.

In 2023, the 523 Poweshiek skipperlings were released at the two extant sites (Springfield Township and Rose Valley) in Michigan. Since no new wild eggs were collected, the zoos have developed a breeding scheme to maintain genetic diversity. With the success of the Poweshiek skipperling breeding program, an emphasis is being put on improving captive neonate survivorship. Most of the captive mortality takes place during the first instar/neonate stage; this is also the period of husbandry that has shown the greatest amount of improvement (*Table*).

Table 2. Egg output and hatch rates from zoo-bred female Poweshiek skipperling in Michigan (Minnesota Zoo and John Ball Zoo combined).

Year	Number of successful breeding pairs	Number of eggs produced	Total number of hatched eggs
2020	2	32	10 (31%)
2021	8	589	206 (82%)
2022	17	1,680	635 (78%)
2023	30	3,108	1856 (85%)

Table 3. Number of wild-held females for egg collections and hatch rates of the Michigan population (Minnesota Zoo and John Ball Zoo combined). To see the number that produced viable eggs, refer to the corresponding years' Minnesota Zoo annual report. No wild eggs were collected in 2023.

Year	Number of wild females collected (number that laid eggs)	Number of eggs produced	Number hatched at Minnesota and John Ball zoos (% hatch rate)
2019	10 (9)	153	109 (71%)
2020	10 (9)	141	66 (47%)
2021	8	190	161 (85%)
2022	5 (4)	143	102 (71%)

Table 4. Total number of Zoo reared Poweshiek skipperlings released at the Michigan populations since 2018. No Poweshiek skipperlings were released in 2021 as all zoo-reared adults were held for breeding that summer.

Year	Count Released
2018	2
2019	14
2020	61
2022	102
2023	523

Table 5. Comparison of neonate to diapause Poweshiek skipperling survival by year since the inception of the program at the Minnesota Zoo and John Ball Zoo.

Life stage	2018	2019	2020	2021	2022	2023
Neonates	18	109	66	553	1372	3163
Larvae placed in diapause	16 (89%)	70 (64%)	41 (62%)	225 (41%)	851 (62%)	1907 (60%)

In 2020, the Assiniboine Park Zoo successfully bred 3 adult Poweshiek skipperlings, resulting in 272 eggs that had various hatch rates (Burns et al. 2021). Breeding, number of eggs and hatch rates remained relatively stable the next year, decreased in 2022, and increased in 2023 (Table 6). In general, zoo-bred females had a higher egg output than wild-caught females (Table 7). Since the last five-year review, 13 (2019), 19 (2020), 191 (2022), and 58 (2023) adult butterflies were released at Manitoba’s Tall Grass Prairie Preserve in 2019, 2020, 2021, 2022, and 2023, respectively (Burns et al. 2020, 2021, 2022, 2024, Westphal et al. 2023). In 2023, The Assiniboine Park Zoo completed the first-ever reintroduction of the species in 2023 with the release of 58 zoo-reared Poweshiek skipperling into the South Block of the Tallgrass Prairie Preserve (Burns et al. 2024).

Each year, a few individuals are held back at the zoo to build the insurance and breeding program.

Hatching and survival to diapause of the species at the Assiniboine Park Zoo shows an upward trend since the zoo started their rearing program in 2017 (Table 8).

Table 6. Egg output and hatch rates from zoo-bred females at Assiniboine Park Zoo, Manitoba, Canada. Note, the releases occur the year following the cohort year (e.g., 2020 cohort resulted in 19 released in 2021).

Cohort Year	Number of successful breedings	Number of eggs produced	Number Hatched	Hatch Rate average % (% range)	No. Released (calendar year is one year after cohort.)
2019	n/a	n/a	n/a	n/a	
2020	3	257	176	50.9 (0 - 91.2)	19
2021	3	249	163	65.5 (60.0 - 69.8)	47
2022	1	51	45	87.3	191
2023	5	435	337	75.3 (51.9 - 85.1)	58

Table 7. Number of wild caught eggs collected, hatch rates and total release numbers at the Tall Grass Prairie Preserve, Manitoba. Note, the releases occur the year following the cohort year.

Cohort Year	Number of Wild Females	Number of eggs produced	Number Hatched	Hatch Rate average % (% range)	No. Released (calendar year is one year after cohort.)
2019	7	120	67	41.0 (0 – 98.9)	
2020	7	49	21	42.8 (0-100)	
2021	10	226	202	89.4 (0 - 100)	47
2022*	12	128	90	70.3 (0 - 100)	
2023**	12	260	229	74.1 (42.9 – 100)	TBD

*In 2022, two wild-caught females did not produce eggs.

** In 2023, one wild-caught female did not produce eggs.

Table 8. Comparison of hatching and survival to diapause of Poweshiek skipperling by year since the inception of the program in 2017.

