

Community Science Bird Monitoring at GALENA SOÓNKAHNI

2022 Project Report



PROJECT OVERVIEW

Since 2015, Tracy Aviary has been conducting a community science bird monitoring project at Galena/Soonkahni (henceforth: Galena), a 250 acre preserve adjacent to the Jordan River. Managed by a number of stakeholders, including Utah Division of Forestry, Fire and State Lands, Utah Open Lands, and Salt Lake County, Galena is one of the largest areas of protected open space along the Jordan River corridor. With this bird monitoring study, Tracy Aviary volunteers help to collect information about how birds use the habitats at Galena, and how community composition changes throughout the site and over time. This information can help guide bird-friendly restoration and management strategies. Here, we summarize results from our 2022 bird monitoring field season.

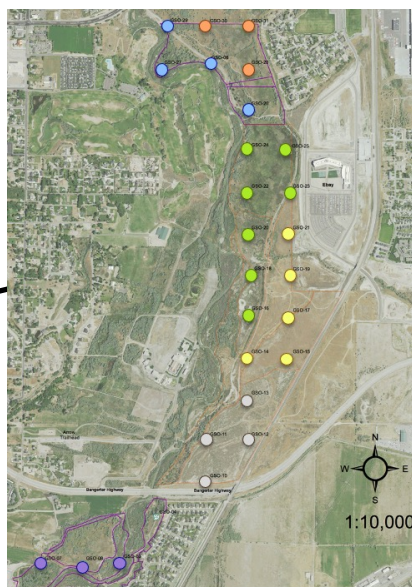
STUDY SITES

We generated 26 sampling points across Galena where we conducted bird and vegetation surveys. These surveys are part of a larger community science bird monitoring program that includes twelve other study sites in the Salt Lake region.

Bird Monitoring Sites



Galena Sampling Points



BIRD SURVEY METHODS



Breeding Season Point Count Surveys

During April – July of 2022, 13 community scientists and Tracy Aviary staff conducted 4 breeding season point count surveys at Galena. Point count surveys were conducted by pairs of community scientists between dawn and 10am. The ‘observer’ identified all birds seen and heard during six minutes, and noted the number of individuals, distance, and direction. The ‘recorder’ wrote all of the observations on the datasheet, and also noted weather and site variables, such as wind speed and cloud cover.



Non-breeding Season Group Surveys

Information from point count surveys was supplemented by non-breeding group surveys conducted at each site in January, February, March, August, October, November, and December 2022. During non-breeding surveys, groups of volunteers led by a trained Tracy Aviary staff person walked a transect through the site and noted all birds seen and heard in the area.



Owl Playback Surveys

During April and June, when owls are most likely to be vocalizing, groups of volunteers led by a trained aviary staff person walked the site in the evening listening for owls, stopping periodically to play owl calls and listen for responses.

2022 BIRD MONITORING RESULTS

4 Breeding Season Surveys

- 3,145 bird observations
- 85 species

7 Non-breeding Surveys

- 8,204 bird observations
- 82 species

2 Owl Surveys

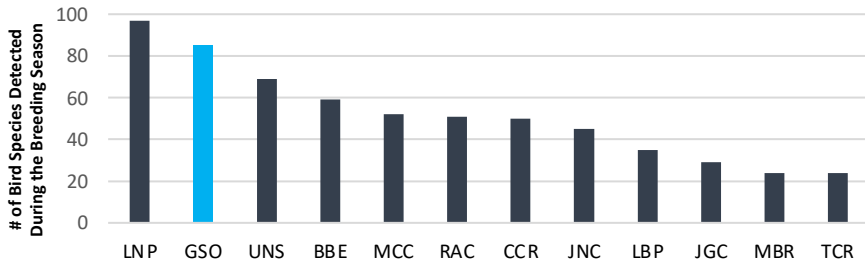
- 3 owl detections
- 2 species

114 total bird species were detected at Galena in 2022

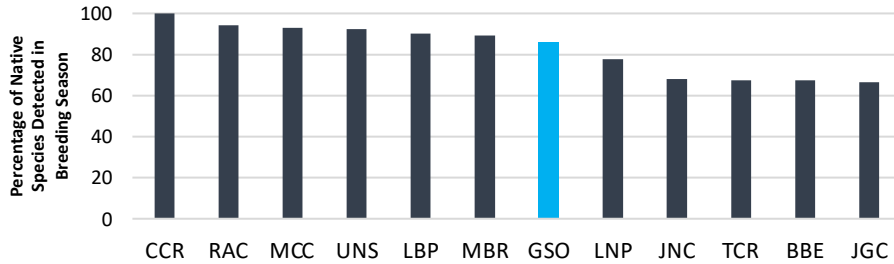
Comparison to Other Sites Along the Jordan River

We can measure the health of an urban riparian site such as Galena by looking at several metrics, including species richness (the number of species detected), and the proportion of native, riparian-associated and urban-sensitive birds that use the site. When comparing Galena (light blue) to other monitoring sites (dark blue), we found high breeding season species richness, average native, riparian-associated, and urban-sensitive bird species.

