50 Years of Raptor Banding at Hawk Ridge

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Introduction

- The number of migrating raptors at Hawk Ridge are among the highest in the eastern United States
- Hawk Ridge's main station is the third oldest and one of the most active banding operations in North America
- Raptor banding efforts have consistently been conducted since 1972
- Diurnal raptor banding occurs from mid-August through November
- Owl banding occurs from mid-September through November
- Since 2007, the raptor banding program has collaborated on various research projects

Research Projects

PAST

- Determining the sources of Northern Goshawks passing through Duluth, Minnesota (S. Hawks, 2007)
- Mercury accumulation in raptors (E. Keyel, 2015)
- Molecular genetic investigation of morphological and genetic differentiation among the three subspecies of Merlin and Rough-legged Hawk to better understand evolutionary relationships (J. Hull)
- Examining population structure and genetic diversity in the American Kestrel (A. Anderson)
- Periodic invasions of Northern Goshawks (R. Green, 1980s - present)
- Examining eyes of raptors and owls (K. MacAulay, 2020)
- Cloacal swabbing as a tool to study diet in migrating raptors using DNA metabarcoding (L. Brouellette, 2021)
- Natal origins and dispersal patterns of raptors banded at Hawk Ridge during fall migration (E. Pavlovic, 2022)
- Minnesota's Red-tailed Hawks: Probabilistic origins of *B.j. abieticola* and dark-morph migrants (A. Pesano, 2022)

PRESENT

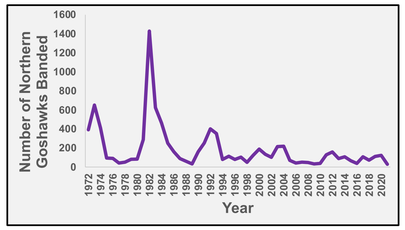
- Feather collections for mercury analysis (M. Etterson, BRI)
- Comparing PFAS exposure in migratory and local Minnesota raptors (M. Etterson & J. Ponder)
- Winter ecology of Northern Hawk Owls (H. Toutonghi)
- Northern Shrike movement ecology using geolocators (A. Valine)
- Upper Midwest American Kestrel Project (H. Lambeau)
- Raptor microbiome (I. Padilla, L. Miller, J. Ponder)
- Oxidative stress strategies and Hg in migrant raptors (BRI)
- Northern Goshawk sexing methods (F. Nicoletti)

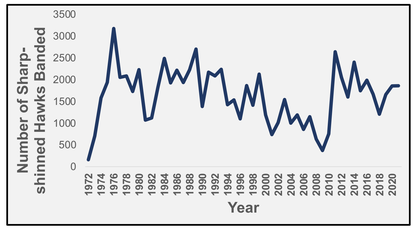
FUTURE

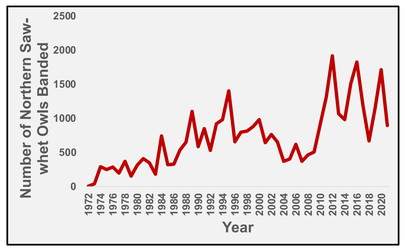
- Unique Red-tailed Hawk movement ecology using satellite transmitters
- Deploying 5 – 10 satellite transmitters per year on species lacking band recovery data
- Chemical exposure in raptors

Banding Data & Key Species

Species	50-year Total (1972-2021)	Yearly Average
Eagles		
Bald Eagle	36	0.72
Golden Eagle	13	0.26
Accipiters		
Sharp-shinned Hawk	81,574	1,631.48
Cooper's Hawk	1,048	20.96
Northern Goshawk	9,171	183.42
Buteos		
Red-shouldered Hawk	5	0.1
Broad-winged Hawk	482	9.64
Swainson's Hawk	3	0.06
Red-tailed Hawk	4,600	92
Rough-legged Hawk	502	10.04
Falcons		
Peregrine Falcon	171	3.42
Prairie Falcon	1	0.02
Gyrfalcon	6	0.12
Merlin	1,797	35.94
American Kestrel	2,057	41.14
Harriers		
Northern Harrier	1,443	28.86
Owls		
Northern Saw-whet Owl	35,786	715.72
Boreal Owl	137	2.74
Long-eared Owl	3,409	68.18
Short-eared Owl	17	0.34
Barred Owl	153	3.06
Great Horned Owl	157	3.14
Great Gray Owl	8	0.16
Snowy Owl	1	0.02
Eastern Screech-Owl	1	0.02
Northern Hawk Owl	1	0.02
Total	142,579	2,851.58







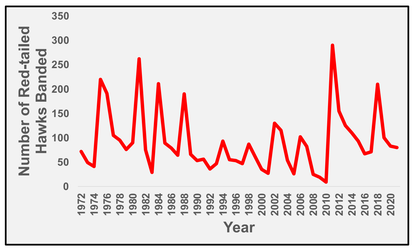


Figure 1. Key species banded over 50 years at Hawk Ridge Bird Observatory. Species included: Northern Goshawk, Sharp-shinned Hawk, Northern Saw-whet Owl, and Red-tailed Hawk.

Importance of Raptor Research

Raptors are important keystone species in the environment and serve a critical role of determining the health of ecological systems. We can research:

- How species ranges are changing with environmental change and habitat loss
- Population trends to determine conservation status and management plans
- Toxicity in the food web through biological sampling

Transmitter Work

Hawk Ridge Bird Observatory has partnered with several researchers looking at satellite transmitter data, including:

- Documenting movements of Snowy Owls using GPS-GSM transmitters (S. Weidensaul, D. Brinker, and N. Smith)
- Golden Eagle movement ecology using transmitters (MN Audubon, Eagle Center, 2010)
- Turkey Vulture migration using GPS satellite transmitters and wing tags (K. Bildstein & D. Barber)
- The Rough-legged Hawk Project (N. Paprocki)
- The Red-tailed Hawk Project (B. Robinson)

Acknowledgments

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