	2017	2018	2019	2020	2021	2022	2023
Eggs Hatched	16	56	57	197	365	135	566
Larvae placed in diapause	6	32	32	60	279	87	423
Survival rate to diapause	37.5%	57.1%	47.8%	30.5%	76.4%	64.4%	74.7%

Mark recapture studies: The zoos mark zoo-reared adults prior to release, which allows them to differentiate from wild individuals. Marked individuals provided researchers with data on dispersal distance from known release sites, longevity of released individuals, and differentiation between wild and zoo-reared individuals (e.g., to ensure egg collections were not previously released individuals).

Genetics research: Given the low number of founders in the zoo populations in the U.S. and the low number of wild adults observed in Manitoba, plans are underway to avoid an imminent genetic bottleneck by exploring a genetic exchange between these two sources. Genetics work at the Assiniboine Park Zoo found that strains of *Wolbachia* are the same between Manitoba and Michigan Poweshiek skipperling (Burns et al. 2021). Coupled with the low F_{st} values (proportion of the total genetic variance contained in a subpopulation relative to the total genetic variance, high values indicate a considerable degree of differentiation among populations) between Manitoba and Michigan populations and with little observed genetic structuring, there is no expectation of major incompatibility issues from crosses. The next step will be to breed Manitoba and Michigan derived lineages in a controlled setting to observe the subsequent generation(s) prior to any release attempts.

Habitat Restoration and Adaptive Management:

In Michigan, within and around Poweshiek skipperling critical habitat, management since the last five-year review has included chemical and mechanical removal of invasive plants, including buckthorn, narrow leaved cattail, and phragmites. Prescribed burns are also being used in some areas (e.g., outside of occupied habitat in Big Valley Nature Sanctuary) to control invasive plants and woody encroachment (M. Losey, Springfield Township, pers. comm. 2024; A. Bacon, Michigan Nature Association, pers. comm. 2024). University partners continue to monitor habitat (e.g., nectar resources, oviposition host plants, larval food sources, and invasive plants) and are developing adaptive habitat management plans for the Michigan sites (Hansen et al. 2023a, b, c, d, e). Burning has occurred at sites classified as potential habitat and dispersal habitat. Burned habitat is monitored and compared to unburned areas (e.g., Hansen et al. 2023b). Additional habitat management activities (e.g., prescribed burns in occupied areas) are covered by a recently finalized Habitat Conservation Plan (U.S. Fish and Wildlife Service 2020).

In Wisconsin, within and around Poweshiek skipperling critical habitat, habitat management since the last five-year review has included chemical and mechanical removal of invasive plants, including buckthorn, narrow leaved cattail, and phragmites. Forestry mowing is limited to dense brush pockets. Prescribed burns have occurred in remnant prairie areas that contain prairie dropseed. In addition, Wisconsin Department of Natural Resources collected and spread seed from a variety of milkweed species and prairie dropseed to increase these plants within the prairie (J. Watson, Wisconsin Department of Natural Resources, pers. comm. 2024).

In Manitoba, within the Tall Grass Prairie Preserve, management over the past five years has included chemical treatment of invasive species, mechanical control of woody species, cattle grazing, and prescribed burns at sites classified as potential and dispersal habitat. In addition, Poweshiek skipperling habitat management guidelines have been developed for currently occupied and unoccupied sites in Manitoba (T. Teetart, Nature Conservancy of Canada, pers. comm. 2024).

Although we are there is still a lot of work to be done before we can identify potential reintroduction sites in these states, there is ongoing habitat management in some historical Poweshiek skipperling sites in Minnesota, North Dakota, and South Dakota.

Outreach and Communication:

Outreach has focused on informing the public about the decline of the Poweshiek skipperling and increasing awareness and support for conservation activities, including captive rearing work and securing Poweshiek skipperling sites. The Minnesota Zoo received GLRI funding through the U.S. Fish and Wildlife Service's Threatened and Endangered Species Template to create a website for the PSIP that highlights the conservation work of this partnership and raises public awareness about the species. The website (<https://savingskippers.org/>) launched in the summer of 2024.

In Michigan, several expert presentations, webinars, social media, and traditional media articles highlighted the species, its challenges, and the conservation work of the Poweshiek Skipperling International Partnership (PSIP). Of note, in 2021, Assiniboine Park Zoo premiered "[Poweshiek skipperling: Recovery Tales of a Tiny Butterfly](#)" video, and in 2022, published a story map "[Plight of the Poweshiek](#)" that outlines the plight of the species and the ongoing conservation work on the species. In 2023, a partnership with Michigan Nature Association, Fauna Creative premiered a short video documentary "[Life on the Brink](#)" that highlighted PSIP conservation work. Signage and closure of Poweshiek skipperling sites has occurred to deter photographers and butterfly collectors from disturbing sensitive Michigan sites.

In Manitoba, outreach highlighted Poweshiek skipperling conservation work in Canada and included expert presentations at scientific conferences, webinars and local events, interpretive signs at the Assiniboine Park Zoo, social media, and press releases and television and radio interviews (Burns et al. 2021, 2022, 2024, Westphal et al. 2023).

