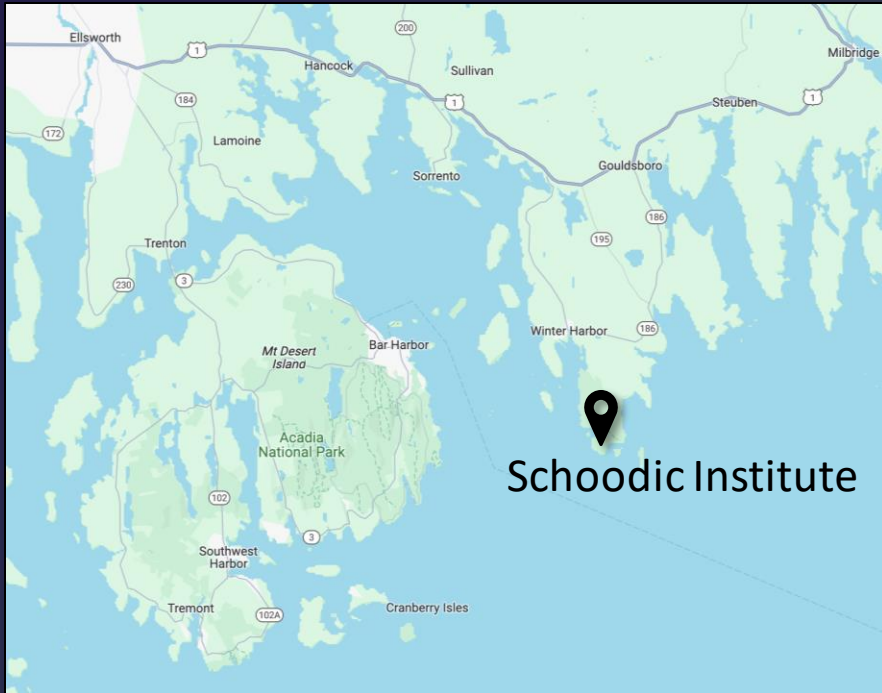




# An early detection and monitoring system based on citizen science observations

Kyle Lima, Nicholas Fisichelli, and Abe Miller-Rushing

# Schoodic Institute



# The State of Forests

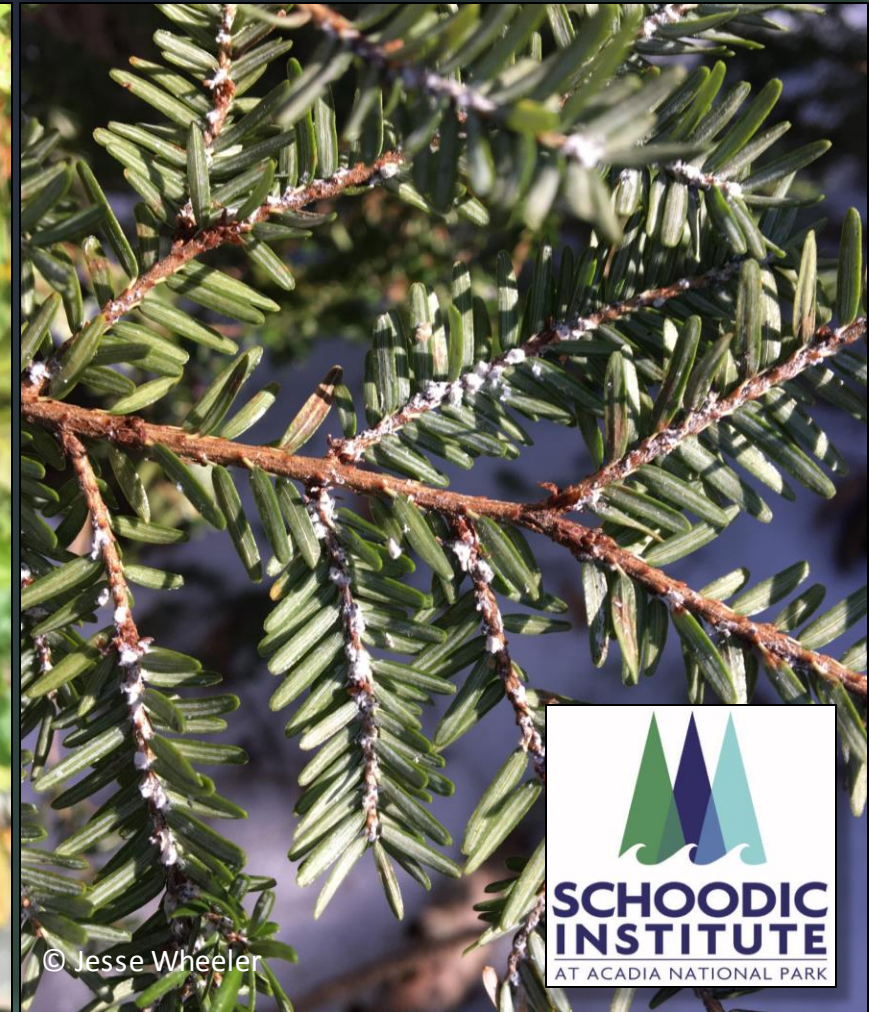
- Forests in the northeastern United States are changing rapidly
  - Climate change, land-use change, invasive plants, forest pests, etc.
- Detecting these changes early is critical



