Raptor Research Foundation 2011 Annual Meeting

Duluth, Minnesota

October 5-9, 2011

Raptor Research Foundation

A Great University on a Great Lake
University of Minnesota Duluth
Department of Biology

NRRI
Natural Resources Research Institute

Duluth Audubon Society

Hawk Ridge Bird Observatory

Annual Meeting at a Glance

Wednesday, October 5	Lower Lobby
7:00 am – 7:00 pm	Registration
7:00 am – 7:00 pm	Vendor Setup (vendors must take down every night and set up every morning)
8:00 am – 12:00 pm	**ECRR** Techniques for Handling, Auxiliary Marking, Measuring, and Blood Sampling Raptors...
8:00 am – 12:00 pm	**ECRR** Raptor Study Skin Preparation
8:30 am – 12:00 pm	**ECRR** Safely Accessing Raptor Nests
8:30 am – 4:30 pm	**ECRR** Harnessing Raptors with Transmitters
1:00 pm – 4:00 pm	**ECRR** Raptor Trapping and Handling Techniques for Scientific Research
1:00 pm – 4:30 pm	**ECRR** Safely Accessing Raptor Nests
1:00 pm – 4:30 pm	**ECRR** Raptor Tissue Sampling and Necropsy
6:00 – 8:00 pm	**Icebreaker Welcome Social in VIKING ROOM**

Thursday, October 6	Great Hall 1 & 2
8:00 – 8:20 am	Welcome by Duluth Mayor Don Ness and Dr. Gerald Niemi
8:20 – 9:20 am	Plenary Speaker—**Dr. Scott Lanyon**, Insights from the Avian Tree of Life
9:20 – 9:40 am	*Coffee Break*

Thursday, October 6	Great Hall 1	Great Hall 2
9:40 am	**T. Booms**, Lessons from the Alaska Short-eared...	**J. Dwyer**, From Duluth to Duluth: How Has ...
10:00 am	**R. Clark**, A Contribution from the World Literature...	**L. Nagy**, Eagle Fatalities in the United States: Data, ...
10:20 am	**M. Gahbauer**, Short-eared Owl Occupancy, ...	**S. Thomsen**, Population Dynamics and Diet of an ...
10:40 am	**G. Holroyd**, The Need for a North American ...	**A. Duerr**, Dispersal of Black Vultures in Response ...
11:00 am	**K. Keyes**, Short-eared Owl Nest Site ...	**R. Tingay**, Distribution and Status of the Pallas's ...
11:20 am	**S. Swengel**, Short-eared Owl Occurrence on ...	**R. Rosenfield**, The Potential for Long-term ...
11:40 am	**D. Wiggins**, Conservation Status of Short-eared ...	**W. Clark**, Harlan's Hawks Are and Have Been ...
12:00-1:40	*Lunch (Shuttles to Hawk Ridge)*	
1:40 pm	**T. Hipkiss**, The Fluctuations and Decline of ...	**C. Boal**, Overview of Awards Given by the RRF
2:00 pm	**K. Munro**, Evaluation of Habitat Characteristics ...	**J. Cava**, Diet of Urban Breeding Cooper's Hawks
2:20 pm	**J. Gagnon**, Landscape Composition and Year ...	**S. Graham**, Barred Owl Diet in the Central Coast ...
2:40 pm	**C. Priestley**, Inferred Autumn Movements of ...	**K. Keyes**, Short-eared Owl Spatial ...
3:00 pm	**S. Weidensaul**, Nocturnal Activity Range and ...	**T. Miller**, Striking a Balance: Modeling Migration ...
3:20 – 3:40	*Coffee Break*	
3:40 pm	**S. Weidensaul**, Autumn Roost Site Selection in ...	**K. Pias**, Foraging Ecology of Breeding Snail Kites
4:00 pm	**C. Neri**, Summer Movements of Juvenile ...	**B. Skipper**, Is Aggressive Nest Defense by Urban ...
4:20 pm	**D. Wiggins**, Breeding Ecology of Northern Saw-whet...	**D. Tempel**, Site Occupancy Dynamics of a ...
4:40 pm	**M. Chowdhury**, Owls in Bangladesh – Past, ...	**J. Therrien**, Avian Predators Play a Key Role in ...
5:00 pm	**G. Holroyd**, Winter Destinations and Breeding ...	**Andersen Judge's Meeting**
6:00 – 8:00 pm	**Poster Session in VIKING ROOM**	
8:00 – 8:30 pm	**William Clark,** Unusual Raptor Plumages: Albinism, Melanism, Hybrids, Dilute Plumage, and Others	
8:30 – 9:00 pm	**Denver Holt,** Snowy Owls: An Overview of Twenty Years of Breeding Season Research in Barrow, Alaska	

