

MESSAGE FROM THE PRESIDENT

Friends and Colleagues,

Six months ago, I wrote about the impact this pandemic could have on global raptor research, conservation, and education. I wish I'd been wrong, but unfortunately, I've heard about field seasons cancelled, graduate students left in academic limbo, and raptor education centers isolated from their K-12 audiences. The good news is that many of you have found ways to safely collect data, connect with schools for online education programs, and discovered creative ways to still make raptor conservation a priority in your community. I'm heartened to hear how resourceful RRF members are so they can continue their passion of working with raptors.

I'm also thankful that RRF has remained financially stable this year despite this turmoil. This is in part because the bulk of our membership renewal income was collected before February and we acted swiftly to renegotiate our conference-related contracts without penalties. Like many scientific societies, we are anticipating a drop in member renewals in 2021 as the economic impact of this global health crisis worsens and budgets tighten. If you have the means to do so, please consider donating to RRF. I also encourage you to reach out to your raptor friends and offer to cover their renewal costs (if their personal budgets are tight) or consider sponsoring a new student for a membership. The RRF Board, Treasurer, and Finance Committee will continue to make sound financial decisions and adapt to the changing economic forecasts. If this is a bottleneck event, we intend RRF to come out the other side more adaptable and resilient than ever.

One way we are adapting is by hosting our society's first Virtual Event this December, as an abbreviated alternative to our annual conference. I encourage you to join us at this historic event and let us know how we did. We are continuing to explore other ways to connect to members throughout the year. Please send us your suggestions and ideas!

My thoughts are with those who have lost family and colleagues in this on-going and unpredictable pandemic.

Best,

Libby Mojica, RRF President



RAPTOR RESEARCH FOUNDATION, INC
(Founded in 1966)

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Secretary: Joan Morrison
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At Large #5: Lisa Takats Priestley
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Editor-in-Chief, *Journal of Raptor Research*: Cheryl Dykstra
Editor, *Wingspan*: Brian Washburn
Website Coordinator: Megan Judkins

For more information about the Raptor Research Foundation, Inc. (founded in 1966), please visit the RRF website at: <http://www.raptorresearchfoundation.org/>.

Persons interested in birds of prey are invited to join the Raptor Research Foundation (RRF). *Wingspan* is emailed twice each year to all members of RRF and is available on the RRF website. Members also receive *The Journal of Raptor Research* (ISSN 0892-1016), which is published quarterly. For membership and subscription information, please contact: **Raptor Research Foundation**, P.O. Box 4444, Topeka, KS 66604, USA; 1-785-550-6904 (phone); membership@raptorresearchfoundation.org (email)

Editor's Note – Thanks to the following contributors for this issue of the *Wingspan*: Laura Biondi, Evan Buechley, Laura Bies, Grainger Hunt, Rowan Kilduff, Giulia Masoera, Libby Mojica, Joan Morrison, Carla Paterlini, Roar Solheim, Dan Varland, and Jesse Watson.

Wingspan welcomes contributions from RRF members and others interested in raptor biology and management. Please submit contributions via email to Brian Washburn, *Wingspan* Editor, at rrfwingspan@gmail.com. For long contributions, please send as a MS Word attachment. If you are submitting photos, please include them within the MS Word document with a caption and photo credit. All issues of *Wingspan* and content guidelines are available at: <http://www.raptorresearchfoundation.org/publications/wingspan-newsletter/online-newsletters-pdfs>

Upcoming Conferences



RRF Virtual Event 8-9 December 2020

RRF 2020 Virtual Event Committee: Jim Bednarz (Chair), Jessi Brown, Teresa Ely, Neil Paprocki, Dan Varland, and Chris Vennum

This Tuesday-Wednesday program will include two half-day sessions, beginning at 10:00 AM Eastern Time (UTC-5) and extending ~ 5 hours each day. Please mark your calendars! The events will include a welcome by President Libby Mojica, a plenary presentation, three workshops (titles below), a Member's Meeting, and an awards ceremony.

- ***Field and In-hand Raptor Identification***
- ***Techniques for Handling, Auxiliary Marking and Measuring Raptors After Capture***
- ***Writing and Peer Review***

There will be no registration charge for RRF members. Non-members will pay a modest registration fee.

As you know, the RRF Board made the decision to postpone the 2020 conference in Boise to 2021 as a result of the coronavirus pandemic. December's *Virtual Event* will provide opportunities to learn and engage in this very challenging year. Additional information will be provided by email and on the RRF website in the weeks ahead.

