# How to Use Large Bird Data Sets: a quick tour of four projects

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The North American Breeding Bird Survey



Wisconsin Breeding Bird Atlas II



*Minnesota* BREEDING BIRD ATLAS

<sup>1</sup> Wisconsin DNR
 <sup>2</sup> Natural Resources Research Institute

# eBird

**Birding, Science, Conservation & Technology** 

## The Cornell Lab of Ornithology\_



# www.ebird.org

**Gather** 

eBird

- Internet-based checklist program
  - Tool for gathering observational data
    - Tool for maintaining personal records

#### **Archive**

- Persistent archive of bird observations
  - Gathers baseline data on bird distribution and abundance

#### **Disseminate**

- Public tool for data visualization
- You can download, also goes to AKN

# **eBird Participation**

- 2.7 million visitors to eBird in 2017
- 395 thousand people entered data
- ½ billion observations
- 28 million checklists
- 5.3 million locations
- Every country in the world
- 10,371 species (98% of all bird species)



## 34,723,199 hours in the field

#### Spatial distribution



Biased towards heavily populated areas, good birding spots Large gaps exist

#### Growth in monthly eBird observations and checklists



# Great data for recent decade, but sparser records prior to that

# eBird Data Entry: Where did you bird?

#### 2 3 Where did you bird?

Identify the location where you made your observations.

#### Choose from Your Locations

Sapsucker Woods	Continue
Edit "My Locations' list	

#### Find it on a Map

Q Enter a county, state, province, or country.

#### Use Latitude/Longitude

Create a new location using latitude and longitude.

#### Select an entire city, county, state, or country

If you were birding across a very large area (e.g., an entire state, county, or city) select this option. Please consider using more precise locations when reporting to eBird so that your observations are more valuable for analysis.

#### Import Data

Import data from a spreadsheet, database, or birding program. Learn how

# Find it on a Map

#### 1 2 3 Where did you bird?



Use the "zoom to" box to zoom to a place name, address, or coordinates in decimal degrees (e.g., 42.4792, -76.45138). You can also click "+" markers to zoom in on groups of birding hotspots or personal locations.

To choose an existing location, click on its marker.

For new locations, **zoom in as far as possible** and click on the map to place a green marker. This marks your new location. To reposition the marker, click anywhere on the map.



# eBird Data Entry: How did you bird?

		+ - Require
* Observation Date:	Mar 😴 30 😴 2016 😴 🧱	nequire
* Observation Type:	Traveling You traveled a specific distance — walking a trail, driving a refuge loop, field birding.	⊫ More into
	Stationary You stayed at a fixed location - watching from a window, hawkwatching, seawatching.	» More info
	<ul> <li>Historical Birding was your primary purpose, but you cannot estimate start time, duration, and distance; use Traveling or Stationary if you can estimate these.</li> </ul>	➤ More info
	Incidental Birding was not your primary purpose - noting a bird while driving or gardening.	» More Info
	Other Choose	
* Start Time (AM/PM):	10 : 03 AM 📴 Use 24-hour Clock	
* Duration:	0 hrs. 44 min.	
* Distance:	.24 miles	
+		

# eBird Data Entry: What did you see?

Domestic	goose sp. (Domestic type) Anser sp. (Domestic type)		Q June to Some
6 Snow Go	ose Chen caerulescens Hide Details		
Details:	took off from pond	X X	<ul> <li>Add Species</li> <li>Alphabetic</li> </ul>
Media.	Drop Files Here or Select		Show Rarities Show Subspecies Group by Most Likely ?
	ML26255311 7564604988_98ef7a0696_k.jpg	Delete	
Enter con Add Deta	Enter comments about this image Add Details	4	
Add dat	Age & Sex Breeding Code Oiled Birds		Are you submitting a comple
Cackling	Goose Branta hutchinsii		able to identify?
15 Canada	oose Branta canadensis Hide Details		Ves No 7