Since the last five-year review, several scientific articles have been published on the species, primarily focusing on stressors contributing to the decline (Belitz et al. 2020), species presence (Pogue et al. 2019), and habitat management (Dupont-Morozoff et al. 2022).

Oviposition research

Oviposition monitoring occurred in the extant Michigan sites and indicated the likelihood that Poweshiek skipperling are preferentially occupying and ovipositing in areas with comparably more available resources (e.g., Hansen et al. 2023a).

Climate change research:

The University of Winnipeg is conducting climate change envelope modeling to determine the climate suitability at the Tall Grass Prairie Preserve and to identify potentially climatically-suitable additional areas for Poweshiek skipperling.

Garita skipperling research and temperature study:

In 2017, the Minnesota Zoo began rearing a closely related species, Garita skipper (*Oarisma garita*) to study temperature and phenological development and has continued the work through 2019 (Runquist et al. 2019). This was conducted to improve husbandry methods after the zoo-reared Poweshiek skipperling experienced accelerated development in 2016. Garita skippers were used to determine the optimal husbandry setup to promote breeding and to study larval development responses to various temperature conditions (Runquist, et al. 2020).

Pesticide research: Grass and soil samples from interior and edges of four Minnesota and one South Dakota prairies were collected from 2014 – 2020, which documented dozens of pesticides across all sites and years on Poweshiek skipperling larval host grasses (Runquist et al. 2024). Quantities of chlorpyrifos were higher at sites where Poweshiek skipperling and Dakota skipper (*Hesperia dacotae*) are both extirpated. Broad-spectrum organophosphate and pyrethroid insecticides were common in late seasons, but few pesticides were detected in soil or early season grass samples. In addition, neonicotinoid insecticides did not present a significant exposure signal at the sampled sites. Additional pesticide studies are being planned at several potential Poweshiek skipperling reintroduction sites in the U.S. and Canada. This project will be at least partially funded through the Inflation Reduction Act.

Population Viability Analysis modeling:

In 2019, GLRI Threatened and Endangered Species Template funded the Conservation Planning Specialist Group to conduct a comprehensive population viability analysis model (using Vortex) to predict possible responses of a variety of population management strategies (Miller 2020). The model helped biologists understand which management strategies would likely improve long-term viability of the species.

Recommendations for future activities

Recommendations for future activities include (but are not limited to) maintaining and building upon the captive rearing, breeding, translocation, insurance and release programs to bolster extant populations and reintroduce the species to previously occupied or new areas (Recovery Action 1). These programs also contain host plant research, population viability analyses, and development of genetic breeding plans (Recovery Action 1). This may also include continued genomic work to inform possible genetic exchange between Canada and U.S. populations (Recovery Action 1). Additional recommendations for future activities include stressor studies and remediation, such as active habitat management and hydrological studies (Recovery Action 2), pesticide toxicity studies, climate change modeling in the U.S., and release strategies in the light of climate change (Recovery Action 4). Ongoing activities include 1) assessing populations and habitat through surveys and monitoring, including mark-release studies to study Poweshiek skipperling survivorship and dispersal (Recovery Action 3) and 2) maintaining and building the PSIP partnership and internal and external communications, such as continued all-partnership meetings and maintaining the PSIP website (Recovery Action 5).

Synthesis

Sites where Poweshiek skipperling are currently present have seen a 75% decrease (from 12 to 3, not including one additional site with unknown status) since the time they were listed as endangered in 2014. Poweshiek skipperling numbers continue to be low at the remaining sites and they have not been found at any additional sites. The majority of Poweshiek skipperling individuals are concentrated at two locations (Michigan and Manitoba), therefore, the species is highly vulnerable to extirpation from a catastrophic event. Additionally, Poweshiek skipperlings are vulnerable to stochastic events due to the small population numbers at all extant sites. A coalition of international partners (PSIP) is actively working to conserve this butterfly through captive breeding and release efforts, habitat restoration and acquisition, population viability modeling, outreach, and research on the genetics, climate change, and pesticides. However, even

with this conservation work, the threats for Poweshiek skipperling have not been ameliorated. These threats include habitat degradation through invasive and woody species encroachment, the effects of climate change (e.g., high temperatures and prolonged drought), altered hydrology, pesticides, and the negative impacts of low population sizes.

After reviewing the best available scientific information, we conclude that Poweshiek skipperling remains an endangered species. The evaluation of threats affecting the species under the factors in 4(a)(1) of the Act and analysis of the status of the species in our 2019 five-year review remains an accurate reflection of the species current status.

RESULTS

**U.S. FISH AND WILDLIFE SERVICE
STATUS REVIEW of *Oarisma poweshiek***

Current Classification:

Status Recommendation resulting from Status Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist (Indicate reasons for delisting per 50 CFR 424.11):
 - The species is extinct
 - The species does not meet the definition of an endangered or threatened species
 - The listed entity does not meet the statutory definition of a species
- No change needed

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date _____

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