**2021 Annual Meeting of the Raptor Research Foundation
9-12th October 2021**



Conference hosts: [The Peregrine Fund](#), [Boise State University](#), [Intermountain Bird Observatory](#), [Golden Eagle Audubon](#), [USGS Idaho](#).

Co-Chairs: Sarah Schulwitz, Director of the American Kestrel Partnership, The Peregrine Fund and Rick Watson, President, The Peregrine Fund.

This joint conference between the Raptor Research Foundation and the Neotropical Raptor Network was originally scheduled for October 2020. Because of the coronavirus pandemic, it has been postponed to 2021. The Local Conference Committee will be updating the RRF website to reflect the new 2021 conference schedule early in 2021.

Questions about the Boise conference can be sent to RRF2020@peregrinefund.org.

**2022 Annual Meeting of the Raptor Research Foundation
and the Florida Ornithological Society**

**4-9 October 2022
at the Embassy Suites by Hilton
Fort Lauderdale, Florida, USA**

Conference co-hosts: Tropical Audubon Society, Florida Ornithological Society, South Florida Audubon Society, and South Florida Conservation Network.

News from the RRF

Raptor Research Foundation 2020 Annual Elections

Submitted by Joan Morrison

Results of the 2020 Raptor Research Foundation Elections are in! Congratulations to:

President-Elect Rob Bierregaard. As a member of RRF since the early 70s, Rob has served RRF in numerous ways. He has served as an at-large member of the RRF board since 2012 and chaired the finance committee since 2013. Since that time, Rob has been instrumental in developing the responsible financial policy RRF has now established. Rob will serve a 1-year term as President-elect, then a 2-year term as President, beginning in October 2021. As President, Rob intends to ensure that RRF remains well-positioned to move forward and adapt to change by implementing RRF's new strategic plan and actively exploring new ways to address the needs of our members and the species to which we are all so deeply devoted. Thank you Rob for continuing your service to RRF!

Vice-President James (Jim) Bednarz. Jim continues in his current position as RRF's Vice President. For more than three decades, Jim has conducted field research on six continents, emphasizing avian population ecology and conservation. Along with serving multiple terms on the RRF Board and chairing numerous RRF committees, Jim served as the Editor of the *Journal of Raptor Research* for 6 years. As Vice-President, Jim wishes to see RRF increase its contributions and impact on global raptor conservation. He will continue to promote diversity in RRF's membership and serve as a strong advocate and supporter for the involvement of students and young raptor biologists in RRF. Thank you Jim for continuing your service to RRF!

North American Director #3 Tricia (Trish) Miller. Trish has studied ecology and behavior of bald and golden eagles across the USA for the past 20 years. As a Director, Trish wishes to promote and advocate for increasing involvement of under-represented groups in RRF. She hopes to work with other committee and board members to develop and undertake efforts to support parents and to attract a more diverse group of scientists and especially students to RRF. Trish replaces Rob Bierregaard, who has served on RRF's board for a number of years and is leaving to assume the position of President-Elect. Welcome Trish!

At-Large-Director #3 Juan Manuel Grande. Juan Manuel Grande, who has served on RRF's board in the past, will be returning to the Board as Director-At-Large #3, replacing Todd Katzner, who has served on RRF's board for the past few years. Thank you, Todd for your years of service on the Board, and welcome back Manu!

At-Large-Director #6 Jennifer Coulson. Jennifer will be continuing in her current position as Director-At-Large #6 and will serve on the Board of Directors for another 3-year term. Thank you, Jennifer for your continuing service as a Director and as Chair of RRF's Legal Committee, Hamerstrom Award, and Cade Award Committees!

Eurasian Director Kenneth Johansen. A newcomer to RRF's board, Kenneth has worked with wild Gyrfalcon populations in subarctic Norway for three decades and has attended most of the annual RRF conferences over those past years. As a RRF board member, one of his major focus areas will be recruiting raptor scientists from many regions to RRF, with a goal of making RRF a true global organization for raptor research. Kenneth replaces Oliver Krone, who has served on RRF's board for the past several years. Thank you, Oliver for your service and welcome Kenneth!

A huge thank you to all the other candidates who ran for one of the open positions. For those who were unsuccessful this time, we encourage you to run again - Director positions open up each year. Also, there are many other ways to become involved with RRF, for example, as a Committee member or chair, or even as a volunteer. We hope you will contact one of the current Officers, Directors, or Committee Chairs, all of whom are listed on the RRF website, <http://www.raptorresearchfoundation.org/>, to learn more about how you can help RRF.