# eBird Mobile Data Entry



arrier S	7	2:55 PM		-	Carrier	ē	2:55 PI	M.	
	Pt.	Pinosseawa Aug 5, 2015, 2:5	tch only 5 PM				Pt. Pinos-seav Aug 5, 2015,	watch only 2:55 PM	
	All	Likely	Ch	ecked - 5		All	Likely	c	hecked - 5
Q	# spec	cies name/	code	Cante	0	t # sp	ecies name	e/code	Cantos
3	Common	Loon			Are yo	ou subm	nitting a cklist of the	_	
	loon sp.				birds y	you wer ly?	e able to	No Yes	
	Pied-billed	d Grebe			Trave	eling	Stationary Incid	tental	(1)
	Eared Gre	ebe			Numb	er of ob	servers		t
1	Western (	Grebe			Durati	on (min	utes)	Calculate	45
	Clark's Gr	rebe			Distar	ice (mile	es)		
3	Western/0	Clark's Grebe			Comm	nents			
2	Black-fool	ted Albatross							
15	Northern	Fulmar							
	Pink-foote	ed Shearwater			з	Comm	ion Loon		
	Flesh-foot	ted Shearwater			1	Weste	rn Grebe		
	Buller's Sl	hearwater			3	Weste	rn/Clark's Grebe		
lome			Review &	Submit	Home			Review 8	Submit

## Data for science while keeping birders happy with fun stats and tools



280

Updated 7 sec ado.

131 species observed in Wisconsin, US that you need for your Wisconsin Life List (321 species)

View Life Needs Alert for Wisconsin, US

Carolina Wren

Eastern Screech-Owl

download

	Sort by 👻
0.5383% frequency	🖸 Мар
0.4172%	🖬 Map
0.3806%	Ka Map
0.0905%	🖸 Мар
0.0640%	🖸 Map
0.0514%	🖸 Мар
0.0488%	🖬 Мар
0.0408%	🖸 Map
0.0402%	🖸 Мар
0.0395%	🚺 Мар
0.0318%	Map.

Print

#### Wisconsin - Life Observations - Harris's Snarrow

122 (60.7%)

122 (60.7%)

122 (60.7%)

113

54

48

16 Drew Goldberg

16 Brian Reinke

16 Alex Harman

Alp	habetic Taxonomic	Location	S/P	Date	1	Hooded Warbler
1	Harris's Sparrow 1	Bayview Park, Ashland	US-WI	26 Sep 2005	4.	Kentucky Warbler
2	Harris's Sparrow	Fellman	US-WI	01 Oct 2005	5.	White-faced Ibis
3	Harris's Sparrow 1	Fellman	US-WI	03 Oct 2005	6.	Laughing Gull
4	Harris's Sparrow 1	Tri-County Corridor, Ashland (West)	US-WI	29 Sep 2009	7	Nelson's Engroup
5	Harris's Sparrow 1	Ellis	US-WI	22 Sep 2010	. (-	Neison's aparrow
6	Harris's Sparrow 2	Washburn Marina	US-WI	17 Oct 2010	β.	Prairie Warbler
7	Harris's Sparrow 2	Bourgo Home	US-WI	15 May 201:	9.	Snowy Egret
8	Harris's Sparrow 1	Washburn Marina	US-WI	15 Oct 2011	10.	European Goldfinch
9	Harris's Sparrow 2	Northern Great Lakes Visitor Center	<u>US-WI</u>	22 Sep 2012	17.	Chuck-will's-widow

Caspian Tern (Apr 13, 2018)

Chipping Sparrow (Apr 14, 2018)

Chipping Sparrow (Apr 15, 2018)

## Lots of online outputs we'll explore in a few minutes...

Black-and-white Warbler	MAP	Q Golden-winged Warbler	Date: Year-Round, All Years 👻 Location:
Tennessee Warbler	MAP	 9 Kenora	Vermilion Bay Dryden Silver Dollar
Orange-crowned Warbler	MAP		tonsoe
Nashville Warbler	MAP		Upsala
Connecticut Warbler	MAP	 Bill and Bill and B	Atikokan+ Quelico
Mourning Warbler	MAP		Provincial Park II
Common Yellowthroat	MAP		Kabe ogama
			National Forest



Red Crossbill (Appalachian or type 1) - © Ryan Brady



1/1 1/15 2/1 2/15 3/1 3/15 4/1 4/15 5/1 5/15 6/1 6/15 7/1 7/15 8/1 8/15 9/1 9/15 10/1 10/15 11/1 11/15 12/1 12/15



# Wisconsin Breeding Bird Atlas II

# www.ebird.org/atlaswi

# What is a bird atlas?



- Document bird species breeding across entire region
- Volunteers head into atlas blocks and report evidence of breeding
- Grid system



# Priority and specialty blocks

<u>Red</u> = 1,130 Priority Blocks <u>Blue</u> = 153 Specialty Blocks <u>Green</u> = as many as we can!



