The Roost, Annual Newsletter of the Owl Research Institute

November 2022 | Volume 26

A Good Year for Northern Pygmy Owls

Whoooo we are

The Owl Research Institute (ORI) is dedicated to owl conservation through research and education. We are a non-profit, 501(c)(3), tax-exempt organization, established in 1988. Our headquarters are located in Charlo, Montana on the Flathead Indian Reservation. ORI is funded by individual and non-profit group donations, grants from foundations and corporations, and occasionally agency contracts. We accept donations of real property. Please consider us in your estate planning. Donations are tax-deductible to the extent of the law.

What we do

We conduct long-term research on owls, their prey species, and their relationship to the habitat in which they live. We use these data to provide information for maintaining viable populations. Additionally, we collaborate on strategic projects, educate the public about owls, and provide research data to land management agencies and conservation partners.

People

- Denver Holt, Founder & President
- Beth Mendelsohn, Owl Researcher
- Steve Hiro, Volunteer Researcher
- Lauren Smith, Communications & Development
- Chloe Hernandez, Field Technician
- Solai Le Fay, Intern & Field Technician

Features

- A Good Year for Northern Pygmy Owls
- Updates from the Arctic: Snowy Owl Breeding Ecology & Lemming Population Study
- Owls from the Inside-out: Owl Pellets & Skeletons

This issue of The Roost was designed by Lauren Smith. Content by Denver Holt, Beth Mendelsohn, Steve Hiro, Lauren Smith, Chloe Hernandez, and Solai Le Fay.

Content

Message from the President

Greetings from the ORI field station! As I write, it's another spectacular autumn day here in western Montana. October days have been sunny and warm, and nights clear and cool. The night skies have

been brilliant, and we have been practicing identification of the constellations during our nightly Northern Saw-whet Owl migration study.

Although there were numerous Snowy Owls, and an uptick in lemming numbers, at Utqiaġvik this past summer only one pair bred. They raised 6 chicks. It was our best Great Gray Owl year with 8 nests found. Beth and crew banded 11 adults and chicks. Northern Pygmy Owls had a good year, with four nests found and 16 chicks fledged. Long-eared Owls did okay, but not outstanding. This year, no Northern Saw-whet, and yet again zero Boreal Owl nests were found. And, Short-eared Owls had almost complete nest failures: 8 of 9 nests failed. Predation appears to be the main reason.

Meanwhile, we have moved our Long-eared Owl breeding study and Northern Saw-whet Owl migration study to the Mission Valley. We are continuing the Long-eared Owl breeding study localized to the Mission Valley. But only time will tell if we find a consistent Northern Saw-whet Owl migration route.

Osprey returned late, and once again to find Canada Geese already occupying the Roger's Place nesting platform. Although present all summer, they did not nest. And, our winter raptor surveys are starting to reveal important results.

With the help of many ORI supporters we were able to buy the new Mobile Owl Research Unit. With this mobile unit we will be able to drive to various research sites to survey or explore their potential and expand the species and areas of study. Meanwhile, our other two trailers are parked at Northern Saw-whet Owl migration sites for the duration of fall migration.

In April, NY Times Best Selling author Jennifer Ackerman joined us for a week in the field to see owl research in action for her book-in-progress. And, in October, I finally met Pete Ripmaster in Asheville, NC. Pete, an ultra-runner, has been raising money for ORI with his Owl Run Hundreds Project.

As I stated in previous newsletters, we opted out of federal funding during the COVID-19 pandemic. And now, given the state of our economy, we need your help more than ever. As a nonprofit organization, we rely on the generosity of constituents, foundations, corporations, and volunteers to support our research projects, education programs, and wildlife conservation messages. I hope you consider us and donate today.

As always, when you are done reading this newsletter, please pass it on to a friend or someone who may be willing to support our work.

Thanks, and enjoy the upcoming winter season!

Meet Solai Le Fay, ORI's 2022 Intern & Wildlife Technician

I didn't know much about birds until college; it wasn't until my first ornithology class that I realized my fascination. I didn't yet know that my drive to work in the field of wildlife biology would lead me to raptors, and I especially didn't realize I would be lucky enough to work in the field with owls.

My time spent learning about birds in college eventually led me to one particular photo – a photo of a biologist's hand holding a Northern Saw-whet Owl prior to banding. At this point, I had never seen nor heard of Saw-whet Owl research, and I was enthralled. In many ways, this photo cemented my

determination to work as a field biologist with owls; I saved the photo in my phone and would revisit it frequently for motivation.

Three years later, after emailing ORI asking to work with them every year, I am now working as the lead bander running ORI's Saw-whet station in the Mission Valley, and will be continuing full-time. These past 6 months working with the Owl Research Institute have been the most enjoyable and rewarding field work I have been a part of. Only after I arrived in Montana did I realize the photo I had loved so much from college had come from ORI, and the biologist holding the owl was Steve Hiro!

From exploring the forest at night listening for Great Gray Owls to scouring the tundra for Snowy Owl nests to sitting in a trailer at night waiting for Saw-whets to fly into the nets, this work has been hard, dirty, tiring, and the best job I've ever had. There really is nothing like being out in the field with owls!

Mobile Owl Research Unit in action!

This summer, donors from 30 states and one Canadian province chipped in to help fund our new research vehicle!