A big thank you also to **outgoing Directors Rob Bierregaard, Todd Katzner, and Oliver Krone**, who have contributed greatly in their service to RRF over the past several years.

New Membership and Business Office

Submitted by Libby Mojica

We are excited to announce the establishment of a new membership and business office for RRF starting 1 October 2020. We have hired Christy Classi and her team to manage RRF's memberships, library subscriptions, and our financial bookkeeping. You'll start receiving emails from the office through our new membership software RRF@wildapricot.org or from membership@raptorresearchfoundation.org.

Please feel free to contact us if you have any questions or concerns with your member profile, the new website, or your RRF membership. Below is the new contact information for the RRF business and membership office:

Raptor Research Foundation

P.O. Box 4444

Topeka, KS 66604

(785) 550-6904

membership@raptorresearchfoundation.org

Update from the Ornithological Council

Submitted by Laura Bies

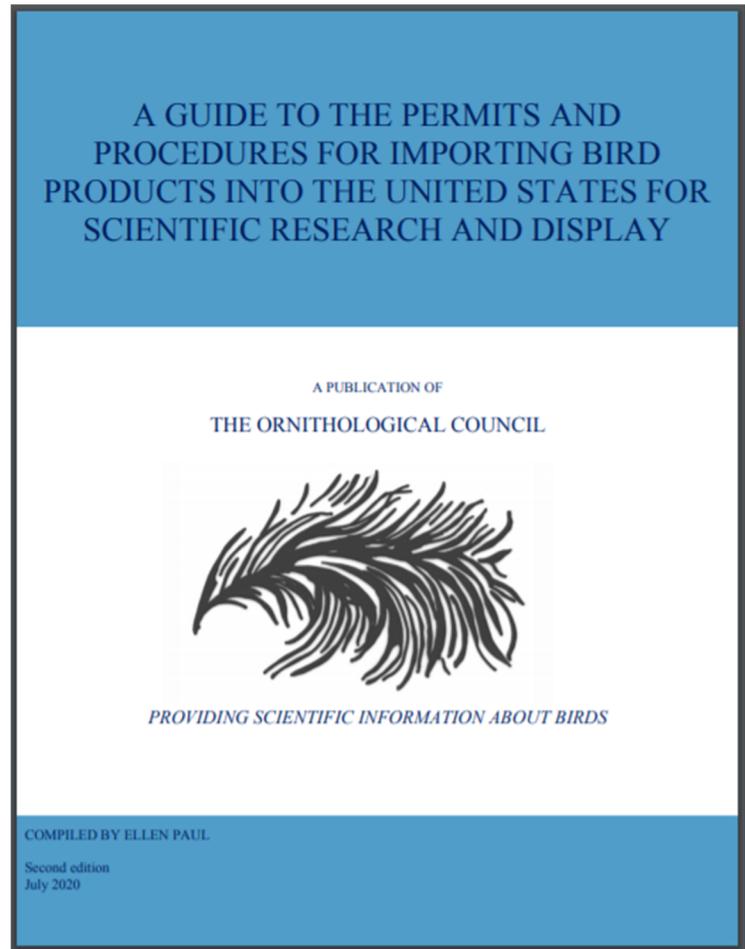
Ornithological Council has released an updated version of *A Guide to the Processes and Procedures for Importing Bird Products into the United State for Scientific Research and Display*. This extensive guide, which was thoroughly updated this year, provides a step-by-step guide for ornithologists importing birds or bird products into the U.S. for research and display, including template documents and checklists to follow.

The Import Guide is available to download for free from the Ornithological Council's website at BIRDNET.org, as a service to the ornithological community.

It contains sections on the import permitting requirements of the U.S. Fish and Wildlife Service, USDA APHIS, and the Centers for Disease Control, as well as information about planning your travel and how to ship your specimen. It leads the ornithologist through the entire process, from paperwork to port and beyond. In addition to the hard-and-fast rules and requirements, this guide also offers best practices and helpful hints.

The guide will be updated regularly as agency permitting requirements change, keeping ornithologists in compliance with the many laws and regulations governing the import of bird products.

If you have any questions after reading the Import Guide or find areas that require further clarification, please contact Laura Bies (laurabiesoc@gmail.com), Executive Director of the Ornithological Council.



