



National Park Service Fire Ecology Annual Report Calendar Year 2014

SOUTHERN GREAT LAKES AREA PARKS (INDU, LIBO, SLBE & CUVA)

Lead Monitor, Mary Fisher-Dunham (INDU)

Fire Ecologist, Scott Weyenberg



Figure 1. Furnessville south unit prescribed fire, May 8, 2014

A. Summary

This was the 17th year of the fire effects program at Indiana Dunes National Lakeshore (INDU). This year's staff included one permanent and one seasonal position. The crew is responsible for the monitoring at INDU and three other parks: Cuyahoga Valley National Park (CUVA), Lincoln Boyhood National Memorial (LIBO) and Sleeping Bear Dunes National Lakeshore (SLBE). In addition, the INDU Fire Effects crew has in the past assisted with monitoring at Voyageurs National Park (VOYA) and St. Croix Scenic Riverway (SACN).



Figure 2. Two Furnessville subunits burned under different conditions this spring resulting in very different effects. The north unit (left) burned on a cooler day prior to leaf out with a PIG of 20-30%, while the south unit (right) burned after leaf out on a hot day with a PIG of 40 to 60%

At INDU, eight prescribed burns (in six units) were completed this calendar year; four burns in three units in both the spring and the fall. Fewer burns were completed than usual, due to poor weather in the late fall and a late spring snow melt. In addition, reduced funding now dictates that all burns are conducted “in house” with limited overtime further reducing burn day options. No other prescribed burns were completed this year in any of the other parks, which the INDU FE program services.

Indiana Dunes is conducting a 1000-acre thinning project in western portions of the park. The fire ecologist, with the help of Great Lakes I&M program staff, provided baseline data on tree density using fire effects and newly acquired Lidar data. In addition, recommendations and protocols for thinning were provided by the fire ecologist.

In an approved break from regularly scheduled FMH and PLM plot monitoring, three specific monitoring projects were conducted. The first is a resampling of long term monitoring plots, established in the 1980's by USGS scientist Norm Henderson. Two western units were completed this past season and the two eastern units will be sampled, in 2015. Data will be analyzed by USGS staff in cooperation with the lead fire effects monitor. A poster will be presented, in February of 2015. The second monitoring project focuses on the effects of fire on certain boreal species, which occur in our eastern units. The project was begun in the fall of 2013 and the first cycle was completed this past year. Data will be explored this winter and a determination made if a longer study is warranted. Complete analyses will be conducted jointly by USGS and INDU Resource Management staff. The third project aims to determine what effects, if any, occur when a larger opening is created in a pre-existing canopy gap in a savanna. The status of this project, initially designed to be a 5 - 6 year study, will be determined by the funding and progress of the 1000 acre thinning project.

One of the largest impacts to this fire ecology program is the reduction of the fire ecologist's staffing level. Now, functioning half time as terrestrial ecologist for St. Croix, the time reduction will significantly cut into data analysis. The fire ecologist will continue to be available for questions concerning sampling other related issues.

Table 1. Fire Effects Plot Workload (2014) and Total Plots Installed

Park	Monitoring Unit	Plot Type (FMH Brush plot, photo point, CBI, etc.)	Pre-burn 2014	Immed. Post 2014+	Postburn (1-20 yrs) 2014	Annual Total (2014)	Total Plots
Indiana Dunes	Prairie	FMH Grass plot	0	0	0	0	28
	Oak Savanna	FMH Forest plot	0	0	0	0	19
	Oak Woodland	FMH forest plot	0	0	0	0	22
	Oak Forest	FMH forest plot	0	0	0	0	1
	Pr/Sav./Wood/Complex (Howes Pr.)	Other - USGS†	0	0	0	0	31
	Sav./Wood/Forest	Other - NPS‡	0	0	0	0	96
	Sav./Wood/Forest/Wetlands	Photo	0	0	0	0	20
	Oak Savanna - mech. thinning**	Fuels & photo plots. Pilot study - cut vs. no cut	24	0	0	24	24
	Henderson plots	Forest plots	0	0	150**	150	208
	Rare species	Fuels & photo plots. Burn vs unburned	42	42	42	126	42
Cuyahoga Valley	Grassland	FMH Grass plot	0	0	0	0	8
		Photo	0	0	0	0	13
Sleeping Bear	Old Field	Photo	0	0	0	0	7
	Jack Pine	Photo	0	0	0	0	2
Lincoln Boyhood	Oak - Hickory	Other - USGS	0	0	0	0	12
Total			66	42	192	300	325†† (533)

