

Introduction and Background

During migration, raptors use air thermals that develop from the differential warming of land structures like bluffs, hills, and mountains. By riding thermals high into the air and gliding from thermal to thermal, raptors save immense amounts of energy while traveling great distances. In the Great Plains, the Loess Hills and places like Hitchcock Nature Center (Fig 1) attract raptors by the thousands during spring and fall migrations due to the thermals produced, making HNC an ideal site to research inland migrating birds of prey. Hitchcock's Hawkwatch program has consistently collected count data on migrating raptors since 1991, and in 2003,



Hitchcock Nature Center was deemed Iowa's first Important Bird Area. Hitchcock Raptor Banding began in 2007 and has collected health, demographic, and morphometric data from over 2000 individual birds.

Methods: Banding Operations

Wild raptors are safely captured and removed from traps by trained researchers. Birds are then outfitted with a properly-fitting USGS band. Measurements like weight, wing chord, tail length, and hallux, and health metrics like fat, crop fullness (in diurnal raptors), and ectoparasite presence are assessed and recorded. Age and sex classes are determined according to the most up-to-date information available for each species (Ligouri 2020, Mackentley 2019, Pyle 1997 and 2022, Weidensaul n. d.). Each bird is captured, processed, and released as quickly as possible to minimize handling time. Banders at our station undergo rigorous training for a minimum of 1 year (typically more) to ensure that operations remain safe and effective, and that data collection methods remain consistent from person to person. Weather data including temperature, humidity, cloud cover, haze, wind speed, and wind direction are taken at open and close of each banding session. Our most-banded species are Red-tailed Hawks (pictured in the bookend images above), Northern Saw-whet Owls, and Sharp-shinned Hawks.

Methods: Diurnal Raptors

We conduct diurnal raptor banding operations daily from about Sep. 7 to Oct. 31 as often as weather permits for 6-8 hours/day. Banding occurs sporadically from Nov. 1 to Nov. 30; during this time-frame, we preferentially select days with strong winds in order to increase our chances of capturing the last migrant Red-tailed Hawks of the season. Using a North-facing banding blind, we watch for nearby migrating raptors. We utilize mist nets and bow nets as outlined on our federal banding permits. Harnessed Rock Pigeons and European Starlings help us attract the attention of raptors in order for the migrating raptors to be captured in nets.



Fig 2: Close up of a Red-tailed Hawk's feet with a USGS band.

Methods: Northern Saw-whet Owls



Much of our owl banding protocols follow those outlined for Project Owlnet stations (Weidensaul, n.d.). Banding operations begin during the second week of October and end around Thanksgiving. Owl banding operations occur at night, with nets opening half an hour after sunset and staying open for 3-4 hours. We preferentially select nights with light Northern winds and aim to operate roughly 4 nights per week during the season. We utilize mist nets and an audiolure as outlined on our federal banding permits. Mist nets are checked as often as conditions necessitate.

Fig 3: a Northern Saw-whet Owl prior to release.

Acknowledgements

Thank you to the organizations who have sponsored our station; to our primary investigators, who have contributed personal funds and countless hours to operations; to our numerous volunteers over the years; and to the many individual donors who have helped keep our banding station funded.



Preliminary Results from 17 Years of Data: Raptor **Migration Banding at Hitchcock Nature Center**

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Ectoparasite Prevalence on HNC's Banded Raptors

While ectoparasite prevalence in Redtailed Hawks (Fig 5B) has remained relatively stable, and in Sharp-shinned Hawks (Fig 5C) appears to be potentially cyclical yet holding stable, our station has recorded a potential increase of ectoparasites found in Northern Saw-whet Owls (Fig 5A). Our banders have anecdotally noted that flat flies (*Hippoboscidae* sp.) are appearing on Saw-whets with more frequency in recent years. Utilizing the Mann-Trend test, results when Kendall testing our NSWO ectoparasite data are statistically significant (tau=0.6, p value=0.001). Results 2 sided from a Durbin-Watson test for autocorrelation, however, yield DW=1.13 with a p-value of 0.02, which could indicate that a positive autocorrelation is at play.