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# Monitoring Challenges

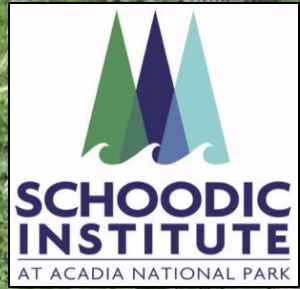
- Forest disturbances are likely undetected for long periods of time
- Current monitoring protocols have limitations
  - Labor/time intensive
  - Small monitoring plots
  - Require specialized skills



# Can Citizen Science Help?

eBird

 iNaturalist



# Working with Acadia National Park



# Collaboration

	A	B	C	D	E
1	species	kingdom	phylum	class	
2	Tamiasciurus	Animalia	Chordata	Mammalia	
3	Lobaria pulm	Fungi	Ascomycota	Lecanoromycetes	
4	Somateria m	Animalia	Chordata	Aves	
5	Branta cana	Animalia	Chordata	Aves	
6	Larus argent	Animalia	Chordata	Aves	
7	Spinus tristis	Animalia	Chordata	Aves	
8	Charadrius s	Animalia	Chordata	Aves	
9	Zonotrichia z	Animalia	Chordata	Aves	
10	Polystichum	Plantae	Tracheophyt:	Polypodiopsida	
11	Claytosmund	Plantae	Tracheophyt:	Polypodiopsida	
12	Drosera rotu	Plantae	Tracheophyt:	Magnoliopsida	
13	Cypripedium	Plantae	Tracheophyt:	Liliopsida	
14	Dendrolycop	Plantae	Tracheophyt:	Lycopodiopsida	
15	Betula papyr	Plantae	Tracheophyt:	Magnoliopsida	
16	Viburnum lai	Plantae	Tracheophyt:	Magnoliopsida	
17	Mitchella re	Plantae	Tracheophyt:	Magnoliopsida	
18	Hamamelis v	Plantae	Tracheophyt:	Magnoliopsida	
19	Gaylussacia	Plantae	Tracheophyt:	Magnoliopsida	
20	Cornus cana	Plantae	Tracheophyt:	Magnoliopsida	
21	Phegopteris	Plantae	Tracheophyt:	Polypodiopsida	
22	Pinus strobu	Plantae	Tracheophyt:	Pinopsida	
23	Fagus grandi	Plantae	Tracheophyt:	Magnoliopsida	
24	Acer sacchar	Plantae	Tracheophyt:	Magnoliopsida	
25	Gaultheria p	Plantae	Tracheophyt:	Magnoliopsida	
26	Osmundastr	Plantae	Tracheophyt:	Polypodiopsida	
27	Thuja occide	Plantae	Tracheophyt:	Pinopsida	
28	Quercus rubr	Plantae	Tracheophyt:	Magnoliopsida	
29	Acer pensylv	Plantae	Tracheophyt:	Magnoliopsida	
30	Maianthem u	Plantae	Tracheophyt:	Liliopsida	
31	Pteridium aq	Plantae	Tracheophyt:	Polypodiopsida	
32	Aralia nudica	Plantae	Tracheophyt:	Magnoliopsida	
33	Gaultheria h	Plantae	Tracheophyt:	Magnoliopsida	
34	Lysimachia b	Plantae	Tracheophyt:	Magnoliopsida	

## Geographic bounds



## Species list



```

1 title AMP Citizen Science Report
2 author Schoodic Institute at Acadia National Park
3 output:
4
5 #> head_document
6 css: email_alerts/www/css/pages_style.css
7 github_repo: https://xylelimo21.github.io/AMP_managers_report/
8
9
10
11 #> library("RMarkdown")
12 library(tidyverse)
13 library(lubridate)
14 library(kableExtra)
15 library(htmltools)
16 library(sf)
17 library(gg)
18 source("email_alerts/email_functions.R")
19
20 #> store ...
21 #> flush ...
22 #> ...

