

National Park Service
U.S. Department of the Interior

Division of Fire and Aviation Management



National Park Service Great Lakes Fire Ecology Annual Report Calendar Year 2025

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Sunrise through the fog at Voyageurs National Park. Photo credit: Scott Weyenberg

The National Park Service (NPS) Division of Fire and Aviation Management relies on science and long-term monitoring to inform an adaptive management approach for assessing and improving fire management programs and activities at park units. Adaptive management, along with policies, standards, and responsibilities for monitoring are described in Chapter 8 of [Reference Manual 18](#). The NPS Fire Ecology Program is responsible for the collection, analysis, and interpretation of fire effects monitoring data for park managers to use for program evaluation and decision making. This annual report is intended to partially fulfill reporting requirements for the Fire Ecology Program and does not constitute a complete analysis of any NPS fire management program or activity. Additional interpretation and reporting can be found in previous annual reports at [NPS DataStore](#) or by contacting the author(s) of this report.

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A. Summary

The Great Lakes Fire Ecology Program had a productive 2025 season. For the first time in its existence the entire crew returned for the next field season. This reduced the impact of the Lead Monitor's absence in February and March, since no onboarding and seasonal training was needed. Vegetation monitoring was done at six parks with 321 plots sampled in total. Of note, the crew made a trip to Voyageurs N. P. for the first time since 2021. In preparation for a 6,000-acre prescribed fire, 51 new permanent Project Level Monitoring (PLM) plots were installed. At Pictured Rocks (PIRO), pre-burn sampling was completed with the installation of 30 additional plots. Prescribed burns are planned at PIRO for the spring of 2026. These will be the first prescribed burns done at the park. One-hundred temporary plots were sampled at Sleeping Bear Dunes to assess the impact of a past prescribed fire in a mesic forest.



Sampling at Voyageurs National Park. Photo credit: Eric Anderson.

The Fire Ecology staff continues to be very active through the spring and fall with fire operations. They assisted with line prep, WUI treatments, fire suppression duties and participated in 13 prescribed burns in seven parks. Three of the burns were out of zone. The crew went on four wildland fire assignments, closed one task book (FEMO), opened one task book (ENGB), and took several NWCG courses.

Fire history research continues at Sleeping Bear Dunes (SLBE), St. Croix Riverway (SACN) and PIRO. The project at SACN was taken on by a graduate student while data collection at PIRO and SLBE continues as time allows.

A brief report was produced for SLBE with talking points and supporting literature to justify the inclusion of a portion of mesic hardwood forest in a 2023 prescribed burn (included in Appendix C). Botanists, contracted by the National Parks Conservation Association to perform a floristic survey, happened upon the burn and were aghast that fire was applied in a mesic forest. The

report cited several deleterious effects presumed to be from the fire. The observers, however, overlooked the major blowdown event that happened six months prior to the burn, which was the reason for many of the assumed negative effects.

Table 1. Fire Effects Plot Workload (2025)

Park	Monitoring Unit	Plot Type	Years Data Collected (start-end)	Annual Total (2025)	Total Plots
St. Croix	Oak Forest	PLM†	2009 - 2025	12	16
	Tallgrass Prairie	PLM	2006 - 2024	9	32
	Glade	PLM	2006 - 2025	5	8
	Oak Forest	Photo points	2023 - 2025	9	24
Voyageurs	Mixedwood	PLM	2004 - 2025	29	44
	Jack Pine	PLM	2025	13	13
	Red/White Pine	PLM	2004 - 2025	6	83
	Oak Forest	PLM	2004 - 2025	2	5
	Bog	PLM	2004 - 2025	1	7
	Jack Pine	FMH	2000 - 2025	1	12
Ice Age Trail	Oak Savanna	PLM	2019 - 2025	9	9
Sleeping Bear Dunes	Red Pine	PLM	2017 - 2025	19	19
	Pine/Oak	PLM	2017 - 2025	14	43
	Jack Pine Woodland	PLM	2018 - 2025	19	19
	Jack Pine Barrens	PLM	2019 - 2025	10	10
	Beech/Maple	Veg squares	2025	100*	0
Pictured Rocks	Jack Pine Barrens	PLM	2025	30	30
Indiana Dunes	Oak Savanna	FMH - Forest	1998 - 2025	2	34
	Oak Woodland	PLM	2005 - 2025	31	115
Total				321	523

† Project Level Monitoring (PLM) plots are similar to Rapid Assessment plots.