Annual Meeting at a Glance

Friday, October 7	Great Hall 1	Great Hall 2
7:00 am – 5:00 pm	Registration (Lower Lobby)	
8:00 am	**T. Katzner**, Status, Biology and Conservation ...	**S. Bradbury**, Raptors and the Regulation of ...
8:20 am	**J. Tremblay**, Breeding Status and Population ...	**W. Bowerman**, Monitoring Concentrations of ...
8:40 am	**C. Maisonneuve**, Variation in Home Range Sizes ...	**L. Burnett**, Eggshell Thinning of California Condors ...
9:00 am	**T. Miller**, Characteristics of Spring Migration of ...	**R. Risebrough**, Exposure of Raptors to Environmental ...
9:20 am	**D. Brandes**, Influence of High-Latitude Warming ...	**S. Hindmarch**, Investigating the Potential Risk of ...
9:40 am	**J. Cooper**, Winter Ranging Behavior of Golden ...	**R. Tingay**, The Effect of Carbofuran Poisoning and ...
10:00 – 10:20	*Coffee Break*	
10:20 am	**M. Martell**, Tracking Golden Eagle Migration on ...	**J. Elliott**, Insecticide Poisoning of Raptors in ...
10:40 am	**M. Wheeler**, Assessing the Genetic Diversity ...	**J. Nichols**, A Physiologically-based Model for ...
11:00 am	**C. Koppie**, U.S. Fish & Wildlife Service Perspectives ...	**M. Fry**, Mitigating the Injurious Effects of Rodenticides ...
11:20 am	**R. Rivard**, Conducting Aerial Surveys for Golden ...	**M. Fry**, Pesticide Exposure Case Files of Raptors in ...
11:40 am	**K. Elliott**, Bald Eagles and Chum Salmon ...	**J. Lincer**, Round Table Discussion Synthesizing the ...
12:00 – 1:40	*Lunch (Shuttles to Hawk Ridge)*	
1:40 pm	**C. Meador**, Prey Selection of Nesting Golden ..	**D. Bittner**, Natal Dispersal of Golden Eagles from ...
2:00 pm	**S. Lewis**, Bald Eagle Space Use in a Recently ...	**D. Brandes**, Modeling the Interaction of Terrain and ...
2:20 pm	**C. Monson**, Summary and Results of the Milan ...	**A. Graber**, Pre-Construction Methodologies Used ...
2:40 pm	**A. Duerr**, High Frequency GPS-GSM Telemetry ...	**H. Seeland**, Methods for Determination of Raptor ...
3:00 pm	**R. Rivard**, Evaluating Population Proportions ...	**A. Peterson**, The Conservation of Airspace and ...
3:20 – 3:40	*Coffee Break*	
3:40 pm	**C. Meador**, Golden Eagle Nesting Ecology: A ...	**T. Nygård**, Movement Patterns and Collision Risks ...
4:00 pm	**M. Kochert**, Long-term Reproduction of Golden ...	**J. Pagel**, Known Eagle Mortality at Wind Turbine ...
4:20 pm	**F. Isaacs**, Bald Eagles Nesting in Oregon and ...	**L. Nagy**, Use of Behavioral Data of Wintering Bald ...
4:40 pm	**S. Windels**, Bald Eagles as Agents of Cormorant ...	**J. Platt**, Lessons Learned from Raptor Interaction ...
5:00 pm	**P. Datema**, A Reevaluation of Great Lakes Fish ...	**C. McIntyre**, Potential Conflicts Between Energy ...
6:30 – 9:00 pm	**Dinner Train** (departs from Duluth Depot—See pg.13 for details)	

Saturday, October 8	Great Hall 1	Great Hall 2
7:00 am – 12:00 pm	Registration (Lower Lobby)	
8:00 am	**S. Miller**, Use of Video Monitoring to Study ...	**R. Perkins**, The Use and Results of a Trained ...
8:20 am	**M. Lanzone**, High Frequency GSM Telemetry ...	**D. Andersen**, Northern Goshawk Population Size ...
8:40 am	**E. Nolte**, What Effect Does Detectability ...	**J. Klucsarits**, Nest Box Selection in Eastern ...
9:00 am	**K. Koch**, Advancing Conservation of Raptors ...	**J. Barnes**, Assessing Peregrine Falcon Predator ...
9:20 am	**O. Krone**, Food Composition and Seasonal ...	**D. Bittner**, Peregrine Falcon Nesting Increases in ...
9:40 am	**J. Bednarz**, Parental Care and Diet of Mississippi ...	**J. Lapointe**, The Impact of Corn and Soybean ...
10:00 – 10:20	*Coffee Break*	
10:20 am	**J. Baldwin**, Long-term Changes in Bald Eagle ...	**S. McCann**, Is the Red-throated Caracara ...
10:40 am	**J. Bosley**, A Territorial Occupancy Model for Bald ...	**E. Forsman**, Population Demography of the ...
11:00 am	**M. Hanson**, Food Habits of Breeding Bald Eagles ...	**J. West**, Owl Occurrence in Several of ...
11:20 am	**D. Bird**, Unmanned Vehicle Systems: A Future ...	**C. Hagenlocher**, Breeding Ecology of Cliff-nesting ...
11:45 – 12:45	**RRF Business Meeting**	
6:00 pm	**Awards Banquet Social**	
7:00 pm	**Awards Banquet Dinner (pre-registrants only) & 2011 Achievement Awards**	
8:30 pm	**Silent Auction Ends**	

Raptor Research Foundation Personnel

Officers

President	Vice President	Secretary	Treasurer
Ruth Tingay	Ted Swem	Greg George	Angela Matz

Publications Editors

Editor *Journal of Raptor Research*	Editor *Wingspan*	Book Review Editor	Web Coordinator
Cheryl Dykstra	Petra Bohall Wood	Allen Fish	Libby Mojica

Directors

Southern Hemisphere	At Large outside N.Am.	Eurasian	North America–1
Munir Virani	Marc Ruddock	Fabrizio Sergio	John Smallwood
North America–2	**North America–3**	**At Large–1**	**At Large–2**
Gary Santolo	Laurie Goodrich	Miguel Saggese	Clint Boal
At Large–3	**At Large–4**	**At Large–5**	**At Large–6**
Michael Collopy	Carol McIntyre	Torgeir Nygard	Michael Kochert