```

Environment: empty

Name	Size	Modified
github	671 B	Oct 10, 2023, 11:23 AM
gitignore	52 B	Nov 21, 2023, 9:31 AM
rhistory	8.4 MB	Nov 21, 2023, 9:29 AM
email_alerts	8.2 KB	Oct 16, 2023, 11:26 AM
index.html	1 KB	Oct 10, 2023, 11:23 AM
LICENSE	205 B	Dec 4, 2023, 8:07 AM
npf_managers_report.Rproj	216 B	Oct 10, 2023, 11:23 AM
README.md		

```

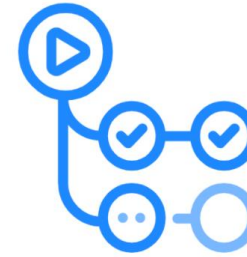
R 4.3.0 - ~/Desktop/Projects/npf_managers_report/ #
R is free software and comes with ABSOLUTELY NO WARRANTY;
You are welcome to redistribute it under certain conditions.
Type "license()" or "licence()" for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type "contributors()" for more information and
"citation()" on how to cite R or R packages in publications.

Type "demo()" for some demos, "help()" for on-line help, or
"help.start()" for an HTML browser interface to help.
Type "q()" to quit R.

```



GitHub Actions





# Acadia National Park Manager's Report

## From citizen science observations

21 November 2023 – 27 November 2023

### Introduction

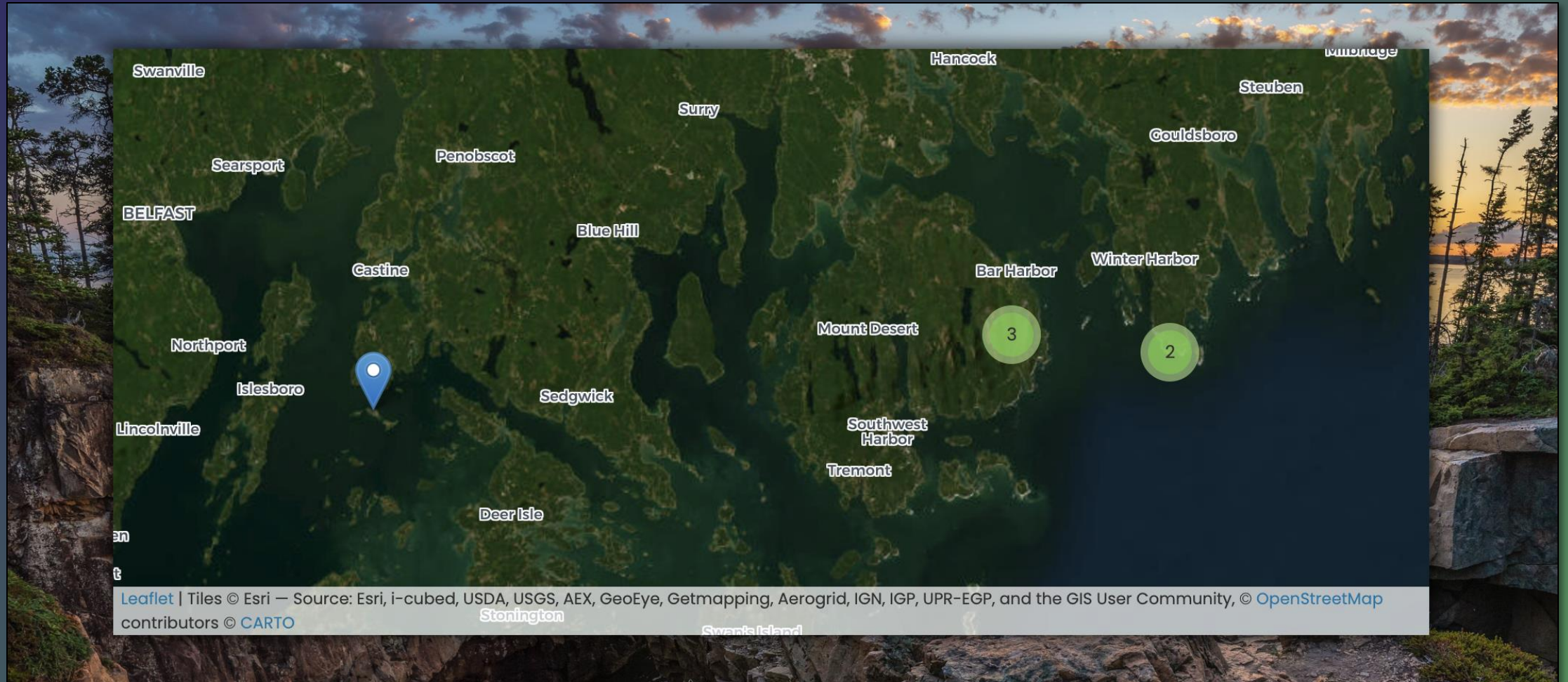
Welcome to the weekly report of iNaturalist and eBird records. These are all observations submitted during the last week for species that Acadia National Park managers have identified as being of management interest.