* These plots are temporary and unmarked. They are not intended to be resampled.

B. Monitoring Results and Recommendations

Reports over the last few years have focused on describing the current site conditions. Managers have expressed their interest in this type of report over more technical trend analyses, which were previously done. These reports are based on plot data as well qualitative observations from site visits. Site visits concentrate on gathering information on the stand attributes that are of

most interest, which varies from site to site. Since the sample plots do not cover large areas of a unit, data from the site visits, though qualitative, are an invaluable supplement to the plot data.

This year the focus has been on completing monitoring plans for IATR and SLBE. Therefore, only one report was produced by the ecologist. This report to SLBE, offered a response to the accusations regarding negative fire effects produce from a prescribed burn in a mesic hardwood forest.

The Fire Ecology program worked with INDU Resource Management staff to mitigate fire impacts on several fire sensitive plant species in the Furnessville North burn unit. Fire Effects staff reduced the leaf litter in flagged patches and ensured that ignition techniques decreased fire intensity near the plants. In addition, Fire Effects staff conducted a review and resampling of an internal, unpublished study of some of these same plant species in a nearby unit, which was partially burned in 2012. Initial concerns were that fire kill these shallow rooted plants. However, resampling showed that populations in adjacent, unburned area also saw significant longer-term declines.

All reports produced to date are listed by park in Section E below. A table summarizing the monitoring results acquired from these reports can be found in the *2022 Great Lakes Fire Ecology Annual Report*.

C. Research, Planning, and Communication

Research

Two fire history research projects which began in 2024 at PIRO and SACN have continued in 2025. Fires scar sampling was done at Miner's Beach (PIRO) by the fire ecologist, and a brief search was done in the Beaver Lake Basin, but no significant samples were located. The SACN fire history project was adopted by a former employee who is now in the Forestry graduate program at the University of MN. He will complete the project for his thesis.

Several fire history projects have been completed at the Great Lakes parks through collaboration with Professor Kurt Kipfmeuller, formerly from the U of MN, now at the U of MI. Collaboration between the fire ecologist and Prof. Kipfmeuller began around 2010 with fire history research at Voyageurs NP (VOYA). Data from this study was published in 2017 in [*Historical drivers of a frequent fire regime in the red pine forests of Voyageurs National Park, MN, USA - ScienceDirect*](#). Research was later completed at Apostle Islands and Sleeping Bear Dunes. New projects were started at SACN and PIRO last year under collaboration with the same professor.

Other peer reviewed research that used monitoring data or involved significant assistance from Fire Ecology staff includes: *To Burn Or Not To Burn Oriental Bittersweet: A Fire Manager's Conundrum*, and *Vegetation Dynamics after Spring and Summer Fires in Red and White Pine Stands at Voyageurs National Park* [Weyenberg & Pavlovic VOYA 2014.pdf](#) ([lakestatesfiresci.net](#)).

Planning

The IATR, SLBE and SACN monitoring plans were started in 2025. The plans are expected to be signed in 2026. Completed plans can be found on IRMA, [Voyageurs NP Fire Monitoring Plan](#), [Indiana Dunes NP Fire Monitoring Plan](#)

The fire ecologist leads prescribed fire planning meetings for the seven parks serviced by the Great Lakes FMZ. He also collaborates with Invasive Plant Management Team liaisons to coordinate, document, and find funding for the fuels treatments they perform at the Great Lakes FMZ parks. The ecologist is also substantially involved in helping parks identify fuel treatment needs, mapping treatment areas and providing data to update burn plans and FMPs.

St. Croix NSR has made great progress toward thinning their pine plantations. The fire ecologist has provided technical advice and documentation on the project. He will continue to assist with this project as well as the Cable fuel reduction project.

Outreach and Communication

The fire ecologist gave two presentations this year. One presentation was to the Fire Ecology group on the work the Great Lakes program has been doing on fire history research. The other presentation was given to park resource managers from the Great Lakes area parks. The presentation entitled *Fire Ecology in a Management Context*, explained how fire is used as a management tool. It touched on various aspects ranging from ignition patterns to fire regimes.