† Fixed radius plots - trees, line intercept - shrubs, nested freq. - herbs, Brown's transects - fuels.

‡ Variable radius - overstory, fixed radius - seedlings, saplings & herbs. Brown's transects - fuels.

+ Immediate post-burn sampling was replaced due to staffing cuts with a site walk-through visually assessing fire severity of the plots and entire project unit. Three such assessments were performed in the spring fall of 2014 and three will be completed in fall of 2014 but are not reflected in the table

** Three sampling events, plot establishment and pre-leafout photos, spring tree sampling, summer shrub and herbaceous layer sampling.

†† Permanent plots remain the same for fire effects at 325, however the permanent Henderson plots sampled during the period 2014-2017 would raise the plot number temporarily by 208; (2014: MW-25; IM-25; 2015: Ks-25; DR-40; 2017: HP/LL-68)

Table 2. Fire Ecology Staffing 2014

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ Qualified (Yes or No)	Training and Development
Mary Fisher-Dunham	2/10/14	12/12/14	22	NO	Refresher. Grass Identification workshop: through Work Force Grant award: Ignition Operations and online classes: IVS 110 currently enrolled & IVS 210 completed through Invasive Species certification program (@ scnc.edu)
Coleman Minney	5/27/2014	9/24/14	8.5	No	GIS training, Grass id course.

+ fire tech staff assisted early in season with tree sampling; fire management assisted with data entry to adjust for the second seasonal position which was not filled.

Table 3. 2014 Management Objectives and Monitoring Results

Burn or Monitoring Unit	Management Objective (Restoration)	Monitoring Results (90% confidence interval)	Objective Achieved?	Year Analysis Completed (Range of data years included in analysis)
*All Units	Fuels reduction	See report	See report	All years
Dune Ridge (Oak woodland) (n=25)	Reduce overstory basal area.	(2005) 92±7.3; (2013) 78±8.4 (p<0.05)	Yes	2013 ('05 – '13)
	Reduce understory woody stem density.	0-1cm class: +1463% (p = 0.03) 1-2.5cm class: +75% (p = 0.02) 2.5-5cm class: -98% (p = 0.0001)	No	
	Decrease seedling densities	+98% (p=0.004)	No	
	Increase herb species richness	(2007) 95; (2013) 104 (p>0.05)	No	
Mnoka Pr.	Prairie restoration	Native grass cover 43 ±11% Non-native grass cover 81 ±8%	No	2012 (2010)
Miller Woods, Toll. Dunes & Inland Marsh	A fact sheet including summary data on all canopy strata was written for a planning meeting.	NA	NA	2012 (various)
Inland Marsh 1 (n=2) W. Beach 3 (n=1)	Reduce woody fuels	1hr: +16% ;10 hr: -24%; 100 hr: -55% 1hr: -40% ;10 hr: -75%; 100 hr: -81%	Yes	2012
Wood Lake (n=2) W. Beach 3 (n=1) Calumet Dune (n=3) Inland Marsh 1 (n=2)	Reduce leaf litter to 2" or less.	Post: 0.95" Post: 0.1" Post: 1.2" Post: 0.45"	Yes	2012
Dune Ridge (Oak Woodland) (n=25) (year 2 data)	Reduce overstory basal area.	5-15cm class: -48% (p=0.0001). 15-30cm class: -14% (p=0.005). >30cm class: no change.	Yes	2009 ('05-'07)
	Reduce understory woody stem density.	0-1cm class: +218% (p = 0.039) 1-2.5cm class: -70% (p = 0.0001) 2.5-5cm class: -96% (p = 0.0001)	Yes but is v. temporary	
Cowles Dunes (Oak Woodland) (n = 2) (3 reads)	Reduce overstory basal area.	Pre BA=77ft ² /ac.; Post 87ft ² /ac.	No	2009 ('03-'08)
	Increase species diversity.	10 to 60% increase.	Yes	
Inland Marsh 5 (Oak Savanna) (n = 1) (6 reads)	Reduce overstory canopy closure/basal area.	Closure slightly reduced and poles reduced significantly.	Yes.	2009 ('98-'08)
	Reduce shrub cover.	Shrub cover increased from 40 to 60%.	No.	
	Increase % cover of C ⁴ grasses	Grass cover remains stable.	No.	
Kintzele Ditch (Oak Forest) (n = 4) (6 reads)	Reduce overstory canopy closure/basal area.	Closure unchanged, BA reduced in one size class due to wind throw.	No	2009 ('99-'08)
	Reduce understory stem density.	Stems less than 2' reduced. Overall woody cover increased after windthrow.	No	
	Reduce woody fuels	1-100 hour fuels: ~100% increase. 1000 hour fuels: ~100% increase.	No	