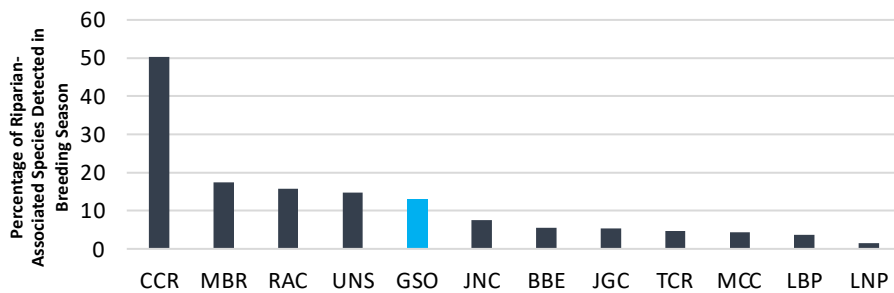
Species Richness



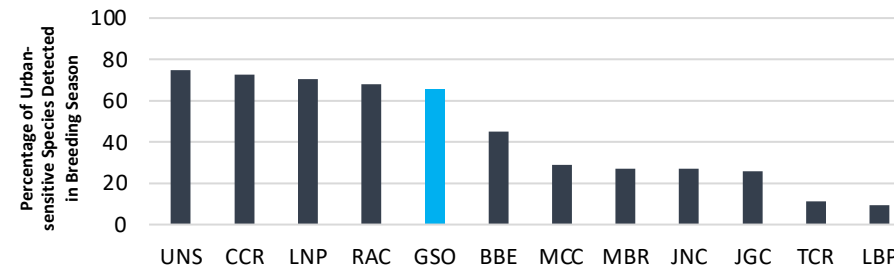
Native Bird Species



Riparian-associated Bird Species



Urban-sensitive Bird Species

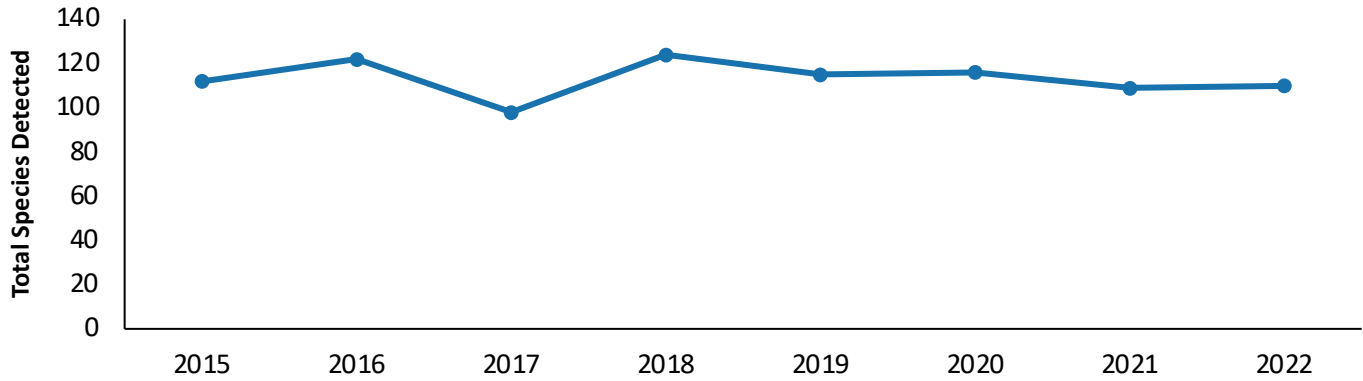


2022 BIRD MONITORING RESULTS

Trends Over Time

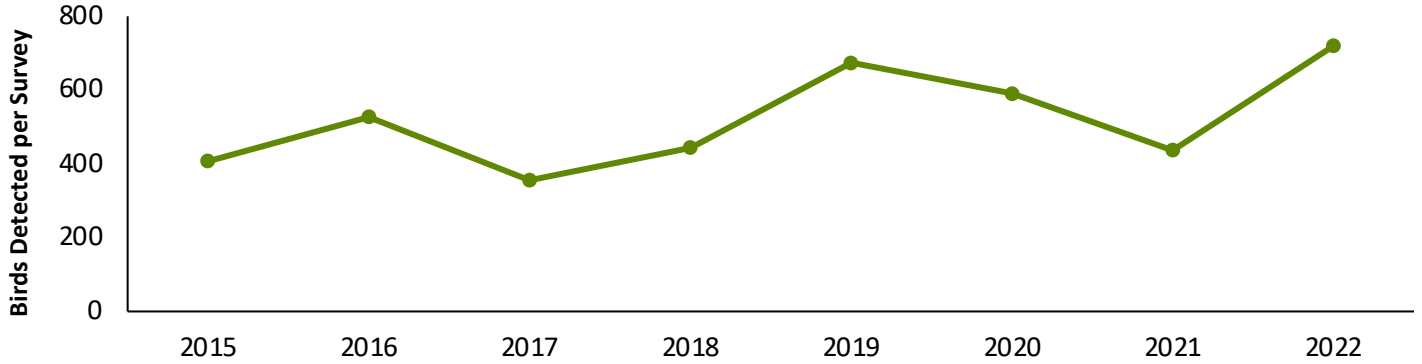
We measured trends in bird habitat use at the site over our bird monitoring period by examining changes in breeding season and non-breeding season species richness (number of bird species detected), and relative abundance (detections per survey).