These data for this report comes from two of the largest open source citizen science projects: iNaturalist and eBird. The records here are both casual and research grade observations, so erroneous identifications are possible.



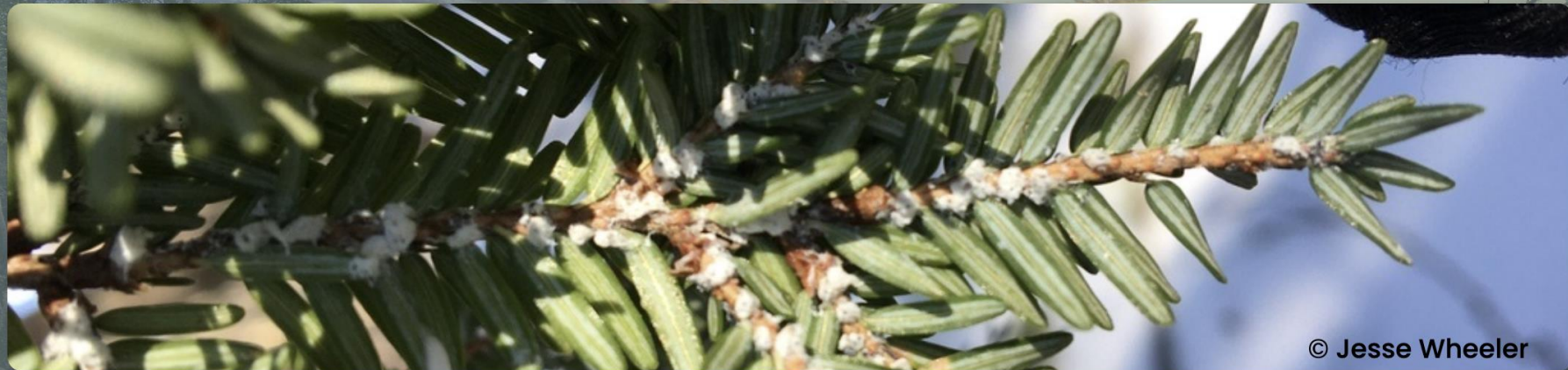
The eBird logo, featuring the text "eBird" in a green, sans-serif font.

# Interactive Map of Observations



# Invasive Species and Forest Pests

## Pest & Invasive Species



© Jesse Wheeler

<b>scientific.name</b>	<b>common.name</b>	<b>observed.on</b>	<b>link</b>
Tussilago farfara	colt's-foot	2023-11-23	<a href="#">view observation</a>

# Threatened and Endangered Species

## Threatened & Endangered Species



scientific.name	common.name	listing.status	observed.on	link
Histrionicus histrionicus	harlequin duck	state threatened	2023-11-24	<a href="#">view observation</a>
Histrionicus histrionicus	harlequin duck	state threatened	2023-11-27	<a href="#">view observation</a>
Falco peregrinus	peregrine falcon	state endangered	2023-11-26	<a href="#">view observation</a>
Alca torda	razorbill	state threatened	2023-11-27	<a href="#">view observation</a>

# Rare Native Species

## Rare Species

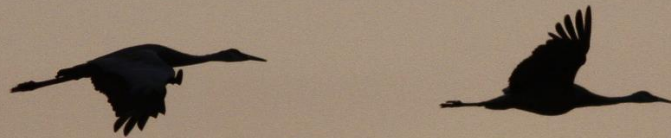


© Andy Fyon

<b>scientific.name</b>	<b>common.name</b>	<b>observed.on</b>	<b>link</b>
Epigaea repens	trailing arbutus	2023-11-24	<a href="#">view observation</a>

# New Park Species

## New Park Species



© Kyle Lima

There were no new species to the park reported this week.