• <u>3 mile x</u> <u>3 mile</u> blocks • WBBA II will be successful if all priority and specialty blocks are completed

• 2015-2019

# How does atlasing differ from general birding?





- Moving more slowly, observing behaviors
- Assigning behaviors to breeding codes (e.g., S-Singing male, P- Pair, FY - Feeding Young)
- Classed as Possible, Probable, Confirmed

# Power of atlases: range shifts



# <figure>



Wilson, et al. 2012. Second Atlas of Breeding Birds in Pennsylvania

# Custom Atlas Portal to eBird



# Custom Atlas Portal to eBird

Did you have a breeding code on your checklist?

Entire checklist goes into Atlas eBird portal

Wisconsin

Breeding Bird Atlas II



Entire checklist goes into traditional Wisconsin eBird portal

www.ebird.org/atlaswi

YES

eBird



www.ebird.org/wi

# Atlas Data Entry Similar to eBird, but

Mind block lines



	Breeding:	S7 Singing	Male Present 7+	days	▼ Hel		
	Add data	Age & Sex	Breeding Code	Media	Details		
2	Common Ye	llowthroat	t Hide Breeding Code or Details				
	Breeding:	FY Feeding	Young		• Hel		
	Add data	Age & Sex	Breeding Code	Media	Details		
6							
6	American Re	edstart Hid	de Breeding Code of	or Details	9		

Use breeding codes from dropdown

### **Wisconsin Atlas Participation to date**

- 1,500 Observers
- Submitted 93,000 checklists
- 240 breeding species
- Documented 5 million birds
- Some data in 95% Priority Blocks
- 35% of blocks complete
- 2 years left of field work (hopefully!)



# Atlas data are pooled with general eBird data

- Available for public download
- Can be stripped out later if needed

FIRST NAME	LAST NAME	SAMPLING E	PROTOCOL 1	PROT	PROJECT CODE	DURATION	EFFORT DI	EFFORT AF NUM	BER	ALL SPECIE	GROUP ID
Chris	Wood	S21445363	Historical	P62	EBIRD_ATL_WI					0	
Chris	Wood	S21445378	Historical	P62	EBIRD_ATL_WI					0	
Chris	Wood	S21445376	Historical	P62	EBIRD_ATL_WI					0	
Chris	Wood	S21445372	Historical	P62	EBIRD_ATL_WI					0	
Chris	Wood	S21445416	Historical	P62	EBIRD_ATL_WI					0	
Rick	Fox	S42848665	Historical	P62	EBIRD					1	
Chuck	Heikkinen	S4480435	Traveling	P22	EBIRD	141	19.312		2	1	
Eric	Epstein	S21452773	Historical	P62	EBIRD_ATL_WI					0	
Aaron	Holschbach	S33575791	Traveling	P22	EBIRD	150	3.219		1	1	
Aaron	Holschbach	\$35963169	Traveling	P22	EBIRD	120	3.219		1	1	
Ginny	Helland	S2989414	Traveling	P22	EBIRD	540	16.093		2	1	
Nick	Anich	S4974239	Incidental	P20	EBIRD					1	
Andrew S.	Aldrich	\$8409682	Traveling	P22	EBIRD	120	3.219		2	1	
Rob	Pendergast	S11366517	Stationary	P21	EBIRD	30			1	1	
Michael	O'Brien	S14276654	Stationary	P21	EBIRD	45			1	1	
Sean	Fitzgerald	\$14183156	Stationary	P21	FBIRD	14			1	1	