Species Richness

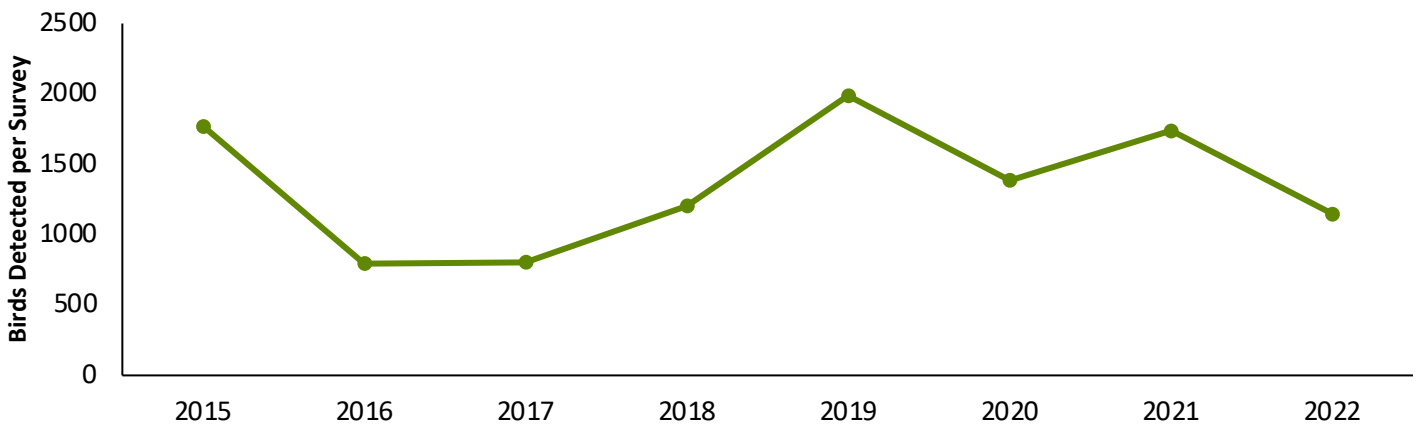


Relative Abundance

Breeding Season (April – July)



Non-breeding Season (August – March)



2022 BIRD MONITORING RESULTS

Bird Habitat Use Patterns Throughout the Jordan River

We use breeding season data to help understand how habitat features and landscape attributes impact where different bird species are found; information that could help with land management and restoration decisions that create, protect, or enhance healthy bird habitat for target species. A multi-season occupancy modeling analysis using bird survey data from 2013-2022 identified the most important factors influencing habitat use by three target riparian-associated and three urban-associated species across our bird monitoring sites. Our analysis examined which habitat attributes (Table 1) influenced the probability that these species would use an area within our sampling sites, or locally colonize or go extinct from an area.

Occupancy Analysis: Species Results

Canopy Cover was found to be an important factor for habitat use by Song Sparrows. They were more likely to occupy and less likely to go locally extinct from areas with higher canopy cover. Bullock's Orioles were more likely to occupy areas with more herbaceous vegetation, and were more likely to locally colonize areas with greater shrub cover. **These results highlight the importance of maintaining and enhancing vertical structure, including canopy trees, shrubs, and herbaceous plants on the ground.**

Distance to River was found to be an important factor for habitat use by all of the target species examined. All species had decreased habitat use as distance from river increased, and Yellow Warblers were also less likely to locally colonize areas further from the river. **This finding highlights the importance of enhancing habitat directly surrounding the river.**

Urban-associated species such as House Finches and House Sparrows were less likely to use habitat with a greater **Buffer Distance** to the developed area, and House Sparrows were more likely to go locally extinct from areas further from development. This finding highlights the importance of providing a large area of protected space that can buffer sites from development, and decrease use by non-target urban-adapted species.

Table 1. Habitat and landscape attributes included in occupancy analysis.

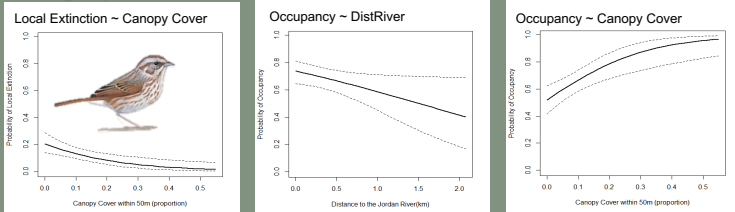
Variable	Measurement (unit)
Canopy Cover	Tree canopy cover within 50m (%)
Canopy Lost*	Decrease in canopy cover from first to last year of monitoring
Shrub Cover	Shrub cover within 50m (%)
Shrub Lost*	Decrease in shrub cover from first to last year of monitoring
Herb Cover	Herbaceous cover within 50m (%)
Water Cover	Cover of water within 50m (%)
Native Canopy	Cover of native canopy trees within 50m
DistRiver	Distance to the river or stream (km)
Riparian125	Riparian or wetland habitat within 125m (%)
Buffer	Buffer distance to nearest developed area (km)

*Variable only included as covariate for local extinction or colonization parameters