# Weekly Email Alerts

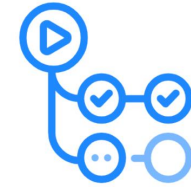
## Acadia National Park Manager's Report

09 October 2023 - 15 October 2023

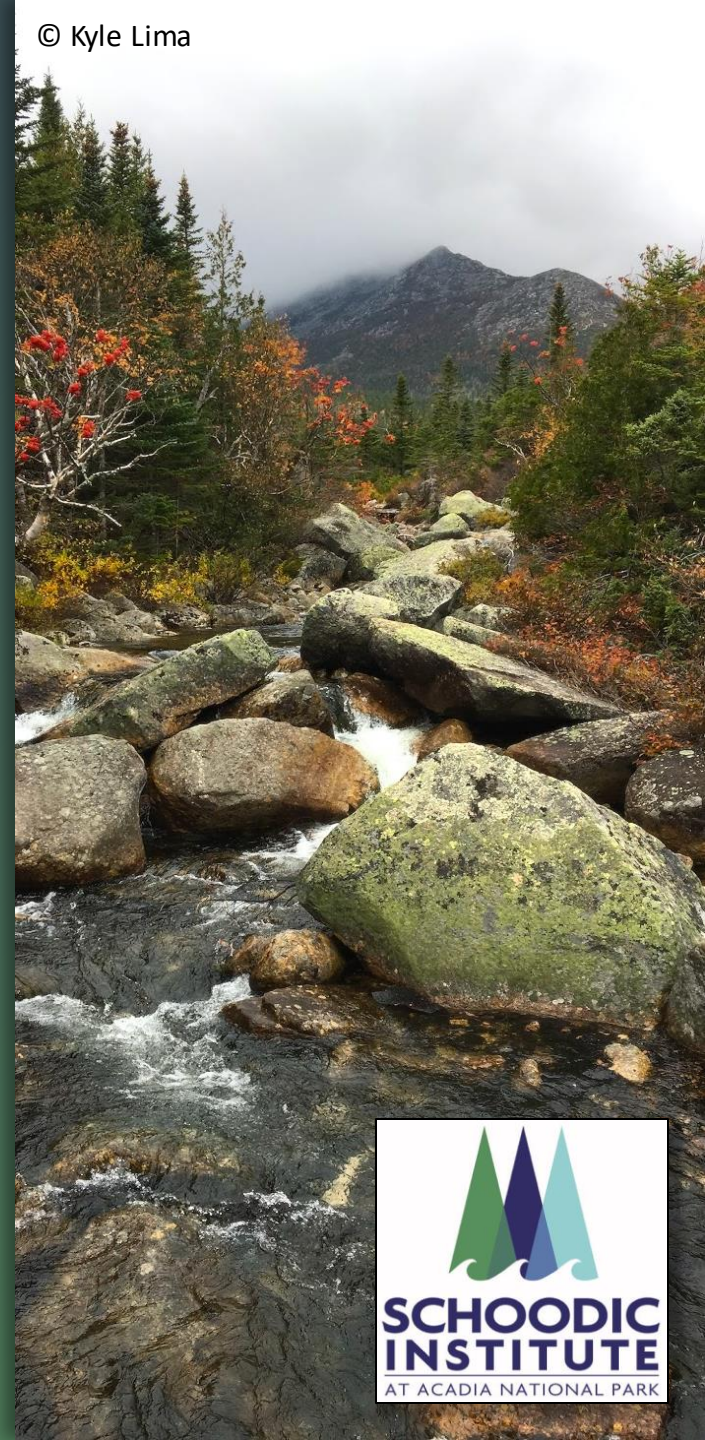


The weekly report has been updated! This report summarizes iNaturalist and eBird records of the species that Acadia National Park managers have identified as being of management interest. Click the button below to view the report.

[Go to the report!](#)



GitHub Actions



# Adaptable Products



- Easily transferrable
- New data visualizations
- Additions to the species list
- Modifications to geographic bounds
- Altered email alert schedule
- Development of new products
- Customize styling





# Conclusion



- Citizen science can be effective at monitoring and early-detection
- Engages people in meaningful science and connects them with nature
  - Requires active communication!
- Adaptable products are essential
- This sort of method can be used anywhere

# Credits



Jesse Wheeler

Hannah Webber

Bik Wheeler

Serena Ross

Catherine Schmitt

Ben Tero Photography

Chris Nadeau

Emma Albee

Seth Benz

Shannon O'Brien



eBird



*This project was made possible in part by the National Park Foundation.*



# Thank you for listening!