This customized vehicle allows us to access remote field sites, and so far this year we've used it to establish new Northern Saw-whet Owl migration banding sites. It is also equipped with technology that should allow us to share updates from the field. We're excited to explore new field sites and new ways of sharing our research!

New Northern Saw-whet Owl Banding Stations

This fall, we had the exciting opportunity to test out different migration paths for Northern Saw-whet Owls in the Mission Valley. Thanks to the generous donations that helped us purchase a new mobile banding station, we were able to try out a few different lake- and mountain-side sites for banding. Solai returned from the Snowy Owl project in Alaska to take the role as lead bander, gathering a crew of eager volunteers.

Rather unfortunately, the owl migration was minimal this year. Likely, the past spring was not a very successful breeding season for the species in this region. A high proportion of migrants are usually made up of first-year birds dispersing from where they were born.

One of the great perks of this project is the ability to host visitors, to share and teach about owls and the field work that we do. Reaching people in this way helps make the research more fun and worthwhile, especially during long cold nights.

Shining UV light on feathers causes pigments to fluoresce, revealing the age of the Northern Saw-whet Owl.

It has also been interesting to start exploring the 10 years of data collected from the past banding station in Missoula at Maclay Flat, where 1,291 Northern Saw-whet Owls were banded on migration! One example: the data is revealing that more owls migrate on colder nights, and that fewer owls are banded on nights with bright moonlight.

THANK YOU to our volunteers:

- Payton Adams
- Brenna Cassidy
- Nicole Dupuy
- Kaylie Durglo
- Troy Gruetzmacher
- Julia Gruetzmacher
- Danny Kastner
- Keyara McCarthy
- Quin Mendelsohn
- Adam Potts
- Hattie Ransom
- Jay Schutze
- Mary Venegas

A Good Year for Northern Pygmy Owls!

The 2022 Northern Pygmy Owl breeding season proved productive and rewarding: productive, as we were able to confirm 4 nests, and rewarding because it was a real team effort, with many individuals searching multiple locations.

The seasonal surveys began towards the end of February, when it's still cold and snowy here in Montana. Yet, as in previous years, we were able to identify multiple individual owls, calling spontaneously or responding to played calls. Steve was joined this year by Beth, Chloe, and Solai, as well as a few volunteers. After many hours in the field our crew was able to identify 4 nests, each producing between 2 to 6 chicks.

Sometimes You Gotta Go For it

One early morning we were listening in an area where we had consistently heard a pair, but had not yet found a nest. Chloe heard the male vocalizing softly, located him, and followed him straight up an incredibly steep hill covered in deadfall, and then found the female near the only cavity in the area. This nest subsequently produced 6 chicks, synchronously hatched within 24 hours, and fledged.

Going 'High' Tech

We also experimented with various trail and security cameras, mounted near the nests, in an attempt to gain further information about prey delivery and fledging. The experience was a bit frustrating, but towards the end of the season we were able to capture the departure of 4 chicks from an aspen cavity 30 ft up. The chicks flew from the cavity opening after being confined and crowded in the nest for 4 weeks. How did they learn how to fly, and all at the same time? How did they practice?

All the more to study, and we're excited to continue our long-term research in the years to come!

THANK YOU to our volunteers

- Ser Anderson

- Weber Greiser
- Alex and Elsa Jehle
- Jillian Leblow
- Brandon Sheehan

The Secret Lives of Owls

In field research, the tools we depend on are crucial to collecting reliable data. Of course, the most important and irreplaceable tools are our observational skills, critical thinking, problem solving, and most importantly, the time spent in the field with our study species and habitat.

However, as humans we have certain limitations. For example: we can't see in the dark; we can't crawl inside tiny holes smaller than an Oreo cookie; and we can't fly (bummer!). So, in some cases, we rely on technology to help us uncover new information about owls.

One of our most informative and well-used pieces of technology is the 'Wireless Cavity Inspection Camera,' which was created by the Ivory-Billed Woodpecker Organization (IBWO). Fondly dubbed the "peeper cam," this tool consists of a small camera head attached to a 50' extension pole, and allows us to look inside cavities to observe cavity-nesting birds.

With the help of the "peeper cam," we were able to determine that Northern Pygmy Owls in Montana hatch synchronously (within the same day)– a previously unknown fact that takes place within the concealed confines of the nest. We have now used the cam to confirm this phenomenon, as well as document laying intervals, clutch sizes, occurrence of nonviable eggs, development, hatching success, diet and prey habits, occupancy of cavities, predator responses, and more.

In fact, we use the peeper camera and pole so much that we need another one for those times of the year when we are monitoring multiple nests and can't be in the same place at the same time! Altogether, another camera and 50' extendable fiberglass pole, and other accessories will cost us $1,395.

Please consider making a donation to help us purchase this essential equipment!

Great Gray Owl Project Expanded

This year the Great Gray Owl project really took off. The process of finding an elusive Great Gray Owl nest can be grueling, meticulous, and even take years! And WE LOVE IT. With 3 full time field researchers and the help of dedicated volunteers, we were able to locate new nesting territories in western Montana.