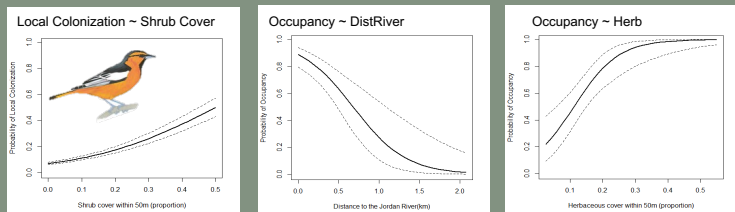
Riparian-Associated Birds

Habitat Relationship Graphs

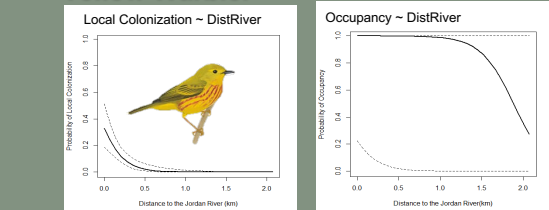
Song Sparrow



Bullock's Oriole



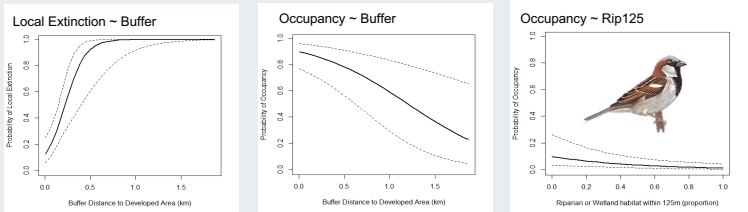
Yellow Warbler



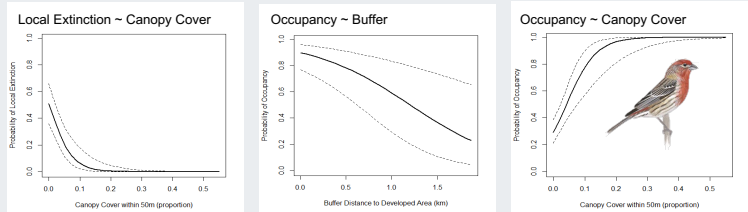
Urban-Associated Birds

Habitat Relationship Graphs

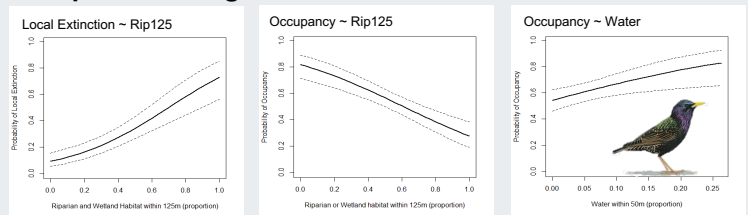
House Sparrow



House Finch



European Starling



RECOMMENDATIONS TO ENHANCE AND PRESERVE BIRD HABITAT

Plant and maintain trees, shrubs, and other native vegetation over a large footprint of the site. This vegetation will enhance the contiguous habitat along the Jordan River corridor and provide a buffer from the surrounding roads and residential development.

Promote vertical structure and canopy cover throughout the site by protecting existing trees/shrubs and/or replacing trees that are removed. This will enhance habitat for riparian-associated birds such as warblers, flycatchers, and orioles.

Keep dogs on leash and discourage use of site by cats. These domestic animals can cause direct mortalities or disturbance to birds.

Maintain standing dead trees to provide habitat for cavity-nesting species. Avoid complete removal if possible; cutting them to a height of 10ft can mitigate safety concerns while still providing cavities.

No tree removal or thinning activities should take place during the breeding and nesting season (April – July). If trees are to be removed, mature trees should be thinned out slowly while they are replaced so vertical structure and fruiting resources are maintained throughout the restoration process.

Improve water quality in the river to support healthy aquatic invertebrate communities.

Add and enhance wetland and ephemeral water elements. Ephemeral water components and additional wetland vegetation will create high quality habitat for species such as Red-winged and Yellow-headed Blackbirds, Virginia Rails and Sora, Marsh Wrens, and Common Yellowthroats.



BIRD MONITORING AT GALENA

Complete List of Birds Detected during Breeding Season (BSS) and Non-breeding Season (NBS) Surveys