Burn or Monitoring Unit	Management Objective (Restoration)	Monitoring Results (90% confidence interval)	Objective Achieved?	Year Analysis Completed (Range of data years included in analysis)
Mnoké Pr. (Tallgrass pr.) (n = 20)	Increase in cover of seeded species.	ANOVA comparison test (p = 0.7 and 0.9) (n: 3 sets of 5 plots).	No	2010 ('04-'10)
	Increase cover of native forbs & grasses.	Native forb: +15% (p = 0.0007) Native grass: +5% (p = 0.05)	Yes	2005 ('95-'05)
	Decrease cover of non-native forbs & grasses.	Non-native forb: -43% (p = 0.01) Non-native grass: -12% (p = 0.0001)	Yes	2006 ('95-'05)
	Increase floristic quality index.	Pre (1995) = 40; 2006 = 52.	Yes	2006 ('95-'05)
Hobart Prairie Grove (Oak woodland) (year 1 data)	Reduce woody stem density by thinning and fire.	Thinning: 0-2" class: -22% to -71% (p = 0.15) (n=3). Fire: 0-2" class: -36% (p = 0.009) (n = 3).	Yes Yes	2007 ('05-'06)
	Reduce woody fuel loading.	1000 hour: 16% (n = 7) 1-100 hour: -1% (n=13)	No No	
Oak Savanna (n = 7 burn units)	Reduce woody fuels.	1000 hour: No change (p > 0.05). 1-100 hour: No change (p > 0.05).	No No	2005 ('98-'05)

*Fuel changes were analyzed for all plots and sample years to determine trends and relationships. Report attached.

B. Program Information

Table 4. Planning - 2014

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2012)	Assisted with how many BAER plans in 2012?
Indiana Dunes	No	2009	11	0
Sleeping Bear Dunes	No	NA	NA	NA
Cuyahoga Valley	No	NA	NA	NA
Lincoln Boyhood	Yes	2003	0	NA

Table 5. Monitoring - 2014

Park	% 2014 Data Entered	% 2014 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
INDU	100%	100%	8	0	0	0
All other parks NA						0

* Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

Table 6. Communicating Results - 2014

Park	# of Project Monitoring Reports completed in 2013	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?*
Indiana Dunes	1†	0	0	No
Cuyahoga Valley	0	0	0	
Lincoln Boyhood	0	0	0	
Sleeping Bear Dunes	0	0	0	

* This information will help to assess Minitab multi-user license needs.

† *Fuel Succession Following Burning in Oak Savannas and Woodlands at Indiana Dunes National Lakeshore.*

Table 7. Research - 2014

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2014	# of Proposals Funded in 2014	# of Research Projects Supported in 2014*	Additional Comments
Indiana Dunes	yes	0	0	1†	
Lincoln Boyhood	yes	0	0	0	
Sleeping Bear Dunes	yes	0	0	0	
Cuyahoga Valley	no	0	0	0	

*Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

†Assisted on one “formally” funded project and two additional research projects that did not have outside funding.