Do you have what it takes to be an owl researcher and find a great gray owl nest? Go out after dark in the early spring, when the owls are defending their breeding territories, heading through remote forest on foot, ski, snowshoe, and ATV. Mimic territorial owl hoots, hoping to get a response from an occupant pair. Then, return to areas where owls were hooting to nest search. Walk transects, scouring the forest for an active nest site. Search for owls in the trees while looking down for owl sign, listening intently for

owl vocalizations, and of course squinting up for anything that could be a nest... all while avoiding bears, cliffs, and surprise snowstorms!

Thank you to onXMaps, who donated subscriptions for their GPS navigation app! This year, the crew searched over 15 square miles of forest on foot, slowly combing the forest for nest sites.

For our nest-site characteristics conservation initiative, we had 8 Great Gray Owl nests and 4 Northern Pygmy Owl nests to measure... and many of these nest were over 75 feet high or in old, decaying snags!

While Denver, our top tree climber, was in Alaska, luckily we were able to recruit the help of professional tree climber, forester, and arborist Brandon Sheehan.

With Brandon's assistance, we were able to bring our database of known Great Gray Owl nest sites in Montana to over 30 nests (not to mention 54 for Northern Pygmy Owls and 70 for Northern Saw-whet Owls!). These measurements will tell us what owls rely on for nesting structures and habitat so that we can conserve these important features. Thanks Brandon, for taking to the trees and sharing your skills!

Saving Snags for Owls

In addition to monitoring the population and learning more about the species, the main goal of our Great Gray Owl research is to find out the characteristics of the nest sites they are using. Through our extensive time in the field, we've identified potential nesting snags, key habitat characteristics, active nests, and occupancy. This data is being use for conservation and management of forests.

This year, we collaborated with Confederated Salish and Kootenai Tribes (CSKT) wildlife biologists to protect rare, old snags during a timber harvest project. Our data was used to identify "Wildlife Trees," successfully protecting wildlife and accomplishing forest management goals.

THANK YOU to our volunteers:

- Jon Barlow
- John Delagrange
- Nicole Dupuy
- Julia Gruetzmacher
- Troy Gruetzmacher
- Sara Ibis
- Andrew Johnson
- Kurt Lindsay
- Judith Mendelsohn
- Amy Miller
- Elizabeth Moore
- Rebecca Ramsay
- Leslie Rolls
- Jay Schutze
- Brandon Sheehan

Updates from the Arctic: Snowy Owl Breeding Ecology & Lemming Population Study

Updates from Denver

In February 2022, I made my first winter trip ever to Utqiaġvik accompanied by film maker Max Lowe and his team. (Max joined me in 2021 for a few weeks during the breeding season- see some of his photos in the 2021 issue of The Roost). The idea was to look for Snowy Owls wintering in Utqiaġvik, and interview Inupiat people as to their cultural relationship with the Snowy Owl. This will all fit into a documentary Max is filming on our Snowy Owl research. Although we did not see any Snowy Owls or lemmings, local people had been observing them periodically during the winter, and even on the sea ice.

I went back to Utqiaġvik in early June for the 31st year in a row of our breeding season study. There were male Snowy Owls everywhere, but few females. At least 50 males were on breeding territories, and a few pairs also on territory.

However, I only found 1 nest, and it was about 30 days behind schedule. Indeed, eggs usually begin to hatch between the second and third week of June. This female laid her first egg around 16-17 June. That aside, they appeared to be an experienced pair, and she laid 6 eggs total, all of which hatched. The first 3 chicks hatched were males, and the next 3 females.

Jennifer Sperry from Breckenridge, CO, volunteered for two weeks this spring and helped me with the study areas surveys. Jen is a seasoned hiker who volunteers for Colorado Pika surveys.

This year ORI field techs Chloe Hernandez and Solai Le Fay came to Utqiaġvik in late June, and after some training, took over the nest monitoring and lemming sampling while I returned to Montana.

All 6 chicks departed the nest on foot, and on schedule. Because they were so late nesting, we were only able to monitored them until around September 1st. Its likely most of them fledged.

Lemming numbers were up slightly but apparently not enough for widespread breeding.

Research Question: Do breeding male Snowy Owls feed their mates the biggest lemmings?

Scientific Abstract

(from Denver's presentation at the 2022 Raptor Research Foundation conference)

Two hundred eighty-four [284] Snowy Owl nests were studied from 1992-2021 at Utqiaġvik, Alaska. Thirty-two prey species cached at nests, yielded 3,334 prey. Of these, 3,000 (90.0%) were lemmings; 2932 (88.0%) brown lemmings (*Lemmus trimucronatus*), 64 (1.9%) collared lemmings (*Dicrostonyx groenlandicus*), and 4 (<1%) unidentified lemmings. Birds were 10% of the total prey. Grand mean body mass of brown lemmings cached over 18 breeding seasons was: 70.6 g; range, 10-125, SD 8.3; SE = ± 0.1657 (n = 2508); 95% CI = 70.6 ± 0.3247. Whereas, grand mean body mass of brown lemming's snap-trapped during these same 18 breeding seasons, was: 47.5 g; range 10-158 SD = 13.1; SE = ± 0.2852 (n = 2109); 95% CI = 47.5 ± 0.5589. Cached brown lemmings were 47.7% heavier than snap-trapped brown lemmings. Furthermore, overall grand mean body mass of brown lemming's snap-trapped over these 18 breeding seasons (47.5 g) was similar to overall grand mean of 12 non-breeding seasons (52.6 g). In sum, brown lemmings cached at Snowy Owl nests were significantly heavier than brown lemmings snap-trapped during 18 breeding seasons, and 12 non-breeding seasons. All brown lemmings snap-trapped in any season were similar in body mass to each other. This suggests Snowy Owl males were selecting the largest lemmings to feed their female nest mates.