Species	Number of Observations (detections/survey)															
	2015		2016		2017		2018		2019		2020		2021		2022	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
American Avocet	1.4	0	0.2	0	0	0	0.2	0.125	2.5	0.125	0.5	0	0	5	0.75	0
American Coot	0.4	7.75	0	5	0.2	6	0.2	4	0.5	1.875	0	2.25	0	3.71	0	3.43
American Crow	0	15.375	0	0.75	0	0	0.4	2	0	0	0	0	0	7.86	0	4.57
American Goldfinch	10.8	8.125	8.2	6.625	6.2	9.375	5	9.375	4.75	9.75	6.5	5	4.6	8	3.25	3.29
American Kestrel	3	1.75	6.2	1.375	6.8	2	4.6	2.75	3.25	3.375	4.25	2.375	2.2	2.29	3.5	1.71
American Pipit	0.2	4.125	0	0.5	0	3.625	0.2	3.125	0	1.125	0	1.625	0	16.14	0.5	1.14
American Robin	24	92.75	28.2	98.25	12.2	68.375	25.2	82	22.5	167.875	35.5	53	38.4	76.71	38.5	131.6
American Tree Sparrow	0	0.625	0	1	0	0.5	0	0.25	0	0.125	0	0.875	0	0.29	0	0
American White Pelican	2.2	1.875	4	0.375	1.4	0	3.2	0	3	2.5	3.25	0	0.2	0.29	1	1
American Wigeon	0	1	0.2	0	0	16.125	0	0.375	0	0.5	0	2.625	0	7.14	0	10.29
Bald Eagle	0	0	0	0	0	0	0	0	0	0.25	0	0.25	0	0.71	0	0.14
Bank Swallow	3.6	2.875	5	0.75	1.6	0.875	3.4	3.75	5	12	3	0.625	1.8	1.71	8.5	0.57
Barn Owl	0	0	0	0.125	0	0.125	0.2	0	0	0.25	0	0	0	0	0	0
Barn Swallow	7.8	7.75	11	10.5	9.4	22	16	13.375	17	15.875	13	10.875	11.6	7.14	12	2.14
Barrow's Goldeneye	0	0	0	0.125	0	0	0	0	0	0	0	0.125	0	0	0	0
Belted Kingfisher	1.6	0.625	2.2	0.25	1.2	1.5	3.4	0.375	0.75	1.125	1.5	0.375	0.8	0.86	1.5	0.43
Bewick's Wren	0	0	0	0	0	0	0	0	0	0	0	0.125	0	0	0	0
Black-billed Magpie	22.4	14	23.6	14.75	20.8	12.875	19.2	12.5	22.25	12.875	13.5	16.125	18.4	8.29	16	15.86
Black-capped Chickadee	4.2	5.75	8.8	5	4.4	4.125	3.4	4.875	6.5	8	6	4	6.8	2	5	4.43
Black-chinned Hummingbird	2.6	0.75	2	3	1.4	1.25	2	1.75	1.75	2	2	2.375	2.2	0.57	2.25	3.14
Black-crowned Night Heron	0	0	0.4	0	0.4	0	0	0	0	0	0.25	0.125	0	0	0.25	0
Black-headed Grosbeak	7	0.125	10	0.375	6.6	0.375	7.2	0.125	3.5	0.125	11.25	0	11.6	0	8.75	0.29
Black-necked Stilt	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blue Grosbeak	1	0.25	3.8	0	0.8	0	0.6	0	0	0	0	0	0.4	0	0.25	0
Blue-gray Gnatcatcher	9	1	11.8	1.25	9	1.375	9.8	1.75	9.75	2.375	14.25	1.375	4.2	0.86	6.75	1
Blue-winged Teal	0	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0
Brewer's Blackbird	0.2	0	1.6	0	0	0	2.4	0	0.5	0	0.25	0	0.2	0	0.75	0
Brewer's Sparrow	0	0	0.6	1	0	0.375	0.2	2.375	0	0.375	1.5	0.375	0.2	0	0.25	0
Broad-tailed Hummingbird	0	0.125	0.2	0	0	0	0.2	0.125	0.75	0	0.25	0	0	0	0.5	0.14
Brown Creeper	0	0	0	0	0	0	0	0	0	0	0	0.125	0	0	0	0
Brown-headed Cowbird	10.6	0	18.6	0.25	9.8	0	10.4	0	15.5	0	17.75	0	11.2	0	16.8	0
Bufflehead	0	0	0	0.5	0	0.25	0	0	0	0	0	0	0	0	0	0
Bullock's Oriole	26.4	0.5	38.4	0.5	26.8	0.375	34.2	0	33.5	0.125	39	0.125	29.4	0	37.5	0.29
Cackling Goose	0	0.125	0	0	0	0	0	0.5	0	0.125	0	0.625	0	0.43	0	0.43
California Gull	1.2	0.625	3.2	3.75	2.4	1.5	1.4	0.375	5.5	0.625	1	3.25	1.6	0.14	6	0.29
California Quail	9.6	9.625	18.2	11.125	5.4	3	10.4	2.375	10.75	6.625	12	6.75	6.6	1.14	14.5	1.71
Calliope Hummingbird	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0	0	0
Canada Goose	9.2	169.375	5.2	110.38	4.2	128.13	8	148.38	35.5	196.875	17.75	92.375	5.4	105.71	29.5	328
Caspian Tern	0.6	0.25	0.4	0.75	1	0.125	1.2	0.5	1	0	0	0	1	0.43	1.75	0.29
Cassin's Vireo	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0	0	0
Cedar Waxwing	3.4	25.875	0	8.75	0	1.375	0.6	8.375	3.75	9.625	1.25	2.25	11	18.86	63	17.86
Chipping Sparrow	0.4	0	0	0.75	0	0.125	0	0.75	0	0.125	0.5	0.125	0	0	0.75	0
Cinnamon Teal	0.6	0	1.6	0.875	0.2	0	1.4	0	0.75	0	0	0	0.2	0.14	0	0
Cliff Swallow	9.2	0.25	9.8	1.25	15.6	0	8.2	0	85.25	0	36.5	2.875	17.6	0	11	0.14