Committee Chairs

Awards	Conferences	Conservation
(position open)	Libby Mojica	Rick Watson & Joan Morrison
ECRR	**Education**	**Finances**
Travis Booms	Jemima Parry-Jones & Jeremy Scheivert	Michael Kochert
Membership	**Nominations**	**Scientific Program**
Ted Swem & Jessi Brown	Laurie Goodrich	James Dwyer

Conference Committee

Local Chair
Julie O'Connor

Gerald Niemi — Matt Etterson — Dan Varland

Raptor Research Foundation 2011 Annual Meeting

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Sponsors

Northern Goshawk Level — $2,000

USFWS—U.S Fish & Wildlife
Minnesota Power Foundation

Peregrine Falcon Level — $1,000

USFS—U.S Forest Service/Superior Nat'l Forest
REGI—Raptor Education Group—Antigo, WI.
NRRI—Natural Resources Research Institute

American Kestrel Level — $500

Alakef Coffee Roasters—Duluth, Minnesota
Twin Ports Paper—Duluth, Minnesota

Vendors

BioTrack LTD—Wareham, Dorset, UK
Advanced Telemetry Systems, Inc.—Isanti, Minnesota
Cellular Tracking Technology—Somerset, Pennsylvania
Tyco Electronics—Greensboro, North Carolina
Perry Framing & Local Art—Duluth, Minnesota
Duluth Pack Store—Duluth, Minnesota
Kollath-Stensaas Publishing—Duluth, Minnesota
Stone Ridge Press—Wrenshall, Minnesota

Hosts

Natural Resources Research Institute

The mission of the Natural Resources Research Institute (NRRI) at the University of Minnesota Duluth is to foster economic development of Minnesota's natural resources in an environmentally sound manner and to promote private sector employment.

History

Back in the early 1980s, Minnesota's economy—largely dependent on natural resources—was taking a beating. The state was reeling from a domestic steel crisis that left about 13,000 workers unemployed on the Iron Range, and global competition was threatening the state's logging, pulp, and paper industries. To counteract the blow—and avoid a similar occurrence in the future— a group of researchers, legislators, and community members envisioned building a center that would study the economic impact and sustainability of Minnesota's minerals, forest products, peat, biomass, and water-related industries. This vision became a reality. In 1985, the Natural Resources Research Institute opened its doors in an abandoned Air Force building. The 20-foot ceilings and cavernous concrete spaces were filled with science laboratories and industrial-sized equipment.

Today

Over the past 20-plus years, NRRI has earned the respect of industry leaders, the academic community, and environmental watchdogs. Its reach is felt throughout the state and beyond. NRRI operates a minerals research laboratory in Coleraine on Minnesota's Iron Range providing research for mining industries, a diatoms research lab in Ely, Minnesota, that focuses on water quality issues, and a Fens Research Facility in Zim, Minnesota, to study peatland restoration.

Minnesota Congressman James Oberstar said of NRRI: "Our state has an abundance of natural resources, and it is our responsibility to protect the environment for future generations, as well as to create new economic opportunities. Through its research, NRRI has been an active participant in revitalizing both areas. It's truly one of Minnesota's gems."

Raptor Research Foundation

The Raptor Research Foundation (RRF) is the world's largest professional society for raptor researchers and conservationists. Founded in 1966 as a non-profit organisation, our primary goal is the accumulation and dissemination of scientific information about raptors. We also promote an awareness and appreciation of raptors amongst the general public. Our 950+ membership spans 50 countries on six continents, forming a global network of raptor experts. The world's leading raptor researchers are members of RRF, along with other professional scientists, wildlife managers, educators, conservationists, students and amateur raptor enthusiasts.

Hawk Ridge Bird Observatory

Hawk Ridge Bird Observatory (HRBO) is a non-profit organization charged with the management of the beautiful and unique Hawk Ridge Nature Reserve, 365 acres of city-owned green space in Duluth, Minnesota. Established in 1972, Hawk Ridge is one of North America's premier sites to watch the fall migration of birds of prey. Because of its location at the tip of Lake Superior (a massive natural barrier to migrating raptors), Hawk Ridge sees an average of 94,000 hawks, eagles, falcons and other raptors each fall. This consistent, sizeable migration opens the door for ongoing research and education not easily duplicated anywhere in North America. Nearly 18,000 people visit Hawk Ridge each fall, participating in educational programs and benefitting from the research that goes on at the reserve.

University of Minnesota Duluth Biology Department

Biology is one of the largest programs in the Swenson College of Science and Engineering at the University of Minnesota Duluth, with over 700 undergraduate students, 50 active graduate students, and 21 full-time faculty members.

For prospective undergraduates we offer B.S. degrees in Biology and Cell and Molecular Biology. We also serve students seeking a B.A. degree in Biology through the College of Liberal Arts and students in the College of Education and Human Service Professions seeking the B.A.S. in Life Science Teaching. For prospective graduate students, the Integrated Biosciences graduate program offers M.S. and Ph.D. degrees.

Biology faculty are actively involved in research supported by over $9 million in external grants. This allows us to offer all qualified undergraduate students the opportunity to participate in faculty research. The Department of Biology is housed in a new 130,000 square foot state-of-the-art research/teaching laboratory facility.