# Atlas data differ from eBird data

• More often have specific breeding information

 Better spatial coverage of most areas

• Property-specific protocol

# **Property-specific Protocol**

* Observation Type:	Traveling - Property Specific	You traveled a specific distance within a block AND within a single property boundary – walking around a state natural area, driving a refuge loop, biking roads entirely through private lands.	More Info						
_	<ul> <li>Traveling –</li> <li>You traveled a specific distance within a block but not within a single property boundary – walking</li> <li>General</li> <li>a trail, driving a road, birding by bike.</li> </ul>								
	Stationary	You stayed at a fixed location — watching from a window, hawkwatching, seawatching.	More Info						
	Incidental	Birding was not your primary purpose — noting a bird while driving or gardening.	More Info						
	Other	Choose T							



# **Atlas Point Counts**



- "side project"
- 2 more years of data collection
- Data will be available to public eventually

## Let's head to the computer and check out eBird and Atlas eBird outputs



# Minnesota's first breeding bird atlas

Nicholas Walton April 18, 2018



Growing Strong Industries ~ Developing New Ideas ~ Nurturing Natural Resources

#### **MNBBA** objectives

- Document occurrence and breeding status
- Collect statewide, systematic observations
  - Species distribution models
  - Population estimates
- Publish website and book with species summaries



#### Introduction to MNBBA

- Minnesota Breeding Bird Atlas (MNBBA)
- 2009 2013
- Over 700 volunteers and paid researchers



#### **Introduction to MNBBA**

- Volunteer atlasing
  - <sup>1</sup>/<sub>4</sub> PLSS Township atlas blocks
    - 9774 total blocks
    - 2352 priority blocks (NE quadrate)
  - >380k observations
  - 249 species detected
  - Confirmed 231 species
- Point counts
  - >140k observations
  - >230 species





#### **Methods: Point Count**

- Three points per township (NE quadrate)
  Dominant, Sub-dominant, Random
- Stratified by region
- Survey from secondary roads
- 10 min, unlimited radius, >250 m apart







>7k point counts

Biophysical attributes

Species distribution model

- One of three modeling strategies depending on:
  - Species' behavior
  - Number of observations
- Population estimates for some species

Minnesota Supercomputing Institute

Pairs / 40 ha [0 - 0.1] (0.1 - 1] (1 - 10] (10 - 100] > 100

UNIVERSITY OF MINNESOTA Driven to Discover<sup>see</sup>



- GLM with offset
  - 69 species
- Ovenbird
  - MN population estimate:
     ~2.8 10<sup>6</sup> pairs
  - PIF MN: ~6.0 x 10<sup>5</sup> pairs



<u>.</u>



- GLM *without* offset
  - 28 species
  - No population estimate
- Gray Jay







- MaxEnt
  - 21 species
  - No CI
- Sandhill Crane



#### Website

- https://mnbirdatlas.org/
- Species accounts for 249 species

Minnesota Breeding Bird Distribution

40 30



Poecile hudsonicus

Overview

1).

Overview

Home Using the Atlas Explore the Atlas Data and Methods About the Atlas

#### **Boreal Chickadee**

Minnesota Breeding Bird Atlas (MNBBA).



Boreal Chickadee. Poedile hudsonicus Cavid Brislance

Assigned a Continental Concern Score of 9/20 by Partners in Flight; listed as a Species in Greatest Conservation Need by the Minnesota Department of Natural Resources.

Moderate

#### Life History

Conservation Concern:

Migration: Permanent resident; periodic irruptions south of its primary range occasionally occur.

Food: Omnivore; largely arthropods, seeds, and berries gleaned from foliage.

4 5 6 7 9

Low

Nest: Cavity nester in trees; often self-excavates in a natural cavity but occasionally uses a hole excavated by another species, primarily woodpeckers.



Figure 1. Breeding distribution and relative abundance of the Boreal Chickadee in North America based on the federal Breeding Bird Survey from 2011 to 2015 (Sauer et al. 2017).