We currently do not know if other NSWO banding stations are seeing similar ectoparasite trends. Our next steps in this investigation to properly interpret our data will be to 1) contact other Project Owlnet banding stations to understand what ectoparasite trends they're seeing, and 2) further analyze our own data to determine whether our DW test statistic is enough of a cause of concern, and if so, how to correct for this, or what other statistical tests may be more appropriate to analyze the data.



Fig 4: a Sharp-shinned Hawk prior to release.











References Inc., Salt Lake City.

Mackentley, N., Jacobs, E. A., and Evans, D. L. (2019). Ageing Northern Saw-Whet Owls (Aegolius acadicus) from Remigial Molt Patterns. Journal of Raptor Research, 53(4), 387-392. Pyle, P. (1997). Identification Guide to North American Birds, Part II. Slate Creek Press, Bolinas, CA. Pyle, P. (2022). Identification Guide to North American Birds, 2nd edition. Part I. Slate Creek Press, Point Weidensaul, S. (n.d.). *Methods.* Project Owlnet. https://www.projectowlnet.org/methods/

Fig 5A: Northern Saw-whet Owl ectoparasite prevalence over time; Tau = 0.6, 2-sided p-value = 0.001, 2-sided conf. interval for Tau= 0.376 < p < 0.824 *Fig 5B:* Red-tailed Hawk ectoparasite prevalence over time; Tau = 0.3, 2-sided p-value =0.116, 2-sided conf. interval for Tau= -0.151 < p < 0.751 *Fig 5C:* Sharp-shinned Hawk ectoparasite prevalence over time; Tau = 0.3, 2-sided p-value = 0.114, 2-sided conf. interval for Tau= -0.138 < p < 0.728

HNC's Banded Raptors: Encounter and Recapture Maps

What are Recaptures and Encounters?

Each band that a bird bander orders from USGS is engraved with a unique 8 or 9 digit serial number. When a wild bird is captured, banded, and released, the bander relays this information to the federal government, along with data about the banded bird's species, age, and sex. A USGS band stays on a bird for the rest of the bird's life, so sometimes banded birds are found months or years after being banded. "Recapture" is a term used for a bander capturing and reporting a bird that has been previously banded; the term "encounter" refers to a non-bander finding and reporting a banded bird through www.reportband.gov.

The maps below depict the recapture and encounter data of birds banded at Hitchcock; in the case of NSWO (Figs 6A and 6B), we have also recaptured multiple birds that were banded by other researchers.



Fig 6A: Northern Saw-whet Owl recaptures and encounters *Fig 6B:* Northern Saw-whet Owl foreign recaptures (n=20). (n=16). Red dots indicate coordinates where our banded owls Yellow dots indicate coordinates where owls we recaptured have been found by researchers or members of the public. were previously banded.



HNC's diurnal raptor recapture and encounter records (Figs 7A and 7B) show a geographic and temporal bias, with many of our birds encountered during the fall, winter, and early spring months. Many raptors that use the Loess Hills during migration, especially Red-tailed Hawks, migrate to and from their breeding grounds in northern Canada and Alaska. The chance of encounters occurring in these regions during the breeding season is small due to these areas' relatively low human population densities.

About 36% (1 in 3) of our diurnal raptors were recovered due to apparent injury or death from adverse interactions with humans or human-altered environments. Out of 66 recaptures and encounters, 21 Red-tailed Hawks, 1 Sharpshinned Hawk, 1 Cooper's Hawk, and 1 Peregrine Falcon were reported by finders to be injured, dead, or euthanized from injuries indicative of electrocution from power lines, car strike, window strike, or gunshot wound.



Diurnal North American Raptors. HawkWatch International

Support Hitchcock Raptor Banding

Through this hands-on work we are learning more about the health and movements of the raptors that call Hitchcock Nature Center home during Fall migration, but there is still more to understand. Donations ensure that we can continue monitoring raptors. Please consider donating to Hitchcock Raptor Banding by scanning the QR code, or visit www.pottconservation.com/support/donate.