Duluth Audubon Society

The mission of the Duluth Audubon Society to promote education, conservation and research focused on birds and to preserve and enhance the ecological diversity of the greater Duluth area.

Thank You!

I wish to offer my sincere gratitude to all of the people who worked behind the scenes to make this conference a success. Libby Mojica, Dan Varland, James Dwyer of RRF were instrumental in their direction and advisement on the multitude of details that must come together over a year-long process. Gerald Niemi and Katy Feldt (both of NRRI), Matt Etterson (EPA), and Jane Cleave and Alison Clark (DAS) have provided great local support for me over the past year.

I especially want to thank James Dwyer and Nate Jones of EDM International, Inc. for handling all of the submitted abstracts in an organized way. It is a huge task!

Our conference logo was graciously designed by Marian Urbi Watts of the Center for Conservation Biology at the College of William and Mary in Virginia.

Hawk Ridge often uses the services of Sparky Stensaas for graphic design and layout. Sparky designed and edited this RRF Conference program, and we thank him for the beautiful job he did.

Hawk Ridge has a robust corps of volunteers who give and give and give! I can't imagine trying to plan this conference without the help of my little army of dedicated volunteers.

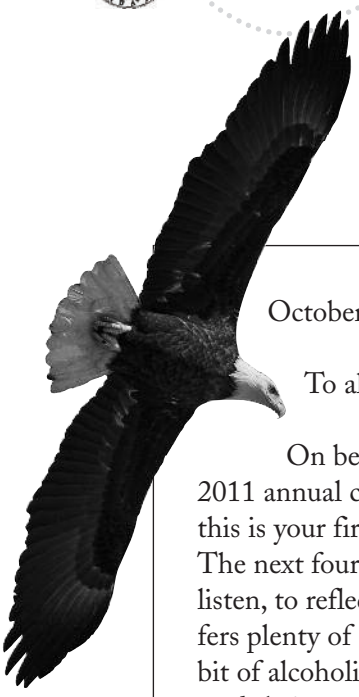
David Alexander	Lisa Ciorleri	Christine Ebert
Jo Fritz	Kari Hedin	Jeanne Filatrault-Laine
Gary Leeper	Janelle Long	Gail Marsman
Gretchen McDaniel	Harold Nordin	Ann Pellant
Ed Zlonis		

The people named above have put in an enormous amount of time on the planning committee since December of 2010! At the time of this publication, we didn't have a complete list of everyone who is on-site with the express purpose of providing you with the best conference possible. Please extend your thanks to the many Hawk Ridge, UofM/NRRI and Duluth Audubon folks who are here to make this week perfect.

Duluth Audubon Society is a small organization sustained by a few intrepid volunteers. Thank you to Alison Clark and Jane Cleave for their efforts in planning this conference!

Duluth is a town rich with excellent birders. We thank our field trip leaders for the time and energy they have put into sharing the birds of the region with you during this conference. Erik Bruhnke, Mike Hendrickson, Sarah Glesner and Sparky Stensaas are your guides this week.

Have a wonderful week here in Duluth!
Julie O'Connor
Local Conference Coordinator
Hawk Ridge Bird Observatory
Duluth, MN



Letters of Welcome

October 2, 2011

To all Raptor Research Foundation Meeting Participants,

On behalf of the Raptor Research Foundation, I extend a warm welcome to you all at our 2011 annual conference here in Duluth. Whether you've travelled from nearby or from afar, whether this is your first RRF conference or your 21st, we're glad you could join us for this special gathering. The next four days provides us with an opportunity to indulge in our shared fascination of raptors, to listen, to reflect, to learn, to be inspired, and most of all, to enjoy. This year's scientific programme offers plenty of scope for intellectual stimulation and the social events will probably provide for a little bit of alcoholic stimulation, especially for those who have braved the podium and successfully delivered their presentations! If you are new to this game and you are nervous about your delivery—don't be. This is an exceptionally friendly crowd and most of us have been in your position and survived to tell the tale.

Conferences like ours don't just 'happen'. Nor do we hire dedicated conference planners (because if we did, the price of registering as a participant would be off the scale). No, for each conference we rely upon an extraordinary group of people who volunteer their time to get it organised. This involves months, often years, of careful planning and preparation, drawing everything together in a final frenzied fortnight prior to us all arriving on the doorstep. This year is no exception and our extraordinary group includes the following individuals: Julie O'Connor (Local Committee Chair), Gerald Niemi, James Dwyer, Libby Mojica, Dan Varland, Matt Etterson, Jane Cleave, Alison Clark and Janelle Long. Please, take the time during the week to tell them how much you appreciate their efforts.

Thank you to our host organisations—University of Minnesota Duluth, Hawk Ridge Bird Observatory and Duluth Audubon Society—without their support we could have been meeting inside a Burger King instead of a Radisson.

I'll close by wishing you all a fantastic week, both in the conference rooms and out at Hawk Ridge. Enjoy.

Ruth Tingay
President, Raptor Research Foundation

Letters of Welcome

October 3, 2011

Dear Raptor Research Foundation Meeting Participants,

It is our great pleasure to welcome each of you to the 2011 Annual Meeting of the Raptor Research Foundation in Duluth Minnesota. This is actually the third time that the Raptor Research Foundation has met in Duluth. Previous meetings were in October 1980 at the University of Minnesota Duluth campus and in November 1995 at the Duluth Entertainment and Convention Center. The program this year is exceptional with over 100 presentations including five symposia. There will also be plenty of opportunity to visit and observe migrating raptors at Hawk Ridge with daily shuttles to Hawk Ridge from the Radisson Hotel. Local field trips are also planned to some of the best bird observation places in the states of Minnesota and Wisconsin, including Wisconsin Point, Park Point, and the St. Louis River "Freshwater" Estuary.