In other words:

Yes, we think males feed females bigger lemmings. When we studied the size of the lemmings cached* at Snowy Owl nests and compared them to lemmings we caught in trap lines across the tundra, the lemmings at nests were significantly bigger than the ones we caught. So, this suggests to us that the male Snowy Owls are catching and bringing the biggest lemmings to feed to their mates and chicks at the nest!

*Cached = stored at the nest. Male Snowy Owls bring as many lemmings as they can catch to the nest, and when there's more than the female and chicks can eat they'll pile up around the nest for later. Kinda like storing them in a pantry... if your pantry was the ground around your bed! The highest number ever recorded at a nest: 86.

Female or male? Sexing Snowy Owl Chicks

Solai and Chloe closely monitored the only Snowy Owl nest in our study area this summer, chronicling the growth and development of the 6 chicks. Once the chicks were about 5 weeks old, the crew was able to predict their sexes.

Sex is predicted based on plumage. The primary flight feathers of females are more heavily marked with dark bars that touch the rachis (center of the feather). Compare this to the primary flight feathers of males, which have dark spots that do not touch the rachis, are less heavily marked, and are more white.

There are also differences in down/downy body plumage between females and males. Females have overall darker sooty body plumage, while males have light gray body plumage.

This sexing method is described in a 2011 scientific paper in the Journal of Raptor Research titled "Sexing Young Snowy Owls," by Mathew T. Seidensticker, Denver W. Holt, Jennifer Detienne, Sandra Talbot & Kathy Gray.

Older adult male Snowy Owls can be pure white. Adult female Snowy Owls have dark spots, and often cannot visually be told apart from younger males.

Snowy Owl Live Cam

From June through August 2022 we had the thrill of watching these 6 Snowy Owl chicks hatch and grow to adolescence on our live cam, which is made possible through a partnership with Explore.org. Find nest updates, photos, and video updates on ORI's website:

Timeline of the 2022 Snowy Owl Breeding Season

Ask Us Anything: Snowy Owl Live Cam

www.owlresearchinstitute.org/single-post/timeline-2022-snowy-owl-nest

New Book The Snowy Owl Scientist by Mark Wilson

Learn more about Snowy Owls and what it's like to study them in this beautiful book by wildlife photojournalist Mark Wilson.

In 2019, Mark made the trek up to northern Alaska to learn about ORI's Snowy Owl Breeding Ecology and Lemming Population Study, the longest-running Snowy Owl project in the world.

The book, while written for ages 10+, is an excellent read for adults too! It's full of fascinating information about this iconic species and what Denver has learned about them in the last 30+ years, details about what it's like on the tundra and some of the other creatures who live there, a history of the area, a page on how to ID males and females, and more!

Grassland Birds in Peril: working to understand threats to Short-eared Owls

Grassland and open-country habitats are one of the most imperiled habitat types. Consequently, bird species that live in grasslands are declining faster than those in other habitat types.

ORI is working to better understand the threats to Short-eared Owls, a key component of grassland ecosystems in the Mission Valley of Montana. Short-eared Owls have been experiencing a population decline throughout the world over the last half century.

Through studying their habitat preferences, behaviors, nest timing, nesting success, and roosts, we are starting to better understand the complex and dynamic ecosystems in which Short-eared Owls breed and live, and ultimately create a conservation plan for the species.

This season, we deployed 7 cameras on Short-eared Owl nests in a 6 square mile study area to remotely monitor nests. We are focused on determining predator dynamics and causes of nest failure. As is typical in the field, this is easier said than done!

Experimenting with a variety of camera systems has been a process of trial and error (emphasis on error!), but we managed to capture some images that will start to reveal the causes of the high rates of nest failure, thereby giving us the information we need to move toward conservation goals.

Some of our Research Questions

- How do agricultural practices affect owls?
- How does predation affect breeding success?
- Does habitat fragmentation increase predation risk?
- What are the best ways that grassland managers can
- help support ground-nesting bird populations?

As ground nesters, Short-eared Owls are extremely vulnerable to a wide array of predators, including: coyotes, birds of prey, skunks, raccoons, snakes, dogs, humans, and more. Other threats include car strikes, barbed wire fences, electrocution, haying, mowing, grazing, fires, and chemical or pesticide application.

Thank you to Moultrie for donating trail cameras and accessories to get this project off the ground!

THANK YOU to our volunteers:

- Troy Gruetzmacher
- Danny Kastner
- Micki Long

- Pamela Murphy
- Austin Novy
- Jay Schutze
- John Zardis

Update: Osprey & Baling Twine

Last year, one of the Osprey chicks on ORI's live cam died due to being tangled in baling twine (see: Danger in the nest: Osprey and baling twine in the 2021 issue of The Roost). Though there were numerous technical issues with the live cams this year, we were able to watch our resident Osprey pair, Charlotte and Charlie, as they returned for the summer. Though they didn't breed this year, we enjoyed watching them on the cams.