Raptor News

New Global Raptor Research and Conservation Grant

Submitted by Evan Buechley

Hawk Watch International (HWI) is very excited to announce the Global Raptor Research and Conservation Grant - new funding opportunity that will invest in projects addressing global raptor research and conservation priorities. HWI will invest in projects led by citizens of developing countries, with the aim of increasing diversity and inclusivity, all while building local capacity for conservation. In this strange new world, as we grapple with the COVID-19 pandemic, it seems ever more pressing to invest directly in projects and people from local communities to achieve conservation outcomes.

Announcement: <https://hawkwatch.org/blog/item/1205-conservation-grant>

Grant details / how to apply: <https://hawkwatch.org/grant>

This grant builds off a recent HWI-led research paper that sought to quantify global raptor research and conservation priorities. Some of the key findings were that raptor research to date has been extremely biased towards a small fraction of species, with ten species (1.8% of all raptors) accounting for one-third of all raptor research, while one-fifth of raptor species have essentially never been studied in-depth.

Discouragingly, we found that, globally, species that are more threatened with extinction are actually less studied. Owls were the least-studied group of raptors, and therefore the highest overall priority for future research. Vultures were the most extinction-prone group of raptors, and thus in need of the most urgent conservation investment. Tropical regions of Central and South America, Sub-Saharan Africa and, particularly, Southeast Asia were identified as the highest priority for investment because they hosted the highest number of total species, understudied species and extinction-prone species. Overall, these findings call for a shift in scientific and conservation resources towards less studied and more endangered species, which disproportionately occur in developing countries. This grant aims to play a small role in doing just that.

Please find further details, including how to apply, here. The application deadline for this first call is December 31, 2020. If you have any questions, please write to: conservation.grant@hawkwatch.org. We also encourage sharing this announcement widely, especially with contacts from developing countries whom may be interested in applying.

Rewilding Cities

Submitted by Rowan Kilduff

Why rewilding? Why cities? What is our full responsibility here?

Rewilding is a way to put the balance back in favor of wild nature, which is our life-support system. To rewild means to give space for native ecosystems, to bring back native biota and to leave it alone and let life do what it does best. To rewild means to realize full interdependence and autonomy (of us all). Rewilding is not costly, and it is a very easy idea to put into practice — give space, let it grow and re-wild in its own time, by its own terms; we recognize the autonomy of the wild / nature, in so doing we recognize our own. We do this for everyone and for all coming generations.

Introduction

We have a lot of raptors in this city including hawks (*Buteo buteo*), kestrels (on the antenna across from me, and even landing right at home a meter from me), sparrow-hawks; an eagle owl flew by my home at dusk this spring (that was a surprise for the Czech Ornithological Assoc.), and driving across the country I've seen a white-tailed eagle; two months ago a golden eagle flying right by the highway on the way to the city; there is also a very wide array of small birds. The soundscape is rich. Do we need rewilding here? Yes. We need to protect what is here now because the machinery does not stop, and anytime this could all be built over. Firstly, we protect and defend, and secondly, we rewild where we can. I imagine grassroots rewilding projects in cities all over, connecting together and supporting each other with all our experience, and by so doing we are rebuilding communities (people as part of natural communities) and interconnecting them across the world. In these times, we need this support. Remembering individual and community responsibility, we start everything at home — where it matters.

Everyone waking, reconnecting with natural cycles.

We live a multi-dimensional life — the patterns of organic energy at work in city and wilderness the same, but much easier to see and feel in 'free nature' — we have to re-learn seasonal cycles, daily cycles, our own body cycles and the planetary cycles. Rewilding cities is not what some people think — that it means 'designing' — in the same way I don't look at large-scale rewilding as designing either, to design it we would need to clearly understand it and we don't understand these wild systems, we are learning from them. To rewild a city we will pour over maps and plans, go out and walk the land and feel it, talk to the people, look at where and how children play, take note of where wildlife trails go, and then we just set aside places. We start small and add to it. We continue to learn from / with these wild systems, from all these energy-exchanges — the sun, the air, the waters, the forests. Two approaches can be considered: the first is that we just leave an area (of any size) to rewild itself fully and completely with no help from us at all; the second is that

we replant native trees, grasses, plants and reintroduce the real natives (e.g., here that would be easier as many are coming back on their own, this country needs to focus on native trees, fighting drought, protecting watersheds and promoting good water use, bringing back more large predators in mountainous areas and extending protected areas with added buffer zones; re-education about raptors, bears, wolf packs, lynx will be important as well as a focus on all pollinators and the health of micro-ecosystems right here in the city). New micro-wildernesses, meadows and forests, including essential corridors (for all types of life) will all need protection, and these will be no-go areas for people. People need to know what it means to have a protected river right there by the city and what a wilderness area really is, whatever the size. Rewilding and realization go together. An ethic or practice comes about in the real life of people, in heart and mind; in community.