Wednesday night kicks off with a Social from 6- 8 pm. Thursday night is your opportunity to observe the posters along with a cash bar with appetizers followed by informal talks by Bill Clark and Denver Holt. Friday night is the dinner train up the North Shore of Lake Superior with a buffet and cash bar. Saturday concludes with the annual banquet and awards ceremony followed by a very special but secret entertainment from your very own RRF members—do not miss it.

Again, we welcome you to the lovely city of Duluth and have a great conference.

Sincerely—your co-hosts,

Matt Etterson
Adjunct Research Associate—Natural Resources Research Institute, UM-Duluth
Research Ecologist—US Environmental Protection Agency
Mid-Continent Ecology Division-Duluth

Gerald J. Niemi
Professor, Department of Biology and Natural Resources Research Institute—University of Minnesota Duluth

Letters of Welcome

October 2, 2011

Welcome to Duluth!

Hawk Ridge Bird Observatory is delighted to co-host this meeting. It gives us a great opportunity to show off our beautiful city and spectacular Lake Superior. We hope you'll take some of the free time during this conference to enjoy our town and appreciate 'our' Great Lake. We believe you'll fall in love with Duluth's natural beauty, and we certainly hope you'll get out to witness Hawk Ridge's incredible raptor migration. Early October is as good as it gets at Hawk Ridge.

While you're in town, head up to our hawkwatch site, or out to one of several birding hotspots identified in the Duluth Audubon's beautiful Duluth Birding Map. If it's a hike you seek, we have two unique options for you: explore the upper reaches of the city on the Superior Hiking Trail, which runs the entire length of Duluth through the parks, forests and green space above the city; or head down toward the lake and stroll the paved Lake Walk along the shore of Lake Superior.

In your conference packet, you'll find the 2011 Visitor's Guide to Duluth, packed with great opportunities to make your visit to Duluth one to remember.

Hawk Ridge volunteers and board members will be at the information table in the Great Hall Foyer all weekend; stop by for more ideas about how to best enjoy Duluth. Conference headquarters are located in the Duluth Room; let us know if there is anything we can do to accommodate you during your visit.

Thank you for coming to Duluth! Without each of you, we wouldn't have this opportunity to come together to learn about the work that is so important to these birds that we appreciate. It is my sincere hope that when you leave this conference you will take with you new information, ideas and passion for studying raptors that will carry your work to a whole new level.

Have a great time in Duluth!
Janelle Long
Executive Director
Hawk Ridge Bird Observatory

Moderator List

General Sessions

General Session I	Joseph Platt	Joseph.Platt@hdrinc.com
General Session II	Renée Rivard	rrivard@wildlife-research.org
General Session III	Renée Rivard	rrivard@wildlife-research.org
General Session IV	Mark Martell	MMARTELL@audubon.org
General Session V	Chuck Priestly	chuck@STRIXecological.ca
General Session VI	Mark Martell	MMARTELL@audubon.org
General Session VII	Chuck Priestly	chuck@STRIXecological.ca

Symposia

Aegolius Owls	Dave Brinker	DBRINKER@dnr.state.md.us
	Scott Weidensaul	scottweidensaul@verizon.net
Andersen Award	Clint Boal	clint.boal@ttu.edu
Golden Eagles	Charles Maisonneuve	Charles.Maisonneuve@mrnf.gouv.qc.ca
Pesticides	Jeffrey Lincer	jefflincer@gmail.com
Short-eared Owls	Geoff Holroyd	Geoffry.Holroyd@EC.gc.ca
Wind	Anna Peterson	pete1112@d.umn.edu

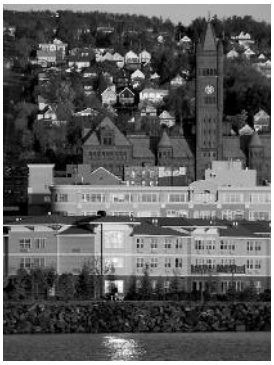
Back Ups

Back up #1	Joan Morrison	Joan.Morrison@trincoll.edu
Back up #2	Jim Bednarz	JBEDNARZ@astate.edu
Back up #3	James Dwyer	jdwyer@edmlink.com

Welcome to Duluth!

Around Town

Duluth has a wide variety of attractions for our visitors! A rich history in lumber, railroads, shipping and mining is on display at The Depot, our showcase Historical and Arts Center; a train museum, marine museum, an indoor water park, 27 miles of hiking trails, nature centers, city parks and our fabulous Lake Walk provide a myriad of self-guided entertainment options for your guests while you're in town. Visit Duluth (www.visitduluth) has a comprehensive trip planning guide that will help you narrow down your options. October is a great time to be outdoors in Duluth, so make time to enjoy our beautiful city while you're here!



Special Events

Icebreaker Welcome Social

Wednesday October 5; 6-8pm, Radisson Hotel
Cost: Free to conference registrants, $15 non-registered guests

Join us on the Superior Street level Viking Room for drinks and appetizers at our welcome social. Exhibitors and volunteers will be on hand to show off Duluth and all we have to offer as you network and reconnect with colleagues and friends.