Unfortunately, Charlie (the male) continued to bring twine to the nesting platform. One afternoon in July, we watched in horror as Charlotte (the female) got snagged in the twine and spent 3 long minutes dangling from the nest platform. Thankfully she was able to free herself, but not all Osprey are so lucky. It is not uncommon to find Osprey carcasses caught up in twine.

To help educate the public on the dangers of baling twine, ORI created an informational brochure, and have shared it at our local public presentations. We have also given presentations to local 4-H groups, who are now educating their communities and picking up discarded twine.

The brochure is available to download from our website. There, you can also learn about why baling twine is dangerous, how you can help, and find other resources.

Please help us solve this problem and save Osprey!

www.owlresearchinstitute.org/osprey-and-baling-twine

Mission Valley Raptor Survey Update

The Mission Valley Winter Raptor Survey completed its second full season and is about to start up again in November, 2022. ORI is based in the Mission Valley of Montana, which is known as a key wintering area for concentrations of hawks, eagles, and other raptors.

As we track raptor numbers, demographics, behaviors, and habitat usage, our data will be an important part of monitoring of these species long-term.

By-The-Numbers Winter Raptor Survey totals

- Hours spent = 230
- Volunteers = 24
- Miles covered = 770
- Total number of raptors counted = 2,753
- Most in one day = 696
- Fewest in one day = 439
- Average per day = 550

Thank you to our incredible team of volunteers:

Payton Adams, Jon Barlow, William Blake, Brenna Cassidy, Michael Church, Rob Domenech, Kari Eneas, Megan Fylling, Zoey Greenberg, Tanner Humphries, Alex Kearney, Judith Mendelsohn, Connor Meyer, Adam Mitchell, Tricia Rodriguez, Lesley Rolls, Caryn Ross, Adrian Rouse, Rena Schweizer, Cathy Tilly, Fred Tilly, & Larry Weeks

Our volunteers endure cold, wind, ice, tepid coffee, and bad snacks for a chance to view hundreds of raptors!

If you're interested in volunteering, email 'info@owlresearchinstitute.org' (put "Winter Raptor Survey Volunteer" in the subject line).

We are looking for experienced observers who can identify raptor species, subspecies, color morphs, sex, and age.

We also have a few spots for beginner/intermediate birders who would like to learn more!

Most common perch types utilized by wintering raptors in the Mission Valley

The majority of raptors were perched upon something when observed during the surveys. While natural perch types (such as trees, shrubs, and snags) are an important perch type for wintering raptors, the most common perches are utility poles and fence posts. Irrigation structures, such as wheel lines and center pivots, are also important. Further, many of the trees utilized are non-native, planted as shelter belts or around homes.

Table 1: Most common perch types used by wintering raptors

PERCH TYPE	UTILITY POLE	TREE	POST	IRRIGATION	SNAG	SHRUB	WIRE
NUMBER OF OBSERVATIONS	1,378	989	788	457	101	65	56

Different types and proportions of raptors observed on our Winter Raptor Surveys in 2021.

Almost half of all raptors are Red-tailed Hawks, about one quarter are Rough-legged Hawks, one-sixth Bald Eagles, and the remaining are a mix of Northern Harriers and American Kestrels, with the occasional Prairie Falcon, Merlin, Golden Eagle, Ferruginous Hawk, and Gyrfalcon.

- Red-Tailed Hawk = 48%
- Rough-Legged Hawk = 27%
- Bald Eagle = 17%
- Northern Harrier = 5%
- American Kestrel = 2%
- Prairie Falcon = 1%
- Merlin, Golden Eagle, Ferruginous Hawk, Gyrfalcon = <1%

Owls from the inside-out: Everything you've ever wanted to know* about Owl Pellets

*Probably more than you wanted to know

How do owls eat?

First, it is important to understand how owls eat. Owls use their sharp, powerful talons to catch and kill prey, then gulp it down whole. Even nestlings can swallow whole or large pieces of prey by the time they are only a couple weeks old.

When the prey is too large to swallow, the owl will eat it in pieces. Minimal plucking and tearing is done with the beak if it can't be eaten whole.

Digestion begins

Next, the food moves down the long esophagus and into the digestive system. Owls, like all birds, have a two-part stomach. The food enters the first stomach called the proventriculus, or glandular stomach. The proventriculus secretes digestive enzymes that are acidic and will break down the food.

Soon, the food passes into the second stomach, or ventriculus, which is often called the 'gizzard.' The muscular contractions of the ventriculus help to soften and mix the food with the digestive enzymes.

Since owls eat mostly fats and proteins, their gizzards function slightly differently from those of other birds and do not have to grind the food as much. The soft, digestible materials and liquids are pushed into the small intestine for the next phases of digestion, and eventually any remaining waste is ejected through the vent with liquid waste from the urinary system. (We call this 'whitewash').

Pellet formation

Back in the ventriculus, the stomach acids are unable to break down indigestible materials such as fur, feathers, and bones. All the leftovers are held back in the stomach and compacted by muscular contractions into a solid mass with the bones packed inside the fur: a nice, tidy package called the pellet.

It's not puking: producing pellets

Next, the formed pellet is egested. Egestion moves the waste back up through the esophagus and out of the mouth- also called casting the pellet. This process is quite different than "throwing up." When an owl is casting a pellet, contractions called anti-peristalsis begin in the second stomach and move up.