Rewilding Gives Us

- * cleaner air, healthy ecosystems, meaning healthy people, new priorities
- * protected watersheds, free rivers
- * freedom from flawed socio-economic / political structures so that we can act truly for universal benefit with working altruism and non-profit aims;
- * long-range planning potential
- * more area for diverse forest, for replanting native trees
- * a practical way to teach our children and coming generations what really matters, to define our highest values and how to live in peace with our environment, with the land, with all life and how to use non-violent (ahimsa) communication in every part of our lives
- * a clearer view on how much space we take up, by giving more space to the wild - to nature and natural communities - we force ourselves to think more creatively about how we design future cities to fit a sky-rocketing population. There is a big chance that our growth will level out when we give the right amount back to wild nature
- * a new respect for our wild brothers and sisters of every kind * a chance to really continue to live here for a long time to come

Plan for Rewilding Our City / All Cities

- * Protect and keep wild the parts that are already wild — forested or wooded areas
- * Simply stop cutting healthy trees that are 'in the way' and start planting more
- * use our green areas, and enrich them — there are many places where we can do this, and it is easier than it sounds
- * Include micro-wilderness of any size; micro and macro are all important, 10m² can work it is only about limitations of thinking
- * No new service roads, create safe corridors where roads cut through forest
- * Recognize and respect natural corridors for wildlife (not only to avoid car collisions, but for the wildlife themselves to follow natural trails)
- * Respect raptors (more protections, not only for golden eagles, but all of them as essential to healthy working ecosystems), be ready to welcome them — we are lucky that they are naturally returning. They only need us to/not damage/the environments they rely on
- * 'Raptor Map' community project where we will learn more about city raptors, their movements, their life — about how we are sharing the same shelter right now.

Wilderness / Nature – Plain Talk

We should always see a city as part of wilderness / nature. By getting through that invisible but powerfully defining barrier (i.e., that city / wilderness are completely different worlds; even antagonistic to each others' survival or health - more so in the case of cities built over wild free nature, but also when we flip it to think of how to give more space to wilderness to come back without it being seen as threatening to 'our place'), we can see that what we build is always part of nature, of the environment, the interdependent ecosystems and the geological regions. There is no self-sustaining city, no city that is not working because of the land, the flow of energy – water – air – etc. from the mountains, rivers, forests. With a more realistic and practical realization we can get more people thinking that having kestrels and hawks in the city is a good thing, and taking care of life is our biggest responsibility.

Like Falcons in this grey haven-home, we are not — and have never been — on our own.

Living in the City: How Healthy is it?

Submitted by Laura M. Biondi and Carla A. Paterlini

Researchers from the Institute of Marine and Coastal Research (IIMyC, UNMdP-CONICET), led by its Director Dr. Laura Biondi, have been studying the ecological, behavioral and physiological factors underlying the successful adjustment of birds to urban life. Dr. Biondi and her team studies the Chimango Caracara (*Milvago chimango*) as an avian model to analyze the variation in body and physiological condition, as well as its relationship with cognitive and personality characteristics, in wild populations exposed to different levels of urbanization. Carla Paterlini (a Ph.D. student) is currently investigating the effects of urbanization on the prevalence of pathogens, hematological and clinical biochemistry parameters, oxidative stress and body condition of Chimango Caracaras inhabiting rural, urban, and suburban habitats in southeastern Buenos Aires province, central Argentina. By analyzing and comparing these variables, the team, which also includes Drs Susana Bo (IIMyC, UNMdP- CONICET, Buenos Aires), Dr. Ramón Nosedá (Laboratorio Azul, Buenos Aires) and Dr. Miguel Saggese (Western U, California, USA), aims to better explain and understand the effect of urbanization on the physiological and health status of Chimango Caracara populations. For the past three years Carla has captured, sampled, and banded more than 170 Chimango Caracaras. Preliminary analysis of the collected data did not show the presence of any of the pathogens sought (*Salmonella* sp, *Bacillus anthracis* and *Trichomonas* sp) in any of the sampling areas. Regarding the parasitological study, we found no differences in parasitic prevalence among environments. However, roundworms of the genus *Capillarias* had a higher prevalence in urban areas compared to rural and suburban areas. We hope this study will contribute to a better understanding of the ecology of this species in habitats with different degrees of urbanization. If there are any researchers or students interested in this study or someone who is researching similar topics, please contact us at: lbiondi76@gmail.com or cpaterlini@mdp.edu.ar