D. Future Direction

This is the second year with an all-permanent crew. This has been a great advantage not just in time saved in the hiring process and training, but it has allowed us to support fire operations with fire suppression and project work during the spring and fall when help is most needed. Our current mode of operation will provide a seamless transition into the new Fire Monitor PD's (GW 0456). All new Fire Monitors and most existing monitors will be hired into these PD's and be expected to fully participate in fire operations work. The Great Lakes Fire Ecology program will not need to change their current program to meet this requirement since all Fire Effects staff are red carded and arduous pack tested. The crew already spends a significant amount of their time on primary fire related activities.

The entire NPS fire program will be rolled into the new US Wildfire Service in 2026. There is currently no information on what changes will be made to the program.

Modifications are planned to the monitoring protocols used at LIBO and select units at INDU. These sites contain plots and protocols we inherited from the USGS in the 2000's. To provide consistency and simplification, the plan is to convert these plots to the standard PLM protocols used at most of the parks within the Great Lakes Fire Ecology program.

E. References, Links, and Additional Reading

Fire Effects Monitoring Plans as well as FFI data for individual parks can be found in the IRMA database, ([NPS DataStore Home](#)). Fire Effects Monitoring plans exist for three parks within the park group: VOYA, INDU, and LIBO with IATR, SACN and SLBE plans expected to be signed in 2026. FFI Datasets exist for VOYA, SLBE, SACN, INDU, PIRO and LIBO.

Below is a list of reports provided to park staff since 2004. Most of the reports are technical reports on specific burn units or ecosystems. Others included method comparisons, seasonal treatment summaries and general ecosystem reviews. Published literature can be found in Section C above. Many post-burn fire severity and fuel consumption reports have been produced over the years. These reports are too numerous to list and are therefore referenced together under the single author (Fisher-Dunham, 2010 – 2022). Species Summaries are summaries of rare or uncommon species that are of particular interest to the parks. These reports summarize species traits, their reaction to fire and possible mitigation measures. They are not comprehensive analysis of the species.

Ice Age Trail

Weyenberg, Scott A. 2023. Post-burn report for the Ice Age Trail Complex prescribed fire, April 27, 2023. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.4.

Indiana Dunes National Park

Belaski, Whitney. 2019. Current Conditions of Oak Savannas and Woodlands in the Western Units of Indiana Dunes National Park (2016-2018). Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.29.

Fisher-Dunham, Mary. 2010 – 2022. Post burn fire severity and fuel assessment reports. Indiana Dunes National Park Fire Effects Files. Porter, IN.

Weyenberg, Scott A. 2005. Oak Savanna Summary report: Plant cover and diversity – 2005. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.7.

Weyenberg, Scott A. 2005. Mnoké Prairie status report – 2005. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.14.

Weyenberg, Scott A. 2006. Addendum to the 2005 Mnoké Report. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.6.

Weyenberg, Scott A. 2006. Hobart Prairie Grove Summary Prescribed Fire and Mechanical Treatments, 2005 - 2006. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.12.

Weyenberg, Scott A. 2009. Fire Effects Summary Report. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.5.

- Weyenberg, Scott A. 2009. Cowles Dune post burn report. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.9.
- Weyenberg, Scott A. 2009. Kintzele Ditch post-burn assessment, 2009. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.14.
- Weyenberg, Scott A. & Fisher-Dunham, Mary. 2010. Indiana Dunes National Lakeshore Fire Effects Monitoring Program Review. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.18.
- Weyenberg, Scott A. 2011. Mnoké Prairie 2010 Summary Statistics Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.1.
- Weyenberg, Scott A. 2011. Assessment of Mnoké Prairie seeding and mowing trials. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.8.
- Weyenberg, Scott A. 2012. Site Conditions Fact Sheet: Miller Woods, Tolleston Dunes & Inland Marsh. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.9.
- Weyenberg, Scott A. 2013. Dune Ridge post-burn condition assessment, 2005 through 2013. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.11.
- Weyenberg, Scott A. 2014. Fuel succession following burning in oak savannas and woodlands at Indiana Dunes National Lakeshore. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.34.
- Weyenberg, Scott A. 2019. Species summary for *Chimaphila maculata*. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.2.
- Weyenberg, Scott A. 2019. Species summary for *Epigaea repens*. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.2.
- Weyenberg, Scott A. 2019. Species summary for *Gautheria procumbens*. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.2.
- Weyenberg, Scott A. and J. Stern. 2020. A rapid condition assessment of Miller Woods Unit 1, Tolleston Dunes East and West, Cowles Dunes and Howes Prairie. Final Report. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.11.
- Weyenberg, Scott A. 2024. Furnessville sensitive species analysis report 2013 through 2016. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.5.