You can sometimes tell that an owl is about to cast a pellet by the look it gets: the facial disc changes shape, the owl may look slightly strained, then opens its mouth wide and out drops a pellet.

How big is an owl pellet?

Pellets are roughly the size of the stomach, and so smaller owls have smaller pellets (and vice versa). The size of the pellet also can reflect when and how much the owl ate. Smaller pellets from smaller owls may only contain ½ to 1 prey animal, whereas pellets from larger owls can contain up to 7 prey items in one pellet!

How long does it take an owl to cast a pellet?

It depends on how much the owl has eaten. After a single meal, if the owl has not eaten again, the pellet will be fully digested and cast within about 8 to 12 hours. However, if the owl eats more, the digestion process starts over until all of the food is fully digested. When the stomach is full, the owl must cast a pellet before it can eat again.

Not just an owl thing

Did you know that many species of birds actually produce pellets? Owl pellets are the most distinctive because:

• Owls swallow whole animal prey.

• Their stomach doesn't grind up the food very much, like in other species of birds that eat grains, plant matter, or insects.

• Other raptors digest more bone because they have more acidic stomachs.

Is it poop or a pellet?

Pellets will have whole bones, and will be more spongy, with fur or feathers.

Poop will be a harder mass with tapered ends, and rarely whole bones.

Owl pellet research

Owl researchers dissect (separate the bones from the fur) the pellets to find prey remains, and identify species in the owls' diet, to figure out what they eat.

By collecting pellets from active nest and roost sites, ORI has been able to do extensive diet analysis on many owl species. Over the years, we have collected and dissected thousands of pellets.

This chart shows the number of pellets we've dissected, and the number of prey items we've found in those pellets, for 7 different owl species.

A few odd and interesting things we've found in pellets include: bird bands, wood chips, crawdads, and plastic.

Table 2: Owl pellets dissected

SPECIES	# OF PELLETS COLLECTED	# PREY IDENTIFIED
LONG-EARED OWL	25,000	41,900
SNOWY OWL	14,000	43,626
SHORT-EARED OWL	800	606
NORTHERN SAW-WHET OWL	200	200
GREAT GRAY OWL	76	213
NORTHERN HAWK OWL	40	45
BOREAL OWL	Not whole pellets- remnants found in nest boxes	226

Long-eared Owl Project Updates

This year, we focused efforts on our study area in the Mission Valley, locating 3 active nest sites, from which 14 young fledged. We did not locate any nests within our greatly reduced study area near Missoula (due to land ownership and access changes last year).

Despite the large nest numbers in 2020, we are still documenting a slight decrease in Long-eared Owl nests since we started our research in 1995. While the average number of individuals has remained fairly steady, the maximum is showing a decrease over time. This means we aren't seeing as many large roosts as we used to. If you would like an accessible table with data for average roost size and maximum

roost size for Long-eared Owl communal winter roost sites in the Grass Valley from 1900 to 2021, please email info@owlresearchinstitute.org.

THANK YOU to our volunteers:

- Ser Anderson
- Judith Mendelsohn

Communal Roosts

Long-eared Owl are communal roosters. No, not like the cock-adoodle- doo type. To roost [verb] means 'to rest when not active,' which is usually during the day for most owl species. During this time, owls return to a resting place also called a roost [noun].

Most owls roost on branches, like Long-eared Owls, while others, like the Short-eared Owl, roost on the ground. Roosts may be chosen for cover, protection, camouflage, temperature, shelter, and a number of other factors.

When owls share a roost area with other individuals of the same species, this is called a communal roost. For Long-eared Owls, they generally roost all in one tree/shrub or a group of trees, often in very close proximity on the same branches. Although they may use the same roost year after year, ORI's banding and recapture data shows that often different individuals occupy the roost.

Long-eared Owls may benefit from sharing the same roost by helping guard from predators or invaders, huddling together for warmth, bonding with potential mates, and staying close to quality hunting spots.

Owls from the inside-out: Lightweight, but strong- Owl skeletons

Picture this: a Great Horned Owl that stands close to 2 feet tall and weighs up to 5 pounds, but only 7% of that weight is the bones! Owls have a lightweight yet strong bone structure.

Owl skeletons have large rings of bone around the eye socket. Called sclerotic ossicles (or sclerotic rings), these massive, tubular, bony structures hold the eye in place. The eye "ball" itself is actually long and tubular in shape and enormous! A Great Horned Owl's eye weighs about the same as a human eye – that would be like if your eyeball weighed half a pound! The shape helps save space in the skull and increases visual acuity, but means that the eye cannot rotate and is fixed in place.

So how does the owl look around? Since they can't move their eyes, they rely on their necks! Owls are able to see 360 degrees around them by rotating their head, without moving their body, or turn their head ¾ of the way around in either direction. (They can also rotate on the other plane, like a clock face, or look all the way up and down.) Owls have 14 neck vertebrae that are flexible and adapted so that when the owl rotates its head around, blood flow is not constricted.

Huge thanks to the talented Larry DePute, who prepared and gifted ORI an amazing articulated Great Horned Owl Skeleton!

A Day in The Life

Ever wonder what a typical day for an ORI researcher is like? We're in the field year-round but are especially busy during the breeding season. Here are some snapshots from throughout the spring and summer:

March 14, 2022

NW Montana

6 am: Steve and the ORI crew head to the forest before dawn to listen for Northern Pygmy Owls.