C. Fire ecologist accomplishments and areas of focus

See Northern Greats Lakes Area Annual Report.

D. Fire effects crew accomplishments and areas of focus

Table 8. Fire Effects Crew 2014 Accomplishments/Focus Areas

Category	Percent Time	Notes
FMH plots	0	
WUI plots	0	
CBI plots	0	
Other plot work	35.5	Henderson long term permanent plot resampling: Sensitive species pre-burn fall, Pre-burn spring, immediate post, and early fall post-burn sampling. Gap study second year summer post gap creation. Post-burn assessment for prescribed burns conducted.
Wildfire assignments	0	
Prescribed fire projects	4	Assisted in 7 prescribed fires: One as squad boss trainee, one holding, one monitoring research plots, one as FEMO, three as smoke patrol/FEMO; supervised a FEMO trainee.
Non-fire fuels projects	0	Assisted with thinning project; Botany development and presentation training for RM; protocol training for FE staff, RM & Fire
Travel out-of-park for plot or project work	0	
Data entry	30.75	
Data analysis	0	Conducted some initial review of sensitive species and Henderson plots and collaborated as requested with USGS staff conducting the 2014 analysis of Henderson plot data.
Supervision/Admin	10	Payroll, travel authorization/voucher, etc.
Training	7	Mandatory training for NPS, Grass id two day class, ArcGIS two day training for seasonal. Work Force Grant application and award for Ignition Operations: IVS class work
Miscellaneous	12.75	Assisted with thinning project Assisted in training plant identification to RM staff; Assisted with monitoring design discussions with RM re thinning project; Field monitoring training with RM staff conducting pre-thinning sampling. Collaboration with ecologist and RM on this year's monitoring projects, design and field protocols and wrote protocols. (=7.95%) Misc.: emails, work related correspondence with fire, computer maintenance and troubleshooting (=4.85%)

E. 2015 Direction

What are program plans for the near future? *This section can be brief and include changes to focus areas, any approved changes to monitoring protocols as a result of a program review, or plans to address future challenges (e.g. budget and staffing changes, travel caps, etc.).*

Current and expected budget cuts have spurred discussions on the best uses of the monitoring crew's time. Consultation between the lead monitor, Eco-region Fire Ecologist and a USGS scientist concluded that the crew's efforts, for the next few years, should focus on addressing specific fire effects concerns and resampling valuable long term monitoring plots (Henderson's plots). The proposed change was approved by the MW Regional Fire Ecologist and the INDU FMO. There was urgency to resample the Henderson plots due to the ongoing 1000-acre thinning project that would impact those plots. Pre-treatment data was essential to provide a clear picture of vegetation change over the past 30 years. Sampling was completed this past summer to acquire that pre-treatment data. The remaining plots will be sampled in 2015.

One of the most important and long standing concerns regarding fire effects, was the impact fire was having on boreal species. Anecdotal evidence revealed significant reductions in these species, apparently due to prescribed fire. A better understanding was needed on this subject. In a collaborative effort, plots were established with the help of USGS, INDU Resource Management and fire effects staff.

Another project, which will help savanna restoration efforts at the park, seeks to determine the effect of increasing canopy gap sizes on herbaceous layer vegetation. The project utilizes the fire programs expertise in mechanical and fire treatment implementation and sampling.

The hiatus of the FMH and PLM plots coincides with Resource Management's ongoing review and prioritization of the prescribed burn units and determination of target conditions for each. The target conditions should drive how and at what frequency fire is applied. This will lead to a revised and likely more simplified sampling schedule. This will likely take place in 2016 or 2017.



Figure 3. Furnessville burn unit spring 2014. Smoke from fire nearing the end of ignition

F. Optional Information

Include any additional material not already covered in the sections above:

- Graphics and/or tables of data analysis results or presentations
- Alternative monitoring activities descriptions
- Challenges facing monitoring program
- Unique solutions to problems
- Collaboration with natural resource managers, other federal agencies, or research institutions
- Photographs of monitoring and fire activities

Also, to help in the ongoing effort to improve FFI, please include any feedback or suggestions here based on your experiences using FFI.