Friday Evening Dinner Train

Friday, October 7, 6:30 to 9:00 pm.
Departs from the Duluth Depot (across Superior Street and one block down the hill from the Radisson Hotel; take the 'skywalk' beneath Superior Street to the Depot).

Pre-registratants only… tickets not available after September 28
Climb aboard the North Shore Scenic Railroad for a spectacular excursion up the North Shore of Lake Superior. We'll have a full-service cash bar aboard the train, and we'll stop about half way into our journey to on-load a delicious Italian Buffet that we'll enjoy en route!

Silent Auction

Thursday, October 6 through Saturday October 8

Bidding opens Thursday morning at 8 am and remains open in the Duluth Room (Superior Street level of the Radisson Hotel) during conference hours until 8:30 pm Saturday evening.

Conference volunteers will ship your purchases to you for an additional fee. Don't let airline fees keep you from bidding on those items you can't resist!

Awards/Appreciation Banquet

Saturday, October 8; Radisson
Social: 6:00pm (cash bar)
Dinner: 7:00pm (buffet)
Pre-registrants only

We'll wrap up our meeting with a delicious three entrée buffet dinner on Saturday evening. RRF leadership will announce the 2011 achievement awards after dinner. RRF member Bob Rosenfield will perform his original music compositions with voice and acoustic guitar.

Field Trips

Hawk Ridge Bird Observatory

www.hawkridge.org
Daily; 9-4pm

Hawk migration at Hawk Ridge is at its best during early October! Good numbers of early season migrants are still visible; the mid-season migration is at its peak, and the late-season travelers will start making early appearances. It is as likely that you'll see a Northern Goshawk as a Peregrine Falcon during this week… and red-taileds, sharp-shinneds, kestrels, merlins and eagles are seen in quantity as well.

Bayside Taxi shuttles (218-724-2424) will be available for $2 per person (per one-way trip) to and from Hawk Ridge. You'll have approximately one hour to watch hawks during this mid-day break before the afternoon session begins.

Free interpretive programs are available at Hawk Ridge on the weekends. If you want to watch hawks on your own, free shuttles are available from the Radisson Hotel daily from 9am-3pm. You must arrange your ride with the front desk staff in advance.

St. Louis River Estuary

Thursday, Friday 6-8am
Trips will return to the Radisson before the morning session begins

Duluth's own St. Louis River is a magnet for migrating and resident birds. This tour will make stops at some of the hot spots along the estuary, dependent upon the conditions, which may include Indian Point, Perch Lake, Mud Lake, and Chambers Grove. This outing is mostly hiking observing/listening with short travel time between locations.

Park Point

Thursday, Friday, Saturday; 6-8am
Trips will return to the Radisson BEFORE the morning session begins

This sandy spit of land extends 5 miles into Lake Superior and provides incredible fall birding, as a wide variety of migrants makes use of this important resting site. Expect to find everything from songbirds and shorebirds; raptors and waterfowl; grassland, beach, woodland, riparian, arctic and boreal migrants all show up on Park Point in the fall. This field trip will consist of birding outside the vehicle with short rides between hotspots on the point.

Wisconsin Point

Wednesday, October 5; 6-10am

Wisconsin Point's location at the intersection of marshland, Lake Superior and woodland makes it one of the best migrant bird areas in the state. This strip of land separates Lake Superior from the St. Louis River estuary. It is one of the best locations in the state to observe rare shorebirds, waterbirds, gulls and other migrants.

Sax-Zim Bog

www.SaxZim.org
Tuesday, October 4; 6am-4pm
Sunday, October 9; 6am-4pm

This is one of the top winter and summer birding locations in all of Minnesota and is located about an hour north of Duluth. The Sax-Zim Bog is a combination of Black Spruce/Tamarack bogs, aspen-birch-fir forest, hayfields and farms. On this trip we'll be driving the country roads looking for birds that include resident Ruffed Grouse, Black-billed Magpies, Gray Jays, Boreal Chickadee, Black-backed Woodpeckers, and early returning White-winged Crossbills, as well as other common northern Minnesota species. Though rarely seen in fall, we MAY even luck into a Great Gray Owl, Northern Hawk Owl, Northern Goshawk, or Sharp-tailed Grouse. A great introduction to exploring the Sax-Zim Bog. This is a combination of short walks down dirt roads and birding from the vehicle with stops to observe and listen.

Crex Meadows Wildlife Area

Sunday, October 9; 5:30am-8pm

Crex Meadows is approximately 2 hours south of Duluth near Grantsburg, WI. This spectacular 30,000 acre wildlife area, near the St. Croix National Scenic Riverway, is a part of the Northern Wisconsin Pine Barrens and is now the state's largest remaining portion of this globally endangered ecosystem. The rare sedge marsh and brush prairie habitats make the area a utopia for wildlife which, in turn, makes Crex a paradise for bird watchers, naturalists, botanists, hunters, and all the other hearty explorers who are interested in the great bounty that nature offers. When we visit we will be able to see Sandhill Cranes, a wide variety of waterfowl (including Trumpeter Swans), open land raptors, and many other species. A great opportunity to discover a unique ecosystem. This outing will be a combination of birding from the vehicle, making stops to observe/listen, and short hikes. We will also spend a short time at the visitor center.

Raptor Research Techniques Short Courses

For Students and Early Career Raptor Researchers

The Raptor Research Foundation (RRF) Early Career Raptor Researchers (ECRR) Committee is hosting a day of raptor research skills short courses for ECRRs at the annual meeting in Duluth, MN. Classes are primarily available to students and early career professionals that are current members of RRF.