Recent Theses on Raptors

Solheim, Roar. 2019. Molt stage, wing bar patterns and digital photography as tools for assessing age distribution and recognizing individuals of Great Grey and Snowy Owls. Ph.D. Inland Norway University of Applied Sciences, Evenstad, Norway. 167 pp. r-solhe3@online.no

The world is heating up. The climate is changing, with increasing temperature changes towards the Arctic. Northern ecosystems of tundra and taiga are subject to changes, even in the most remote areas void of human presence. One of the most profound characteristics of these northern ecosystems are the cyclic changes in population size of mammals, birds and insects, small microtine rodents being the central species in the dynamics. Several studies have demonstrated that the cyclicity of lemmings and voles have changed during the recent decades, with consequences for many other species of the food webs. Changes in the cyclicity of lemmings and voles are especially expected to influence their predators. All arctic and boreal owl species hunt microtine rodents, and enigmatic species like the Snowy Owl and the Great Grey Owl are totally dependent on such prey animals to breed. The Snowy Owl is listed as a vulnerable species worldwide, while the Great Grey Owl is considered to have a stable world population. The population of Snowy Owls breeding in Fennoscandia has declined while the Great Grey Owl recently has expanded its breeding distribution.

Small mammal hunters like the Snowy Owl and the Great Grey Owl are directly influenced by changes in the cyclicity of microtines. The difference in population development of these two vole hunters in Fennoscandia enhance the importance of monitoring both species under a regime of expected future changes of ecosystem cyclicity. Knowledge of population size, reproduction and survival, and the age structure of populations are paramount information in such monitoring as reproduction and mortality varies with age.

I present a method for aging Great Grey Owls and Snowy Owls based on the moult patterns in their wings. I have demonstrated the difference between the first juvenile wing feathers and later adult wing feathers, and that it takes three to four years for an owl to replace all juvenile wing feathers. As long as at least one juvenile wing feather is left in the wing, the number of moults and the age of the owl can usually be determined. I have further developed a method for individual identification of Great Grey Owls and Snowy Owls based on bar patterns of their wing feathers. I have shown that it is possible to use photographs of free flying owls for aging and identification of individuals. Identification based on visible characters is a long established and used technique in mammal studies, but has hitherto not been used on free flying birds. Using photographs in such studies is a non-invasive technique which may enhance the amount of data available in population studies of birds. I have used these techniques in three studies on Snowy Owls and Great Grey Owls.

Snowy Owls were photographed along transect routes during a summer invasion on Belyi Island north of the Yamal Peninsula in Russia in July 2015. A minimum of 25 owls were identified, sexed and aged by studying the moult and bar patterns of their wings from flight photographs. The moult patterns showed that 80% of the owls were hatched in 2012-2014. Results from Norwegian satellite studies of Snowy owls showed that 12 adult owls which bred in Norway in 2011 spent the summers 2012-2014 along the Russian Arctic. This implies that Snowy Owls must have bred successfully in these parts of the Russian Arctic in 2012-2014.

An expanding population of Great Grey Owls was studied in Hedmark, south-eastern Norway in 2009-2018, when the number of nests rose from 1 to 119. Adult breeding owls were captured for banding or control, and their wings were photographed for moult analyses and aging. Birds which could not be captured were photographed in flight. The photographic method increased the amount of birds which could be aged, and especially the amount of males which may be more reluctant to approach intruders at the nest site, and thus avoid capture. The year 2011 with 22 recorded Great Grey Owl nests stood out with as many as 77% of the breeding birds were young birds hatched in 2010. Control of two nesting Great Grey Owls banded as nestlings in Sweden in 2010 indicated that good reproduction in mid-central Sweden in 2010 followed by natal dispersal of young birds was the foundation of the breeding population in Hedmark.

I have demonstrated that data gathered through public sciences can be used to age Great Grey Owls when they hunt in open landscapes during a vole depression year. More than four thousand reports of Great Grey Owls were received through the national species archives in Norway and Sweden in 2012, the majority of data derived from Sweden. Slightly more than eight hundred of these reports were accompanied by photo(s) of the owl, and of these 323 could be used to age the bird. The number of individuals was reduced to 144 by the ID numbers of localities, since one owl may be reported by different observers. Wing and tail feathers showed that at least 76% of all the Great Grey Owls reported in 2012 were juvenile birds hatched in 2011. This demonstrated that also 2011 was a good reproduction year of Great Grey owls in south Scandinavia.