G. Metadata and FFI Database Update on NPS Data Store

As you know, long-term monitoring data are highly valuable! We are glad to have almost all of the NPS FFI databases centrally located on the NPS Data Store. This central data storage option allows us to have an additional secure data location other than those in the parks' or regional offices. It also allows NPS users and others to view the metadata and contact data stewards for access to monitoring data for research or educational purposes. In addition, Landfire staff will be able to download the needed FFI databases directly from the Data Store for Landfire model validation purposes, eliminating the need for NPS staff to respond to another, separate data call.

Once this season's FFI data entry and quality checking are complete, please follow these instructions to update your park(s) metadata ("references") and upload the updated FFI databases to the NPS Data Store.

- 1) Backup the FFI database(s) in FFI (note backup file date for metadata).
- 2) Zip backup file(s) - **this step is critical to reduce file size**, upload time and server storage space utilized. PLEASE use the following naming convention for your zip files: "**FFI_2014_XXXX**", where XXXX is the 4 letter code for the park, or for the lead park in a network if more than one parks' data are included in the database.
- 3) Access the Data Store at: <https://irma.nps.gov/App/Reference/Welcome>
- 4) Select **Manage**, then **Manage My References** and click on the **Search** button (don't need to enter any search criteria to display all references for which you are an owner).
- 5) Select the reference (metadata record) you wish to update from the list displayed to open the Reference Profile where you can make edits to update the reference.

- 6) Expand “Version History”, to view and select the **Manage Versions** option. You will then select **Clone this Reference to Create a New Version** to create a new Reference for this year’s update while preserving past metadata and databases as archives.
- 7) Once you **Save** the new, cloned reference, you can make any changes necessary to update the reference with this year’s information. Most likely, the edits will be to the “Date of Issue/Release”, which is the date of the new FFI backup file, and the “Content End Date”, if you have collected new data this year that was added to the FFI database. Select **Edit Details** from the menu at the top of the profile to make these changes. If anything else has changed (e.g. new protocols established, old protocols abandoned, etc.), you can make these edits to the text fields (e.g. Abstract) as well. Once changes are complete, you must select the “Save and set to” **Active** button at the bottom of the window.
- 8) Finally, upload the new zipped FFI database backup file by selecting **Add Digital File** from the menu at the top of the reference profile (or Add Holding from the Holdings section). Click on **Select Files** and then browse to your zipped FFI database backup file to select it, and then select **Upload**. You must also add additional owners here who have permission to edit the holdings if necessary (we recommend at least one person besides yourself; I (MB) am happy to serve as an additional owner to assist with Data Store if you’d like, but not required!). Remember to Save as **Active** once you have completed any changes.
- 9) Repeat the above steps for each of your FFI databases.

Please feel free to contact MB if you have any questions at all about the process of updating the metadata and FFI databases on the Data Store.

INSTRUCTIONS FOR UPLOADING 2014 ANNUAL REPORT TO DATA STORE

1. Save your report as a PDF file using the following file naming convention “2014 *Park/Network Name* Annual Report.pdf”.
2. **NEW THIS YEAR!!!** We will now be uploading our annual reports to the IRMA Data Store instead of the Fire Ecology Sharepoint site. This change will allow us to have all of our Fire Ecology Program information stored in one reliable, accessible location. We are working with the I&M program to transfer all of our past annual reports from Sharepoint to the Data Store. Once this is done, you will be able to use the versioning feature of Data Store to clone the last annual report reference and update it with the current year's report (just as we are doing with the FFI databases). I will be sending out separate, detailed instructions for uploading the annual reports to the Data Store as soon as they are finalized.
3. Please e-mail your regional ecologist, MaryBeth Keifer, and Nate Benson to let us know when you get your report uploaded.

Call MaryBeth Keifer (603-795-2333) if you have any questions or problems.