Lincoln Boyhood National Memorial

- Weyenberg, Scott A. 2010. Lincoln Boyhood National Memorial: Forest assessment. Indiana Dunes National Park Fire Effects Files. Porter, IN. pp.9.

North Country Trail

- Weyenberg, Scott A. 2022. Site visit of the North Country Trail property in Solon Springs, WI Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.9.

Pictured Rocks National Lakeshore

Weyenberg, Scott A. 2024. Stand assessment for Twelve Mile Beach East jack pine stand. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.3.

Saint Croix National Scenic Riverway

Weyenberg, Scott A. 2009. Olson's Prairie condition assessment. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.4.

Weyenberg, Scott A. 2010. Peaslee condition assessment. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.6.

Weyenberg, Scott A. 2009. Sterling Prairie condition assessment. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.6.

Weyenberg, Scott A. 2009. Sunrise Prairie condition assessment. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.4.

Weyenberg, Scott A. 2014. Sterling Prairie progress report. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.7.

Weyenberg, Scott A. 2022. Saint Croix Scenic Riverway 2022 post-burn report. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.20.

Weyenberg, Scott A. 2022. Wild Mountain site assessment. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.20.

Weyenberg, Scott A. 2023. 2023 Peaslee Island bedrock glade condition assessment. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.11.

Weyenberg, Scott A. 2024. 2024 Springbrook vegetation summary. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.7.

Sleeping Bear Dunes

Weyenberg, Scott A. 2025. Response to NPCA report on prescribed fire in mesic forests at Sleeping Bear Dunes National Park. Saint Croix Scenic Riverway Fire Effects Files. St. Croix Falls, WI. pp.8.

Appendices

Appendix A. Staffing and Accomplishments

Table A-1. Fire Ecology Staffing 2025

Ecologist and Monitors	Position	Appointment Length	Training and Development
Scott Weyenberg	Fire Ecologist	PFT	
Eric Anderson	Lead Monitor	PFT	RX-215 Wilderness First Aid S-211 EVOC FI-110 WF Certified Arborist (ARBO) added to Red Card Task book opened: ENGB
Abigail Zastawny	Bio Sci Tech	PSTF 13/13	FI-110 WF Wilderness First Aid S-131 Task book closed: FEMO
Joe Urban	Bio Sci Tech	PSTF 13/13	FI-110 WF Wilderness First Aid S-211

Table A-2. Fire Ecologist 2025 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	29%	FMP, monitoring plan, burn plan development and review, etc.
Presentations	6%	Presentations to Fire Ecology group and Park RM programs, SACN fire refresher, twice
Meetings/task groups	5%	Fire planning meeting with GL parks, site visits with RM.
Wildfire assignments	3%	Staffing and Swiss 2 complex
Prescribed fire/fuels treatment projects	13%	Line prep, rx fire at IATR, pile burning and thinning at SACN
Research	4%	Research for FEMP's and SLBE report, fire scar analysis
Field work/data collection	16%	Sampling at SACN, PIRO and VOYA.
Data management	1%	FFI data management
Data analysis	1%	Estimated amount of time spent performing analyses, including data summaries and statistical tests

Category	Percent Time	Accomplishments and/or areas of activities
Supervision/ admin tasks	16%	Hiring, supervision, payroll, travel authorization/vouchers, purchasing, etc.
Training	3%	Required training, fire refresher.
Miscellaneous	3%	Things that don't fit in other categories – assistance to other work groups/projects (e.g., natural resources), etc.

Table A-3. Fire Effects Crew 2025 Accomplishments/Focus Areas

Category	Percent Time	Notes
Data collection	13%	Sampling at PIRO, INDU, SLBE, IATR, VOYA
Wildfire assignments	11%	Crew went on four wildfire assignments as FFT1, FFT1(t), ENGB(t), and FAL2(t)
Prescribed fire/fuels treatment projects	38%	Line Prep at INDU, SLBE, IATR, EVER, and PIRO. Participated in 13 prescribed burns at eight parks.
Travel out-of-park for plot or project work	2%	Traveled to VOYA, PIRO, SLBE, and IATR for sampling
Data entry/management	10%	Data entry for INDU, PIRO, SLBE, VOYA, and SACN. Managed data from SLBE from 2017, 2018, and 2019 to have format consistent with later data sets.
Data analysis	0%	Time spent assisting Fire Ecologist in data analysis tasks
Administrative activities	12%	Payroll, travel authorization/voucher, etc., crew lead tasks
Training	9%	See Table A-1
Miscellaneous	4%	Things that don't fit in other categories – search and rescue, assisting other work groups/projects (e.g., natural resources/I&M), etc.