#### Website Notes

- Explore the atlas > Species accounts
- ALFL
- Walk through tabs
- Interactive map
- Can show just some evidence codes
- Cycle through map layers > breeding evidence by region
- SDM
- Back to County to show species list
- Turn on OSM with parks and WMAs
- Zoom to Sawyer WMA > block list
- Zoom to Cooke SP > custom area

#### **Website Notes**

- Raw data from AKN
- Data and methods > Access raw data

Principle funding was provided by the Minnesota Environment and Natural Resources Trust Fund (ENRTF) as recommended by the Legislative-Citizen Commission on Minnesota Resources (LCCMR)

Additional funding and in-kind donations:

- Audubon Minnesota
- Minnesota Department of Natural Resources
- Minnesota Ornithologists' Union
- Natural Resources Research Institute at UMD
- United States Fish and Wildlife Service

In addition to contributions by volunteers, data were also provided by:

- Audubon Minnesota
- Cornell Lab of Ornithology
- Golden-winged Warbler Working Group
- Hawk Ridge Bird Observatory
- Hormel Nature Center
- Minnesota Department of Natural Resources
- Minnesota Ornithologists' Union
- Midwest Peregrine Society
- Minnesota Prairie Chicken Society
- National Park Service
- Natural Resources Research Institute of the UMD
- The Nature Conservancy
- United States Fish and Wildlife Service
- United States Forest Service
- United States Geological Service
- University of Minnesota
- Wildlife Rehabilitation Clinic

#### Computing power provide by:



#### Minnesota Supercomputing Institute

#### ■ UNIVERSITY OF MINNESOTA Driven to Discover™

Thank you to the hundreds of volunteers and project partners who contributed to the Minnesota Breeding Bird Atlas!



https://mnbirdatlas.org/

- Group 1: Land use/land cover
  - LANDFIRE (23 classes) at 3 spatial scales
  - Wetland cover at 3 spatial scales
  - Choose spatial scale here

#### • Group 2: Disturbance

- Forest loss at 3 spatial scales (year matched to count)
- Road density (m per 500m buffer)
- Human population (humans per 500m buffer)
- CropScape at 3 spatial scales (year matched to count)
  - Conservation (c)
  - Row crop (r)
  - Small grain (s)

Insect disturbance at 3 spatial scales (year matched to count)

- spruce budworm (sb)
- eastern larch beetle (elb)
- forest tent caterpillar (ftc)

#### • Group 3: Land cover structure

- Three cover categories for three vegetative types (forest/herb/shrub) at 3 spatial scales
- Two height categories for 3 vegetative types (forest/herb/shrub) at 3 spatial scales

- Group 4: Landscape metrics
  - Number of patches at 2 spatial scales (500m and 1000m; choose 1)
  - Patch richness at 2 spatial scales (500m and 1000m; choose 1)
  - Both based on LANDFIRE level 2

#### • Group 5: Climate

- Average annual precipitation (mm)
- Average June precipitation (mm)
- Average annual temperature (°C)
- Average minimum June temperature (°C)
- Geographic coordinates x and y

# Intro to the North American Breeding Bird Survey

Nicholas Walton April 18, 2018

> Natural Resources Research Institute

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Growing Strong Industries ~ Developing New Ideas ~ Nurturing Natural Resources

#### What is the BBS?

- Large-scale survey of NA birds
- Primarily continental US and southern Canada
- Annual
- 1966 to present
- Over 5k survey routes
  - Around 3,700 active
  - Randomly placed



#### **Count protocol**

- Routes are series of roadside point counts
  - 24.5 miles long
  - Stops every 0.5 mile (i.e., 50 point counts/route)
  - Start <sup>1</sup>/<sub>2</sub> hr before sunrise
  - 3-minute point count period

#### **BBS** products

- Species and guild trends over multiple scales:
  - Route, state, region, survey wide
- Survey wide trend maps
- Survey wide species distribution maps





Alder Flycatcher trend (BCR 12) and distribution

#### Get involved!

- Michigan: Katie Koch (<u>katie\_koch@fws.gov</u>)
- Minnesota: Bob Janssen (<u>rbjanssen@aol.com</u>)
- Wisconsin: Mark Korducki (Korducki@earthlink.net)