The goal of the short courses is to provide student and early career RRF members unique, hands-on training in raptor research techniques that is not typically available through traditional college-level courses or text books. Often, the success of a research project can depend largely on the application of nuanced skills, such as knowing when a telemetry harness fits properly and when it does not. Such field research skills are best learned through intimate, one-on-one training provided by an experienced expert. We hope to provide this kind opportunity to RRF's developing researchers so they may apply these skills in their own research and ultimately improve the quality of research conducted on raptors.

In addition to providing technical training, we also hope the short courses will provide an opportunity for spontaneous synergies and networking by participants and teachers alike by sharing their collective experiences. Because students and early career professionals may not have ready access to colleagues and experts in their chosen fields, the short courses will provide unique opportunities to students and early career professionals to network with others at similar stages in professional development and with those more experienced in raptor research techniques.

ECRR Morning Courses

Safely Accessing Raptor Nests

Course Description: This class will cover the following topics: safety, gear and use, knots, ascending, rappelling, getting into nests, structures, and bird handling while aloft. Class will be taught at the Univ. Minnesota Duluth climbing wall with a strong emphasis on experiential learning while hanging from ropes. Climbing harnesses and all gear will be provided.

Instructors: Joel Pagel, US Fish and Wildlife Service and Teryl Grubb, US Forest Service

Time: Two Sessions: 08:30 – 12:00 and 13:00-16:30 (identical sessions, attend only one.)
Class size: 8 students per session.

Techniques for Handling, Auxiliary Marking, Measuring, and Blood Sampling Raptors after Capture: A Bird in the Hand is Worth Two in the Bush.

Course Description: This course will give students hands-on experience in applying the following types of auxiliary markers to raptors: conventional US Fish and Wildlife Service leg bands, colored leg bands, leg flags, patagial markers, dyes, and feathers (through feather imping). Students will also have the opportunity to learn and practice proper handling, measuring and blood sampling techniques. This class will be taught at the Radisson Hotel.

Instructors: Eugene Jacobs, Linwood Springs Research Station; Dan Varland, Costal Raptors; Wayne Nelson, Camrose, Alberta; and Scott Ford, Avian Specialty Veterinary Services.

Time: One session: 08:00-12:00
Class size: 10 students

Raptor Study Skin Preparation

Course Description: This class will provide students the basic information on how to create museum-quality study skins from raptor carcasses. Students will have the opportunity to create a study skin from a raptor carcass and receive step-by-step instructions on how to do so. This class will be taught at the Radisson Hotel.

Instructor: Jason Smyth, Florida Institute of Technology
Time: One session: 08:00-12:00
Class Size: 10 students.

ECRR Afternoon Courses

Safely Accessing Raptor Nests

[See course description above]

Time: Two Sessions: 08:30 – 12:00 and 13:00-16:30 (identical sessions, attend only one.)
Class size: 8 students per session.

Raptor Tissue Sampling and Necropsy.

Course Description: This class will focus on techniques for getting research quality data through tissue samples and field necropsies on dead raptors. Students will learn how and where to collect tissue samples and conduct field necropsies on raptor carcasses of various sizes… students should be ready to get their hands dirty! This class will be taught at the Radisson Hotel.

Instructor: Irene Bueno, University of Minnesota Raptor Center

Time: One session: 13:00-16:30
Class size: 16 students

Raptor Trapping and Handling Techniques for Scientific Research

Course Description: This class will demonstrate safe trapping and handling methods, including the use of the traditional lure pole and bow net, as well as the use of the Bal-chatri, Dho-Ghaza, and the pigeon harness. Permitting, health and welfare of birds, trap construction, noose tying, and trap use will be covered, including hands-on instruction. This class will be taught at the Radisson Hotel.

Instructor: Bill Heinrich, The Peregrine Fund

Time: One session: 13:00-16:00
Number of Students: 8

ECRR Full Day Courses

Harnessing Raptors with Transmitters

Course Description: This class will cover the process of attaching a transmitter (either VHF or satellite) to raptors, from initial thoughts of the bird's welfare to specifics of making harnesses and attaching them to birds. The majority of the class will be hands-on, involving creation of a backpack-style harness and using that harness to attach a transmitter to carcasses of different sized raptors. As time allows, we may discuss other attachment techniques (e.g., tailmount, patagial) as well as thoughts on data management. Class will be taught at the Radisson Hotel.

Instructors: Steve Lewis and Brian Millsap, US Fish and Wildlife Service

Time: One Session: 8:30 – 16:30 with a one-hour lunch break.
Class size: 16

Schedule
Thursday, October 6

Welcome, Plenary — Great Hall 1 & 2

8:00 – 8:20 am Welcome by Duluth Mayor Don Ness and Dr. Gerald Niemi
8:20 – 9:20 am Plenary Speaker—**Dr. Scott Lanyon**, Insights from the Avian Tree of Life
9:20 – 9:40 am Coffee Break

SYMPOSIA

Short-eared Owls: The Need for a Conservation Plan — Great Hall 1

Moderator: Geoff Holroyd

9:40 am **Travis L. Booms** and James A. Johnson
Lessons from the Alaska Short-eared Owl Migration Study

10:00 am **Jeffrey L. Lincer**
A Contribution from the World Literature of the Short-eared Owl *(Asio flammeus)*