Table A-4 provides a breakdown of all the fuel projects undertaken by fire effects staff. In additions to the regular fire monitoring performed by the Ecology program, we also have a significant impact on fire operations as well.

Table A-4 Fire Effects Staff fire operations accomplishments.

Park	Treatment	Unit Name	Number of Crew
<i>Indiana Dunes (INDU)</i>	Line Prep	Furnessville	2
		Miller Woods 3	2
		Miller 5	2
		Miller 1	2
		Miller 7	1
		Cowles Dune	3
		Dunewood Campground	2
		Hobert Prairie Grove	3
		West Beach	2
	Rx Burn	Miller 1	2
		Miller 3	3
		Furnessville North	2
		Derby Ditch	2
		Mnoke Prairie	2
<i>ST. Croix NSR (SACN)</i>	Line Prep	Arcola	1
		Sunrise	1
		Sterling	1
		Rice Lake Flats	1
<i>Lincoln Boyhood Home NM (LIBO)</i>	Haz Fuel Trt	Pile burn	1
<i>Everglades NP (EVER)</i>	Rx Burn	Pine Rocklands	2
	Line Prep	River of Grass	2
<i>Mt. Rushmore NM (MORU)</i>	Rx Burn	Starling Basin	2
<i>Wind Cave NP (WICA)</i>	Rx Burn	Lookout Flats	2
<i>Sleeping Bear Dunes (SLBE)</i>	Line Prep	Good Harbor Trail	1
		Good Harbor West	1
	Rx Burn	Good Harbor Trail	1
		Good Harbor West	1
	Rx Burn	Savanna North	3

Park	Treatment	Unit Name	Number of Crew
<i>Ice Age Trail NST (IATR)</i>		Savanna South	3
		Tower	2
<i>Pictured Rocks NLS (PIRO)</i>	Line Prep	Miners East	1
		Miners West	1

Appendix B. History of Fire Effects Monitoring Plots

Table B-1. All Fire Effects Plots Established

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Time period	Total Plots
Ice Age Trail	Hardwood forest	PLM	2019 - 2022	9
Indiana Dunes	FMH			
	Prairie	FMH - Grass	1996 - Present	28
	Oak Savanna	FMH - Forest	1998 - Present	19
	Oak Savanna	1/4 FMH - Forest	1997-1998	6
	Oak Woodland	FMH - Forest	1998 - Present	21
	Oak Woodland	FMH - Forest	1999 - 2002	1
	Oak Forest	FMH - Forest	1999 - Present	1
	Sub Total	FMH		76
	PLM or similar			
	Pr/Sav/Woodland	USGS (Howes)	1986, 2005 - Present	31
	Oak Woodland	PLM	2004 - Present	49
	Oak Savanna	PLM	2009 - Present	29
	Oak Forest	PLM	2004 - Present	10
	Sub Total	PLM		119
	Photo			
	Wetland	Derby Ditch Photo	2005 - Present	33
	Sub Total	PHOTO		33
	TOTAL	ALL INDU		228
Lincoln Boyhood	Oak - Hickory	Other - USGS	1985 - Present	12
	Oak - Hickory	Shrub cover board	2012 - 2016	6
	Oak - Hickory	PLM	2016	3
	TOTAL	ALL LIBO		21
Pictured Rocks	Red Pine	PLM	2024 - 2024	29
	Jack Pine Barrens	PLM	2025	30
	TOTAL	ALL PIRO		59
St. Croix NSR	PLM			
	Oak Forest	PLM	2014 - 2023	16
	Tallgrass Prairie	PLM	2006 - 2023	32
	Glade	PLM	2009 - 2023	8
	Jack Pine Barrens	PLM	2011 - 2023	10
	Pine/Oak Forest	PLM	2011 - 2023	6