9:30 am: Chloe and Solai head to the lab to hand-construct traps for catching owls later in the season, while Beth and Denver catch up on office work. Everyone drinks coffee.

12 pm: The crew heads out for an afternoon of crashing through thorny, woody draws in search of Long-eared Owl nests.

6 pm: The crew head into the forest on foot and ATV to survey for Great Gray Owls.

1 am: Finish up a long night in the forest listening for owls.

May 25, 2022

Mission Valley, MT

8 am: The crew meets at the field station to prepare the day's equipment and heads out into the grasslands, walking transects and searching for Short-eared Owls and nests.

12 pm: Beth, Chloe, and Jon take off to the woods, searching for owl sign and nests.

1 pm: Elsewhere in the valley, Denver, Steve, and Solai visit the Long-eared Owl nests. Climbing up the tree, the chicks are scooped out of the nest, banded, and returned to the nest.

5 pm: Chloe dissects owl pellets in the lab, Solai goes through footage from trail cameras on owl nests, Beth contacts landowners, and Denver prepares a presentation.

7:15 pm: Board games on the porch at the farm!

June 21, 2022

NW Montana

5:30 am: Alarms go off and the crew crawls out of sleeping bags - It's time for a dawn attempt at trapping and banding a family of Great Gray Owls.

12 pm: A quick stop at a Pygmy Owl cavity nest to peek inside the cavity and monitor chick development, followed by a check on another nest.

3 pm: It's all hands on deck unpacking the truck and organizing our gear after the overnight excursion.

4:30 pm: At last, a pause in the day to shower and nap!

7 pm: Taco night at Beth's!

August 6, 2022

Utqiaġvik, AK

9 am: Up in Utqiaġvik, Alaska - Denver, Solai, and Chloe patch up a flat tire, gas up, hop on their ATVs, and ride into the tundra to hike and scan for nesting Snowy Owls.

1 pm: The team measures and collects data from the roost mounds of Snowy Owl males found on the tundra.

3 pm: Denver takes a tundra nap while Solai and Chloe set up lemming trap lines.

4:30 pm: The crew conducts a nest check at the only Snowy Owl nest in the study area, monitoring chick growth, recording the behavior of the adults, and weighing the cached prey. Afterwards, the team quickly works on maintaining the Explore live cam on the nest.

7:30 pm: After a quick and cold polar plunge in the Arctic Ocean, Denver, Chloe, and Solai head back to the apartment for a night of "The Bachelorette" and a warm communal meal.

ORI hosts author Jennifer Ackerman

In late April, we were thrilled to host Jennifer Ackerman for a visit as she gathered information for her most recent book. *What An Owl Knows* (Penguin Press) comes out on June 13, 2023.

Jennifer spent her time with us out in the field, learning about the different species of owls we study and the hard work and dedication that goes into our long-term research projects. We were delighted she was able to spend so much time with us, and enjoyed sharing our knowledge!

Ackerman is the author of numerous books, including NY Times best-seller *The Bird Way* (2020) and The *Genius of Birds* (2016). Both are excellent reads, and highly recommended by ORI!

Education Highlights

We love giving educational & scientific presentations on our research and sharing information about owls! Every year, we conduct outreach with groups across Montana and North America.

Some highlights from 2022:

Denver on the TEDxBozeman stage, April 2, 2022.

Denver on stage at the Red Poppy in Ronan, MT, performing owl calls to musical accompaniment by Danny Kastner.

Lauren, Beth, and Beth's daughter Quin, tabling at the Birds of Prey Festival in Kalispell, MT.

Lauren at Owl Pellet Night at Ronan Co-op Brewery, in Ronan, MT.

Find links to articles, presentations, radio interviews, podcasts, videos, and more on ORI's website: www.owlresearchinstitute.org/ori-in-the-news\

In Memory

Letitia “Tish” Doll

1948-2022

Charlotte, NC

Letitia “Tish” Doll loved owls and had a huge collection, her husband Chuck told us. She was a proud lifetime member of the Chi Omega women’s fraternity (their mascot is an owl). When she passed away in March 2022, at their daughter Kathy’s suggestion Chuck reached out to ORI.

Tish was a devoted daughter, wife, and mother, and her favorite activity was spending time with her children and grandchildren. She and Chuck were married for almost 50 years. Tish was active with her local Chi Omega alumni chapter (she served as president), and with the Girl Scouts of America and the University City Women’s Group in Charlotte, NC. She is dearly missed by her family & friends.

Andrea Wiley

1945-2022

Lolo, MT

We were deeply saddened to learn of Andrea Wiley’s passing in March 2022. She was a long-time ORI supporter, and Denver and Beth have fond memories of spending time capturing and banding Long-eared Owls and Northern Saw-whet owls with Andrea and her family.

Her love for owls and her kind and gentle nature towards animals and people were evident to all who met her, and we are grateful for the time we spent with her and her family.

ORI is humbled by the generosity of those who love and miss Andrea & Tish, and we are honored to be the recipient of donations made in their memories.

Pete Ripmaster’s Owl Run Hundreds Project

How far would you go to raise money for Snowy Owls?

Pete Ripmaster is running 100 miles... 50 times! His goal: to be the first person to run 100 miles in all 50 states, raising $50,000 to support ORI along the way.

As of October 2022, he’s finished runs in 20 states and has raised just over $26,000!