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← → C @	0 nttps://www.pwrc.usgs.gov	bbs/RouteMap/Map.cfm#	···· 🏠 🔍 creative commons	
Paturient Wildlife Research Genter	In Partnership with:	Environment Canadia Service Service de la faune	Consistent Nacional para al Conscienters y Den de La Biodiversidad	A.
	North American Bre	eding Bird Survey		201
B	Available Routes for	2018 Field Season		
	Please Select Your Cou Below	ntry and State +	-	-
RRS Home	Constant United Stat			
About BBS	Country: Oniced Stat			-
RDE Nous	State: Minnesota			1 Coloma
Related Links				
Related Canks	34 Available B	0.000		
an terreter	Zoom to:	Details:		• • • • • • • • • • • • • • • • • • • •
Participate	50001 - Money Creek	Info		
Learning Tools	50003 - Hartland	Info Assigned		
Data Entry	50004 - Huntley	Info • Available		
Contact Us	50005 - Chandler	Info		
	50006 - Ash Creek	Info		
ine Nessel	50007 - Millville	Info		
Results and	50008 - Lakeville	Info		1.0
Analyses	50009 - Minnetonka	Info		
Raw Data	50010 - Arlington	Info		
and the second second	50011 - Courtland	Info		1000
	50012 - Redwood Fall	Info		1 mm
Coord Login	50013 - Maynard	Info		
	50014 - Dawson	Info		
	50015 - Princeton	Info		
	50016 - Osseo	Info		
	50017 - Knapp	Info		
	50018 - St Stephen	Info		
	50019 - Appleton	Info		
	50020 - Gluek	Info		
	50021 - Chokio	Info		1000
	50022 - Cromwell	Info		
	50023 - Wigwam Bay	Info		
	50024 - Mille Lacs	Info		
	I BOORD IN A			

#### Data entry



2018 Breeding Bird Survey Comment Forms: USA and Canada - English [pdf] Canada - Français [pdf]

New! Add-as-you-go Field Sheets

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#### Data download

- Raw data
- BBS products

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Science for a changing world												
Patuxent Wildlife Research Center												
Minnesota												
North American Breeding	North American Breeding Bird Survey Trend Results											
Help file												
Check out our Regional Cre	dibility -	measure										
		1966-	2015	i trends-	1	1	2005-2015	1				
Species	N	Trend		( 95%	ci )	Trend	( 95%	ci)	RA			
Red-necked Grebe	13	0.51	(	-6.77,	8.32)	-7.38	( -26.89,	10.04)	0.03			
Pied-billed Grebe	58	-1.10	(	-2.80,	0.53)	-1.18	( -4.83,	1.69)	0.49			
Common Loon	48	1.11	(	0.21,	1.98)	1.05	( -0.94,	2.78)	1.09			
Herring Gull	15	-3.59	(	-6.98,	-0.14)	-3.69	( -12.29,	4.64)	3.26			
Ring-billed Gull	47	3.82	(	0.11,	7.49)	-1.35	( -13.82,	9.27)	2.49			
Franklin's Gull	20	-11.71	(	-17.95,	-3.93)	-13.90	( -33.00,	7.60)	108.32			
Caspian Tern	12	1.42	(	-8.50,	10.98)	1.20	( -45.39,	37.33)	0.01			
Forster's Tern	19	-0.42	(	-9.28,	5.71)	5.71	( -4.29,	16.31)	0.26			
Black Tern	47	-6.29	t	-8.33.	-4.40)	-5.61	( -9.96.	-1.67)	4.37			



https://www.pwrc.usgs.gov/bbs/

#### **Data download**

#### • Raw data

- Species and guild trends over multiple scales:
  Route, state, region, country, survey wide
- Survey wide trend maps
- Survey wide species distribution maps

#### Access route data

- Raw data
  - Not data archive (unless really want raw data)
- Retrieve raw data
- Enter Retrieval System
- Species Totals for a Route
- Make sure you're familiar with these species

#### Access species data

- USGS Results and Analysis
- Survey results
  - Species groups summaries
    - 2005-2015
    - Boreal hardwood transition (BCR 12)
    - Woodland breeding
  - Trend estimates (by species)
  - Trend estimates (by region same info different entry)
  - Distribution maps
  - Trend maps

- BBS is good for large scale picture
- State of the birds report