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Time period	Total Plots
	Oak Savanna	PLM	2009 - 2023	3
	PIRE Plantation	1m square	2024 - 2024	121*
	Photo			
	Oak Forest	Photo Points	2017 - 2023	24
	Tallgrass Prairie	Photo Points	2022 - 2024	2
	PIRE Plantation	Photos	2024 - 2024	3
	Oak Forest	Canopy photos	2022 - 2024	83*
	TOTAL	ALL SACN		308
Sleeping Bear	Pine / Oak	PLM	2021 - 2024	43
	Jack Pine	PLM	2018 - 2022	19
	Jack Pine Barrens	PLM	2019 - 2022	10
	Red Pine	PLM	2017 - 2024	19
	Mesic Forest	1m squares	2025	100*
	TOTAL	ALL SLBE		191
Voyageurs	FMH			
	Red/White Pine	FMH forest	1989 - 2019	35
	Mixedwood	FMH forest	1990 - 2013	13
	Jack Pine	FMH forest	1991 - 2014	12
	Sub Total	FMH		60
	PLM			
	Red/White Pine	PLM	2004 - 2025	83
	Jack pine	PLM	2025	13
	Mixedwood	PLM	2004 - 2025	44
	Aspen/Birch	PLM	2004 - 2025	8
	Bog	PLM	2004 - 2025	7
	Oak	PLM	2008 - 2025	5
	Sub-total	PLM		160
	Photo			
	Red/White Pine	Photo Points	2003 - 2019	12
	Jack Pine	Photo Points	2004 - 2014	1
	Mixedwood	Photo Points	2004 - 2014	6
	Oak Barrens	Photo Points	2004 - 2014	1
	Sedge Meadow	Photo Points	2004 - 2014	1
	Sub-total	Photo Pnts		21
	TOTAL	ALL VOYA		241
GRAND TOTAL				1036

Appendix C. Report to Sleeping Bear Dunes



RESPONSE TO NPCA REPORT ON PRESCRIBED FIRE IN MESIC FORESTS AT SLEEPING BEAR DUNES NATIONAL LAKESHORE



Blowdown at the Good Harbor Trail burn unit. Photo credit: Eric Anderson.

Scott Weyenberg, Great Lakes Fire Ecologist
April 17, 2025

Introduction

The following report responds to spurious allegations made in a floristic assessment report sponsored by the National Parks Conservation Association (NPCA) (Slaughter and Aby-Kruger 2025). Allegations are made in reference to a prescribed fire implemented in the spring of 2023 that included portions of a mesic hardwood forest.

NPCA Report Summary

The author of the NPCA report, Mr. Slaughter, claims we have misapplied prescribed fire by burning multiple times in the Mesic Northern Forest (Beech/Maple/Hemlock, henceforth BMH) and the Dry/Mesic Northern Hardwood forests (Pine/Oak). He alleges that the burns, though we've only burned once in each unit, in the BMH forest have toppled many beech trees and/or have made them susceptible to and have already caused more frequent windthrow. The burn allegedly also denuded the understory eliminating the advanced regeneration of beech and hemlock "...resulting in unusually depauperate understories and herbaceous layers", which are "unnatural" and "savanna-like". The removal of the advanced regeneration, combined with beech bark disease, will cause the stand to fail to replace itself and presumably convert to another forest type.

Timeline at the Trail unit

Summer 2022. Monitoring plot installation in Pine/Oak Forest.

October 18, 2022. Blowdown event that blocked the east/west portion of the trail and created large canopy gaps and jackpots within the BMH Forest south of the Trail unit.

Winter 2022/2023. Decision made to move the fireline from the trail, south to the road, due to the blowdown.

May 23, 2023. Rx fire.

September 2023. Post burn assessment in Pine/Oak Forest.

July 2024. Second year post burn sampling of the Pine/Oak Forest.

Goals for the Pine/Oak Forest

1. Maintain the site in pine and prevent conversion to mesic forest type.
2. Expand areas containing red pine.

3. Increase available light to the understory by reducing under and mid-story shrubs and white pine saplings.
4. Increase herbaceous diversity by increasing light levels and creating pockets of exposed mineral soil.