Dissertation available at: <https://brage.inn.no/inn-xmlui/handle/11250/2637793>

Watson, Jesse Laurence. 2020. Ferruginous Hawk (*Buteo regalis*) Home Range and Resource Use on Northern Grasslands in Canada. University of Alberta, Edmonton, Alberta. 124 pp.

Human alteration of the landscape can have implications for wildlife at the individual and population levels. The grassland ecosystem has been highly altered and is at risk of further alteration due to increasing demand for human food, pastureland, and energy development. The Ferruginous Hawk (*Buteo regalis*), a grassland obligate, has experienced declines across its range due to loss of habitat leading to its listing as a Threatened species in Canada. Understanding how

breeding Ferruginous Hawks have been affected by anthropogenic change in the grassland region of southern Alberta and Saskatchewan is important to inform species recovery and management. My goal was to investigate how anthropogenic development has affected Ferruginous Hawk range use and perch choice at the level of 3rd-order selection. I tracked 48 breeding, male Ferruginous Hawks during the 2012-2017 breeding seasons, and used high-resolution satellite telemetry to address this goal.

In Chapter 2, I measured the size of hawk core areas (50% contour; $\bar{x} = 3.54 \text{ km}^2 \pm 8.52 \text{ SD}$) and home ranges (95% contour; $\bar{x} = 36.33 \text{ km}^2 \pm 94.74 \text{ SD}$) ($n = 92$), the first range-size estimates for satellite-tracked Ferruginous Hawks in Canada. I used linear mixed models to test the relationship of perch density and land-cover type on range size as an indicator of range quality. I found the density of fencelines and proportion of cropland were significant influences on range quality, with higher densities of fenceline and lower proportions of cropland resulting in smaller core areas. However, at the home-range scale, there was a significant interaction between fenceline density and the proportion of cropland, with increasing densities of fenceline mediating the effect of proportion of cropland on home-range size. Additionally, increasing proportions of tame grass and tame hay resulted in smaller home ranges and thus higher range quality.

In Chapter 3, I studied 24 hawks that were monitored intensively in 2013 and 2014 with GSM transmitters, which generated a high volume of location fixes. My objective was to evaluate perch use by Ferruginous Hawks at two scales. Firstly, I estimated Resource Utilization Functions at the home-range level to compare use intensity among elevated perch types (fencelines, power distribution lines, and power transmission towers), and also among common land-cover types (native grassland, cropland, tame grass, tame hay, and idle field). Resource Utilization Functions indicated that hawks showed the highest relative use at areas near transmission towers, but they were the least abundant elevated perch types on the landscape. Hawks also showed highest use in areas near distribution lines and areas far from fencelines. Among vegetated land-cover types and relative to areas with native grassland, hawks showed highest use in areas with low levels of cropland and high levels of tame grass and tame hay. Secondly, I visited 1,436 perches of known use, distributed among 20 hawk home ranges, and measured micro-site land-cover characteristics and relative prey abundance, indexed by mammal burrow counts, within the hypothetical viewscape (i.e., 50 m) of a perched hawk. I tested the influence of these predictors on intensity of perch use, with mixed effects logistic regression. Fence posts were the most common elevated perch type, comprising 52% of all perches. Transmission towers were the most heavily-used perch type but were the least abundant perch type on the landscape, resulting in less overall use. Hawks showed higher use at perches with higher proportions of bare ground, higher burrow counts, and less cropland within 50 m. I concluded that, although prey abundance is important for Ferruginous Hawks, prey accessibility and visibility, as influenced by the juxtaposition of perch height, amount of bare ground, and relative abundance of prey are the best indicators of perch use within home ranges.

In Chapter 4, I summarize potential benefits and consequences related to human-made elevated perches on Ferruginous Hawks and recommend that future studies should investigate perch use of Ferruginous Hawks through direct observation and experimentation to determine how placement of new perches may affect breeding individuals.

Masoero, Giulia. 2020. Food hoarding of an avian predator under food limitation and climate change. University of Turku, Turku, Finland. 171 pp.