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	2015		2016		2017		2018		2019		2020		2021		2022	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Common Goldeneye	0	0.25	0	1.25	0	1.625	0	0.75	0	0.625	0	0.75	0	1.86	0	2.57
Common Grackle	0	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0
Common Merganser	0.2	0	0	2.25	0	0.375	0	0.125	0	0.125	0	8.125	0	4.14	0	9.71
Common Raven	0.8	0.375	0.4	1.125	0.4	0.75	1	2	0.75	1.25	0.5	0.625	0.8	0.43	0.75	1
Common Yellowthroat	1.2	0.125	1.4	0.125	0.4	0.125	0.4	0.25	0.25	0.5	3.5	0.125	1	0	1	0
Cooper's Hawk	0.2	1.375	0.2	0.5	0	0.75	0	0.75	0	0.625	0.25	0.875	0.4	0.86	0.25	0.57
Dark-eyed Junco	0	4.5	0.2	4.75	0	4	0.2	5.375	0	10.75	0	3.75	0	5.29	0	5.71
Double-crested Cormorant	2	0.125	4	0.125	0.6	0	0.2	0.125	2.5	3.375	1	1	2	0	3.25	0
Downy Woodpecker	0	0.625	0.4	0.5	0.2	0.5	0	0.625	0.25	0.875	0.5	0.5	0.6	0	0.25	0.29
Dusky Flycatcher	0.2	0	0	0	0	0	0	0.125	0.5	0	0.25	0	0	0	0.25	0
Eared Grebe	0	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0
Eastern Bluebird	0	0	0	0	0	0.25	0	0	0	0	0	0	0	0	0	0
Eastern Kingbird	0.6	0	1.4	0	0	0.125	0	0.875	0	0	0	0	0.4	0	0	0
Eurasian Collared-Dove	0.6	2.125	3.6	2.75	1.6	9.75	3.4	6.5	3.5	6.875	3	7.5	4.6	3.29	6.25	5.14
European Starling	7.2	1050.75	8	220.75	6.2	133.25	10.4	568.6	16	1205	4.25	790.9	2.6	1147.9	8	368.6
Evening Grosbeak	0.2	4.875	0.2	0	0	4.25	0.2	1.25	0	1.125	0	1.75	0	0.29	0.5	3
Ferruginous Hawk	0	0	0	0	0	0	0	0.125	0	0	0	0	0	0	0	0
Forster's Tern	0.4	0	0	0	0.2	0	0	0	0	0	0.25	0	0	0	0	0
Fox Sparrow	0.4	0	0	0	0	0	0	0	0	0	0	0.125	0	0	0	0
Franklin's Gull	0.6	0.875	3.6	1.5	1.6	0.125	0.4	0	1.75	7.875	0.75	0	1.6	2.86	12.3	0
Gadwall	0	5	0	1.625	0	2.75	0.2	1.25	0	0.125	0	2.5	0	1.29	0	2.29
Golden Eagle	0	0	0	0	0	0	0.2	0	0.5	0	0.25	0.125	0	0	0	0
Grasshopper Sparrow	0	0	0.2	0	0	0	0	0.125	0	0	0	0	0	0	0	0
Gray Catbird	0.4	0	0	0	0	0	0.2	0.125	0	0	0.25	0	0.6	0	1.25	0.14
Great Blue Heron	0.4	0.75	0.2	0.375	0	1.625	0.2	1.25	0.5	0.375	1	0.625	0.8	1	2.5	0.14
Great Egret	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0
Great Horned Owl	0	0	0.2	0.125	0.2	0.125	0	0	0	0	0	0	0	0	0	0
Great-tailed Grackle	0	0	0	0.125	0.2	0	0	0.875	0.75	0	0.25	0	0	0	0	0
Green-tailed Towhee	0	0	0.2	0.125	0	0	0	0	0	0	0	0	0	0	0	0
Green-winged Teal	0.2	1.5	0.4	5.125	0	0.25	0	0.875	1	0.5	0	1	0	0.14	0	1.86
Hammond's Flycatcher	0	0	0	0.125	0	0	0	0.125	0	0	0	0.25	0	0	0	0
Hermit Thrush	0	0	0	0.25	0	0.125	0	0.125	0	0.25	0	0	0	0	0	0.14
Herring Gull	0	0	0	0.25	0	0	0	0	0	0	0	0.125	0	0.14	0	0
Hooded Merganser	0	0.625	0	0.25	0	0	0	0	0	0	0	0	0	0.29	0	0
Horned Lark	0	0.5	0	0	0	0	0	0.25	0.25	0.25	0	1.25	0.2	0	0	3
House Finch	9.8	30.5	5.8	12.125	5.2	11.875	7.2	21	12.75	15.5	18	22.25	15.8	18.14	19.5	13.71
House Sparrow	0.6	12	1.4	10	0.6	9	1.6	8.875	2	7.625	2.5	6	0.4	0.43	4.75	2.57
House Wren	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0.14	0	0
Killdeer	4	0.5	7.4	0.75	1.8	0.875	5	0.625	6.75	0.625	2.5	0.375	3	1	0.75	0
Lark Sparrow	0.2	0	0	0.125	0	0	0.2	0.375	0	0.625	0.25	0	1.8	0	0	0
Lazuli Bunting	4	0.5	3.6	0.75	0	0.75	0.2	1.25	0.75	1.5	2.5	0.75	0	0	0	0.29
Lesser Black-backed Gull	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14
Lesser Goldfinch	4.4	3.875	4.6	5.125	4	1.75	6.8	2	14	7.375	6.25	14.875	4	1.86	8	4.43
Lesser Scaup	0	0.125	0	0	0	0	0	0	0	0	0	2.25	0	0.43	0	0