Background

The Trail burn unit encompasses Pine/Oak Forest (~180 acre) and a portion of Mesic Hardwood forest near the wetland and east/west trail segment (~40 acres). The unit is dominated by white pine and red oak with white oak, red pine, sugar maple and bigtooth aspen as associate species. This is the target community for restoration using prescribed fire. As a matter of consequence, portions of mesic forest are included to avoid making nearly 1 mile of fireline through the woods and creating additional social trails, as well as a significant amount of work and some soil disturbance. This mesic community around the creek is composed of hemlock, sugar maple, beech, paper birch and white cedar. This area was not expected to burn very well if at all.

In October 2022, a blowdown rendered the southern fireline impassible. Clearing the trail would have taken a significant amount of time and posed some safety concerns due to the height of the boles off the ground. It was decided to move the fireline south to the road which included approximately 120 acres of BMH Forest. It was assumed that the burn in this type would be of low intensity and severity and one burn would not do the ecosystem any harm. At other locations within the Great Lakes Ecoregion Park network, where fire has burned through maple forest, the fire has always burned with low intensity with flame lengths less than 4 - 6’.

In 2016 approximately 17 areas of blowdown, totaling 5.7 acres, were documented within the BMH Forest that was burned. Based on aerial photos from 2024, the October 2022 wind event and/or the 2023 fire affected approximately 50 acres of the mesic forest, toppling roughly 30 – 40% of the trees within that area. I cannot determine what portion of the fallen trees are due to the fire versus the blowdown without a site visit. A leaf-off aerial photo from April 4, 2023, seems to indicate that at least some of the windthrow areas were made larger by the fire.

2023 Burn Results

Data collected in the pine forest during the 2023 post-burn assessment, documented a Low to Very Low fire severity on average in the Pine/Oak Forest. Scorch heights ranged from 5 – 20 feet. The burn was regarded as successful in moving the forest toward the restoration goals.

A post burn assessment was not done within the BMH Forest, since it was not deemed necessary given the low severity of the burn north of the trail. Areas of this type that were observed north of the trail, either did not burn or only burned in patches removing only the upper-most portion of the litter layer.

Having not visited the BMH Forest south of the trail it is possible that areas of blowdown that had dry material, likely from fallen snags, would burn hot enough to scorch and kill nearby canopy trees.

Beech/Maple/Hemlock Forest Description

Monitoring

The BMH Forest type was not included in the monitoring plan for several reasons. First it was not part of the burn unit, and still is not. Small portions that are included are not monitored because they typically do not burn and if they do, they do not burn hot enough to significantly alter the vegetation, other than killing or top-killing some seedlings.

Fire Frequency in Beech/Maple/Hemlock Forests.

Mr. Slaughter references three sources to document the fire regime in the BMH Forest. They are, Cleland (2004), Cohen (2000) and LANDFIRE (2016). The Cleland paper is based on GLO notes and reviews of other studies. The remaining two summarize other people's research on the subject. There are only a few research articles that directly assess the fire regime of the BMH Forest in MI and WI; Frelich (1991) and Whitney (1986) are the two most relevant. Frelich uses plot-based sampling to determine the fire rotation. These studies determined that the fire rotation in the BMH Forest (or similar) for stand replacement fires, those killing greater than ~75% of the stand, is >1000 years (Cleland 2004, Frelich 1991, Whitney 1986). In this forest type, Frelich is the only one to estimate surface fires based on fire scars and presence of pioneer species such as birch and aspen. His fire interval estimates for surface fires are 400 – 500 years for any given point. There are some important limitations to this estimate, however. First, surface fires, especially in this forest type, tend to be of very low intensity and rarely result in fire scars especially on mature trees. Second, the study only estimates surface fire events after 1890. It is well known that fire frequency decreased after this point as Native American burning ceased. Within Frelich's study area (Upper MI), 19 of his 60 plots contained fire scarred trees and he also mention other fires occurring in this type elsewhere in the region. I have also been on lightning fires in this type on Isle Royale. The point is, while surface fires within this type are rare and often small, they do occur. In addition, when fires do occur in this type they often happen after windthrow events (Stearns 1949, Frelich and Lorimer 1991, Frelich 2002).

Natural Succession

Frelich (2002) provides a description of the successional sequences within the Hemlock/Hardwood Forest, very similar to the BMH Forests at Good Harbor. Following a severe disturbance, such as a large windthrow event followed by fire, the stand will convert to a birch dominated stand. Birch will eventually be replaced by white pine. Surface fires and small scale windthrows will maintain the dominance of white pine and birch. Variation in these disturbances will lead to pockets of hemlock and mesic hardwoods. The dampening effect these species have on fire will eventually lead to a stand once again dominated by Hemlock/Hardwoods.