Visit www.peteripmaster.com to learn more, follow his progress, and donate!

A note from Beth

These past few years working with ORI have been a privilege. How many people can say that they have their dream job, observing owls, being outdoors daily, and learning from one of the top researchers in their field? This year has felt especially rewarding as we made meaningful progress towards owl conservation.

Another highlight has been the opportunity to recruit, lead, work with, and learn from a dedicated team of staff and volunteers. Special thanks to Steve, Amy, Troy, Jon, Austin, and all the other volunteers for creating memorable moments and for your dedication to our organization.

It has been my further pleasure this past year to teach and work alongside two bright and enthusiastic researchers who completed our internship program. Chloe and Solai both demonstrated a tireless work ethic, excellent observational skills, commitment to the projects, teamwork, and exceptional passion for owls and wildlife. After the breeding season, we realized that we needed to retain Chloe and Solai on the team and were pleased to offer extended opportunities on the Snowy Owl and Fall Migration projects. From excelling as interns to leading the Northern Saw-whet Owl banding station, Chloe and Solai have accomplished a lot at ORI and we have full confidence in their abilities and prospects for the future.

Part of ORI's mission is education – including fostering the next generation of owl researchers. We provide an incredible opportunity for aspiring researchers to develop vital experience and countless skills in the field and beyond. The hard work of interns and technicians makes it possible to accomplish our research goals.

Thank you to our generous internship donors for your invaluable support – your contribution goes a long way. If you would like more information about sponsoring an intern, please contact us. We need your help to support ORI's top-notch intern program into the future!

2022 Scientific Publications

• Holt, D. 2022. Review of the book Owls of the Eastern Ice: A Quest to Find and Save the World's Largest Owl, by Jonathan C. Slaght. Association of Field Ornithologists Book Review, https://www.afonet.org/2022/03/owls-of-the-eastern-ice/.

• Holt, D.W., M.D Larson, S. P. Hiro, and M.T. Seidensticker. 2022. Is This Philopatry or Dispersal in Female Boreal Owls? Northwestern Naturalist 103(2), 154-161, (1 August 2022). https://doi.org/10.1898/NWN20-35

In Press:

• Why Are Snowy Owls White, and Why Have They Evolved Distinct Sexual Color Dimorphism? A Review of Questions and Hypotheses. Journal of Raptor Research (Autumn 2022).

• On Being A Wildlife Field Researcher. The Wildlife Professional (Nov - Dec issue).

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ORI Store

Give the Gift of Owl Conservation: Symbolically adopt an owl today!

Learn more: https://www.owlresearchinstitute.org/support

ORI Wish List

In each newsletter, we provide a list of items that will help us with our research projects and facility maintenance. Or, make a donation and we'll designate it for a specific item on our Wish List! Thank you!

- Chest freezer- for storing educational specimens
- Snowmobiles – winter field research
- Snow blower - for clearing driveway & field station
- Flatbed trailer – for hauling ATVs
- Small tractor – field station maintenance
- Dissecting microscope– lab work & pellet analysis
- Mist nets – for capturing owls
- Headlamps – for nighttime owl projects

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Donate online at: www.owlresearchinstitute.org/donate. Thank you for your support!

Partners in Conservation

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- Confederated Salish & Kootenai Tribes
- Five Valleys Audubon
- Flathead Audubon
- Flathead Lake Biological Station
- Glacier Institute
- Montana Academy
- Montana Fish, Wildlife and Parks

- Montana Natural History Center
- Montana Wild Wings Recovery Center
- National Bison Range Complex
- Natural Exposures Photography
- Ninepipes Lodge & Great Gray Gifts
- Polar Bears International
- Raptor View Research Institute
- Sacajawea Audubon
- U.S. Fish & Wildlife Service
- U.S. Forest Service
- Wild Skies Raptor Center

Alaska

- Alaska Department of Fish & Game
- North Slope Borough, Dept. of Wildlife
- Utqiagvik Inupiat Corporation (UIC)
- UIC Science and Logistics
- U.S. Fish & Wildlife Services
- Alaska Raptor Center

Other working partners

- Explore.org
- International Snowy Owl Working Group (ISOWG)
- Henry Mros II
- University of New Hampshire
- University of Texas El Paso

Land owners

- Andy Aldeen and Meadowland Ranch
- Mark and Mary Benedict
- George and Barbara Biggs
- Susan Clairmont
- Karen Biron and Mike Warrington
- Bud, Laurel, and Jo Cheff
- Jim and Donna Cheff
- Alfred Deschamps
- Fred Deschamps
- Susan Gardner
- Norma and Gary Granley
- Jeffrey Jones
- Ronald Jorgensen
- Jodi and Brett Kulina
- Diane Lemm
- Barbara and Peter Lewis

- Amy and Joseph Miller
- Helene and Thomas Michael
- Brian and Stephanie Morton
- Murray and Diane Nelson
- Phillip O'Connor
- Susan Rivers and family
- Jim and Delores Rogers
- Vikki Spencer
- Peter Stark
- Cheryl Thomas
- Scott Tomson

Tune in to live owl cams!

Watch wild owls in real time as they roost, nest, and raise a family! Cams are seasonal, and are made possible through our partnership with Explore.org - the world's leading philanthropic live nature cam network and documentary film channel. Tune in today!