Hoarding behaviour (storing food for later use) has evolved to reduce the risk of starvation when resources are scarce. In this thesis, I studied the food-hoarding behaviour of Eurasian pygmy owls (*Glaucidium passerinum*) under spatiotemporally varying environmental conditions. I investigated differences between age and sex classes, the effect of intra-specific competition, predator responses to the abundance of the main prey, and the effect of climate on their behaviour. These data were collected starting in 2003 in western Finland, where the abundance of voles fluctuates in three-year population cycles. The number of stores per year and the biomass of prey items stored increased with vole abundance. Females and yearlings had larger and heavier stores than males and adults, respectively. At times of low vole abundance, adult owls stored more small birds and fewer small mammals than yearlings. Females stored more small mammals than males, and showed a tendency to store fewer birds. The numbers of yearlings of both sexes and adult females increased with increasing vole abundance. Owls were less likely than expected to have a neighbour of the same class (sex or age) when the main prey was abundant, suggesting high sex- or age-specific competition. Food stores, however, were mostly larger when the nearest neighbour was of the same sex. In years of low vole abundance, increasing conspecific density reduced the total prey number stored by an owl, suggesting a high cost of competition. This thesis also reveals a strong effect of autumn and winter climate on food-hoarding pygmy owls and on the quality of the stored food. Pygmy owls may be partly able to adapt to climate change by delaying the initiation of food-hoarding. Numerous weather variables nonetheless affect their hoarding behaviour and the perishability of the cached food. Rotten food may be of poor quality and may be connected to a lower recapture probability. In female owls, rotted food hoards, often consumed, are linked with a lower future recapture probability, presumably indicating that they either die or emigrate permanently from the area. Detailed knowledge of age- and sex-related differences in hoarding behaviour under fluctuating abundances of the main prey can thus provide a fundamental tool to better understand the dynamics of a predator population and its response to climate change.

Thesis available at: <https://www.utupub.fi/handle/10024/150424>

Something New!!! Raptor Poetry

Editor's Note: I am always amazed by the creativity and talents of the RRF membership. Art, photography, writing, and all sorts of raptor-focused creative expression are shared by RRF members for the enjoyment of all. To my knowledge, I believe this is (perhaps) the first raptor poetry to be shared. Thank you Rowan for the fantastic poem and willingness to share!

1 am, 21st June 2020

people sleepin'
dark clouds
rains
sound
you made me jump! just now
— Dear Little Brother
alight
on
my
balcony
rest quick wings
a while
and
go
I watch you fly
and part of me.
Little Brother kestrel.

Rowan Kilduff

ANNOUNCEMENTS and BRIEF NEWS ITEMS

For Sale

RRF Publications, Pins, and Decals – Hard copies of *The Journal of Raptor Research* (Vol. 1-30), most Raptor Research Reports, and RRF pins and decals may be purchased directly from RRF (Rich Van Buskirk, RRF Treasurer; email: treasurer@raptorresearchfoundation.org).

See <https://raptorresearchfoundation.org/publications/journal-of-raptor-research/back-issues/> for details and prices. Orders for 4 or more issues receive a 30% discount. Hard copies of *The Journal of Raptor Research* (Vol. 50+) may be purchased from **Raptor Research Foundation**, P.O. Box 4444, Topeka, KS 66604, USA; 1-785-550-6904 (phone); membership@raptorresearchfoundation.org (email). All issues from Vol. 1-39 are available on SORA (<https://sora.unm.edu/>) for free download.

Announcements

***The Journal of Raptor Research* Website Launched!**

The Raptor Research Foundation is pleased to announce the launch of *The Journal of Raptor Research* website. Accepted papers will now be published as Early Online prior to print publication. To celebrate, the entire new website will be open access for the first month. Access the website through the Raptor Research Foundation website or at journalofraptorresearch.org.

Questions? Contact the Editor at journalofraptorresearch@gmail.com.

Important Golden Eagle Paper Now Available

There is this wonderful paper of which I'm sure you're aware by Hienrich Haller published in 1996 on golden eagles in the Alps. It's in German, but there's a good English summary and the tables and figures also have English translations in the legends and captions. The citation is:

Haller, H. 1996. Der Steinadler in Graubünden. Der Ornithologische Beobachter 9: 1-167.

Well, to make a long story short, I wrote Haller about a year ago and asked him if he would make his paper available on the Internet. He agreed, but nothing happened for a long time until, low and behold, IT IS THERE! Here's the website:

https://www.parc.ch/snp/pdf_public/2018/6224_20180116_090101_Beiheft_9.pdf

Grainger Hunt (Thank you for sharing Grainger!)

Raptor Management and Techniques Manual Available On-line!

The 2nd Edition of the *Raptor Management and Techniques Manual* – Edited by David Bird and Keith Bildstein – is available for download (as a PDF) on the Raptor Research Foundation's website

<https://www.raptorresearchfoundation.org/publications/techniques-manual>



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