Frequently Asked Questions

I address some typical questions about the burn and its impacts below.

Did we burn outside of the natural range of variability for the fire regime?

It depends on when the last fire was and the area being considered. I would argue no, for a couple reasons. The “study area” we are considering is the area between Little Traverse Lake and Lake Michigan. The soil is sandy in this area making it drier than the typical BMH Forest site, which is one of the reasons why it burned, rather than self-extinguish. The site is adjacent to pine barrens and dry/mesic forests that we know burned frequently based on fire history research done at Platte Plains and Good Harbor (Kipfmueller 2019). Kipfmueller’s research found that the maximum fire interval for the Good Harbor area is 20 years between fires. Since all fires do not leave scars, the interval is less than 20 years. It is reasonable to assume that at least some of these fires burned into the mesic hardwoods stand to the south. If they did, it shows that the surface fire interval in these stands was likely more frequent than every 400 – 500 years. If they did not, our prescribed burn would likely be within the range of 400 – 500 year interval, since we have no records of fire occurring in stand in question. In addition, we only burned the stand once, and do not plan to burn it again.

Did we burn at the wrong time?

Fires in this forest type often occur after significant windthrow events and or drought (Stearns 1949, Frelich and Lorimer 1991, Frelich 2002). There were windthrow events in the stand in 2016 and 2022. If the stand was ever to be burned this was the right time to do it.

Was the burn more severe than what would occur naturally?

I have not walked the interior of the site. I did not see significant mortality from the firelines, however. The other areas burned at Good Harbor are more flammable, fire dependent

ecosystems and fire severity was low with only single tree falls due to fire burning in previously scarred trees.

Did we “wreck” anything ecologically?

Not likely. Frelich (2002), in his book *Forest Dynamics and Disturbance Regimes*, comments as to why he spends any time discussing fire in a forest type (Hemlock/Hardwoods) where fires are so rare. He states, “...fires, despite their rarity, play a major role in maintaining diversity.” Fire is the only avenue by which shade intolerant tree species such as birch, aspen, red oak and white pine, as well as shade intolerant herbaceous species, can enter the stand. Mr. Slaughter, however regards the addition of shade intolerant species, as a threat to the forest. His expectation is that the Lakeshore allow natural processes, e.g. fire, to take place unhindered. This is not possible due to the fragmented landscape and altered fire regime, and the fire suppression policies of the Lakeshore.

Mr. Slaughter complains that the fire scarred trees will die due to added stress and subsequent windthrow. From personal observation and as documented by Frelich (1991), scarred hemlock and sugar maple have no difficulty living out their normal life span with a fire scar.

It seems that Mr. Slaughter was not aware of the 2022 windthrow event and assumed that all or most of the fallen trees are due to the fire. I suspect this because he makes no mention of the event, even though it is highly significant.

In the end, the desired future condition for the stand is subjective as long as it lies within the realm of the successional sequences of the forest type. Mr. Slaughter is concerned that the advanced regeneration has been killed and with the presence of beech bark disease and woolly adelgid, the demise of the stand is now hastened. Whether it has been hastened remains to be seen, but it is largely irrelevant. The writing is already on the wall, beech and hemlock are unlikely to survive in large numbers due to the introduced pathogens. In the face of these pathogens, the fire, by enhancing diversity and facilitating a new age class of trees, can be considered helpful to the persistence of the forest overall. If parts of the stand regenerate to species other than beech, maple and hemlock, i.e. white pine and paper birch, this is completely within the natural successional sequence (Frelich 2002). It is entirely possible that the windthrow openings will regenerate to maple, beech and hemlock considering they are the closest species. The presence of the suite of shade intolerant herbaceous species is temporary only lasting about 5 years (Weyenberg and Pavlovic 2014).

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Definitions

Fire rotation: The amount of time required to burn an area equivalent to the whole are of interest. The entire area does not necessarily burn because some areas burn several times while others not at all.

Fire frequency or Fir Occurrence: This is the number of fires that occur at a point per unit time, typically expressed as a percent. For example, 10 fires in 80 years the frequency would be 10/80 or 12.5%.

Fire Interval is reciprocal of frequency and is the average number of years between fires at a point.

Mean Fire Return Interval is the average time between successive fires for a defined area and time period.