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	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Lincoln's Sparrow	0.2	0.25	0	0.25	0	0	0	0.375	0	0.5	0	0	0	0.14	0	0
Loggerhead Shrike	0.2	0	0	0	0	0	0	0.375	0	0	0	0	0	0	0	0
Long-billed Curlew	0.2	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0
Long-eared Owl	0	0	0	0	0	0	0	0.125	0	0	0	0.875	0	0	0	0
MacGillivray's Warbler	0	0	0	0.375	0	0	0.4	0.125	0.5	0	0	0	0	0	0	0
Mallard	14	99.5	13.8	66.125	9	75.125	11.6	51.125	22	60.375	12	93	11	59.43	9	35.86
Marsh Wren	0.8	1.625	0.2	1.25	0	0.5	0	1.5	0	1.875	0	0.875	0	0.57	0	1.14
Merlin	0	0.125	0	0.125	0.2	0	0	0.125	0	0	0	0.375	0	0.57	0	0.14
Mexican Duck	0	0	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0
Mountain Bluebird	0	0	0	0	0	0	0	0.125	0	0	0	0	0	1.14	0	0
Mourning Dove	25	9.5	28.6	5.25	20.4	7.75	27.4	10.63	31.75	10.13	29.5	5	29.4	2.86	26.3	5.86
Nashville Warbler	0	0	0	0.375	0	0	0	0.375	0	0.125	0	0.125	0	0	0	0
Northern Flicker	0.6	12.5	0	9.125	0	8.125	0.2	7.375	0	6.875	0.25	7	0.2	9.57	0.25	11.71
Northern Goshawk	0	0	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0
Northern Harrier	0	0.5	0	0.75	0	0.875	0	0.125	0	1.75	0.25	1	0	2	0.5	0.29
Northern Mockingbird	0	0	0	0	0	0	0	0	0	0	0	0.125	0.2	0.43	0.25	0.14
Northern Pintail	0	0.375	0	1.375	0	0	0	0	0	0.125	0	0.125	0	0	0	0.14
Northern Rough-winged Swallow	7.6	5.5	12.4	4.25	11.8	1.5	11.4	1.25	17.25	5.75	12.25	0	7.8	0	6.75	0.71
Northern Shoveler	0	1.375	0	0.25	0	0	0	0	0	0	0	0.5	0	0.14	0	0.43
Northern Shrike	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0	0	0
Olive-sided Flycatcher	0	0	0	0.125	0	0	0	0	0	0	0	0	0	0	0	0
Orange-crowned Warbler	0	0.25	0	0.625	0	0.125	0	0.75	0	1.25	0	1	0	0.14	0	0
Osprey	0	0.125	0	0	0	0	0	0	0.75	0.125	0	0	0	0	0	0
Peregrine Falcon	0	0	0	0	0	0	0.2	0	0.25	0	0	0	0.2	0	0	0.14
Pied-billed Grebe	0	1.25	0	0.625	0	0.25	0	0.375	0	0.25	0	0.25	0	0.29	0	0.71
Pine Siskin	0.2	0.125	0.6	0	0	0	0	0	0	0.375	0	0.25	0.2	0.14	1.25	0.14
Prairie Falcon	0	0	0	0	0	0	0	0.125	0	0.375	0	0	0	0.14	0	0
Purple Martin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0
Red-breasted Merganser	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.29
Red-tailed Hawk	1.8	2.75	3.6	4.125	2.6	5.5	3.8	3.875	3.5	4.875	2.75	4.625	2	4	3.25	2.14
Red-winged Blackbird	50	25.875	66.2	20.5	52	47.75	58.6	34.25	86.25	17.25	60.75	84	48	66.71	49.5	14.14
Ring-billed Gull	0	4	0	12	0.2	3	0	0.875	0.25	2.375	0	3.875	0	3.86	0	3.29
Ring-necked Duck	0	0	0	0	0	0.125	0	0	0	0.25	0	0	0	0	0	0
Ring-necked Pheasant	6.6	0.75	19.8	0.75	10.6	1.75	27	1.5	23.75	1.75	28	2.375	29.6	1.71	26.5	0.57
Rock Pigeon	3.8	19.625	9	34.75	8	126	9.6	60.25	29.75	62.25	35.25	26.75	8.8	39.29	39.8	19.43
Ross's Goose	0	0	0	0.125	0	0	0	0.125	0	0	0	0	0	0	0	0
Ruby-crowned Kinglet	0.8	0.375	0.2	0.125	0	0.125	0.2	0.5	0	0.5	0	0.25	0.2	0.43	0.5	0.29
Ruddy Duck	0	0	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0
Rufous Hummingbird	0	0	0	0	0	0	0	0.25	0	0	0	0.125	0	0	0	0
Sandhill Crane	0	0	0	0.125	0.2	0	0	0.375	0	0	0	0.875	0	0	0.25	30
Savannah Sparrow	0.2	0	0.2	0	0	0	0	0.125	0	0	0	0.375	0.2	0	0.25	0
Say's Phoebe	0.2	0	0.6	0	0.2	0.25	0.4	0.375	0.75	0.125	0.5	0.5	0	0	0.25	0.14
Sharp-shinned Hawk	0.2	0.5	0	0.5	0.2	0.75	0.8	0.875	0	0.875	0	0.25	0	0.86	0	0.57
Snow Goose	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.86

BIRD MONITORING AT GALENA

Complete List of Birds Detected during Breeding Season (BSS) and Non-breeding Season (NBS) Surveys

Species	Number of Observations (detections/survey)															
	2015		2016		2017		2018		2019		2020		2021		2022	
	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS	BSS	NBS
Snowy Egret	0	0.125	0	0	0	0	0.2	0	0	0	0	0	0.2	0	0.5	0
Solitary Sandpiper	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14	0	0
Song Sparrow	28	10.375	29.4	10.125	23.4	8.75	26	7.875	21	10.125	26.25	7.875	24.4	8.43	28.8	9
Sora	0.2	0	0	0.125	0	0	0.4	0.125	0	0.125	1	0.125	0	0.29	0	0.14
Spotted Sandpiper	2.2	3.375	3.8	0	0.2	0.25	1.6	0	4	0.125	3	0	0.8	0	1	0.14
Spotted Towhee	0.4	0	1.4	1.125	0	1.625	0.4	1.75	0.5	2.75	0	2.375	0	3.14	0	3.14
Swainson's Hawk	0.6	0.5	0	0.625	3.4	0.75	2	0.25	2	0.5	1	0	0.2	0.14	1	0
Swamp Sparrow	0	0	0	0	0	0	0	0	0	0.125	0	0	0	0	0	0
Tennessee Warbler	0	0	0	0	0	0	0	0.125	0	0	0	0	0	0	0	0
Townsend's Solitaire	0	0	0	0	0	0	0	0	0.25	0.375	0	0.125	0	0	0	0
Tree Swallow	1.4	0.125	0	0	0	0	1	0.25	4	0.375	0	0.5	0.2	0	2	0
Tundra Swan	0	0	0	2.625	0	0	0	0	0	0	0	0	0	0	0	0
Turkey Vulture	0.2	0.125	0.8	1	0	0	0.6	0.375	2	0.125	0.25	0	0.2	0.29	0.5	0
Vesper Sparrow	0	0.5	0.2	0	0	0.25	0	0.375	0.25	0	0	0	0	0.29	0.25	0
Violet-green Swallow	0.6	0	0	0	0	0	0	0.125	0.25	0.25	0	0	0.4	0	0.25	0
Virginia Rail	0	2.25	1	2.125	0.2	2.5	0.4	1.75	0.75	0.75	0	0.875	0.2	2	0.25	0.57
Warbling Vireo	0	0.125	0.2	0.125	0	0	0.4	0	0.25	0.125	1	0	0	0	0.75	0
Western Kingbird	14.6	2.125	17.8	2.125	20	0.625	14.8	0.875	21.5	1.125	20.75	0.5	18	0	30.3	1.71
Western Meadowlark	15.6	0.25	15	0.25	3.8	0.375	5.8	1.25	8.5	1	0.75	1	6.8	0	4	0.43
Western Screech-owl	0	0.25	0	0	0	0.25	0	0	0	0	0	0	0	0	0	0
Western Tanager	0.4	0.25	0.6	1	0.8	0.125	0.4	1	1.25	0.25	2.75	0.5	0.2	0.57	0.25	0
Western Wood-pewee	0	0	1.4	0.125	0	0	0.2	0.125	0	0	0.75	0.125	0.2	0.14	1	0
White-crowned Sparrow	3.8	40.5	1.8	19.125	1	12.5	0.8	24.375	0.75	35.25	0.25	29	1.6	47.29	2.5	32
White-faced Ibis	1.6	10.75	2	5.5	6.2	3.875	3.2	41.75	10.25	9.375	38.5	16.125	3.4	0	108	0
White-throated Sparrow	0	0	0	0	0	0	0	0.125	0	0	0	0	0	0	0	0
Willet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.25	0
Willow Flycatcher	0	0	0.4	0.125	0	0.125	0.2	0	1	0	1.25	0	0.2	0	0.25	0
Wilson's Phalarope	0	0	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0
Wilson's Snipe	0.2	0.125	0.8	0	0.4	0.25	0.6	0.125	1.5	0.25	0	0.125	0	0.14	0	0
Wilson's Warbler	0.2	0	0.6	0.125	0	0	0	0.875	0.5	0	0	0.25	0	0.43	0.25	0
Wood Duck	0	1.125	0	0.125	0	0.5	0	0	0	0.25	0	0.75	0	1.29	0	0.29
Woodhouse's Scrub-Jay	0	0	0	0	0	0.125	0	0.125	0	0.125	0	0	0	0	0	0
Yellow Warbler	7.8	0	10.2	2.25	7	1.25	10.2	1.625	8.75	1.75	14.75	0.125	9.2	0.71	6.5	1.14
Yellow-breasted Chat	0.2	0	5.6	0	0.2	0	0.8	0	1	0	3.5	0	2.6	0	1.75	0
Yellow-headed Blackbird	5	0.25	5.6	2.5	2.4	11.375	0.8	0.125	3	0.5	1.5	0.125	1.6	4.57	3	0.29
Yellow-rumped Warbler	0.6	14.375	2	15.625	0.2	7.125	0.2	7.75	2.25	11.375	1.5	9.375	0.2	5.71	1	8

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