10:20 am Kristen L. Keyes, **Marcel A. Gahbauer**, Kurt Hennige, and David M. Bird
Short-eared Owl (*Asio flammeus*) Occupancy, Detectability and Habitat Use Across Seasons on Amherst Island and Wolfe Island in Eastern Ontario, Canada

10:40 am **Geoff L. Holroyd** and Helen E. Trefry
The Need for a North American Conservation Action Plan for the Short-eared Owl

11:00 am **Kristen L. Keyes**, Marcel A. Gahbauer and David M. Bird
Short-eared Owl (*Asio flammeus*) Nest Site Characteristics, Success and Associated Threats on Amherst Island and Wolfe Island in Eastern Ontario, Canada

11:20 am **Scott R. Swengel**
Short-eared Owl Occurrence on Grassland Bird Surveys in Seven Midwestern States During 1988-2010

11:40 am **David A. Wiggins**
Conservation Status of Short-eared Owls (*Asio flammeus*) in the United States and Canada

12:00 – 1:40 pm Lunch (Shuttles to Hawk Ridge)

* = denotes Student Award Candidate
BOLD = presenter

SYMPOSIA

Breeding Ecology, Distribution, and Movements of Aegolius Owls — Great Hall 1

Moderator: Scott Weidensaul

1:40 pm **Tim Hipkiss**, Jonas Gustafsson, Ulf Elkund, Katie Andrle, and Birger Hornfeldt
The Fluctuations and Decline of Tengmalm's Owls in Northern Sweden

2:00 pm **Kathrin J. Munro**, Ian G. Warkentin and Christine M. Doucet
Evaluation of Habitat Characteristics and a Habitat Suitability Index Model for Boreal Owls (*Aegolius funereus*) in Western Newfoundland, Canada

2:20 pm **Jonathan Gagnon**, Marion Seguy, Louis Imbeau, and Marc J. Mazerolle
Landscape Composition and Year Effects on Northern Saw-whet Owl Diet in Boreal Québec

2:40 pm **Chuck Priestley** and Geoffrey Holroyd
Inferred Autumn Movements of Northern Saw-whet Owls (*Aegolius acadicus*) based on Stable Hydrogen Isotope Analyses of Feathers Collected at Beaverhill Lake, Alberta

3:00 pm **C. Scott Weidensaul**, Anna Fasoli, Andrew Weber, Kim Romano, and Annah Panci
Nocturnal Activity Range and Behavior in Migrant and Wintering Northern Saw-whet Owls (*Aegolius acadicus*) in the Central Appalachians

3:20 – 3:40 pm Coffee Break

3:40 pm Aura Stauffer and **C. Scott Weidensaul**
Autumn Roost Site Selection in Migrant Northern Saw-whet Owls (*Aegolius acadicus*) in the Central Appalachians

4:00 pm **Chris Neri** and Nova Mackentley
Summer Movements of Juvenile Northern Saw-whet Owls (*Aegolius acadicus*) at Whitefish Point, Michigan

4:20 pm Charlie E. Miller and **David A. Wiggins**
Breeding Ecology of Northern Saw-whet Owls (*Aegolius acadicus*) at an Isolated Great Plains Site

4:40 pm **Mohammad M. Chowdhury**
Owls in Bangladesh – Past, Present and Future

5:00 pm **Geoff Holroyd** and Helen E. Trefry
Winter Destinations and Breeding Dispersal of Canadian Burrowing Owls

6:00 - 8:00 pm **Poster Session in VIKING ROOM**

GENERAL SESSION I — Great Hall 2

Moderator: Joseph B. Platt

9:40 am Scott J. Chiavacci, Kyle E. Pias and **James F. Dwyer**
From Duluth to Duluth: How Has the Focus of Raptor Research Changed Since 1995?

10:00 am **Laura R. Nagy**, Chris Farmer and Karl Kosciuch
Eagle Fatalities in the United States: Data, Data Gaps and Implications

10:20 am **Sarah K. Thomsen** and Laurie Harvey
Population Dynamics and Diet of an Island Population of Barn Owls (*Tyto alba*)

10:40 am **Adam E. Duerr**, David Allaben, Tim Linder, Daniel Thomas, Scott Barras, Jeff Cooper, Ray Fernald, Sergio Harding, and Jeanette Parker
Dispersal of Black Vultures in Response to Culling

11:00 am Martin Gilbert, **Ruth E. Tingay**, Nadia Sureda, Loslomaa Jambal, Batmunkh Davaasuren, and Gombobaatar Sundev
Distribution and Status of the Pallas's Fish Eagle in Mongolia: A Cause for Conservation Concern?

11:20 am **Robert N. Rosenfield**, Travis L. Boom, Kurt L. Burnham, Brian J. McCaffery
The Potential for Long-term Monitoring of Gyrfalcon and Peregrine Falcon Breeding Populations using Undergraduate Students: an Apparent Inexhaustible Source of Funding

11:40 am **William S. Clark**
Harlan's Hawks Are and Have Been Breeding within the Red-tailed Hawk Range in Western Canada

12:00 – 1:40 pm Lunch (Shuttles to Hawk Ridge)

ANDERSEN AWARDS SESSION

Andersen Student Presentation Award Session — Great Hall 2

Moderator: Clint W. Boal

1:40 pm **Clint W. Boal**
Overview of Awards Given by the Raptor Research Foundation and Introduction to the Andersen Award Special Session

2:00 pm *__Jenna A. Cava__, Andrew C. Stewart and Robert N. Rosenfield
Diet of Urban Breeding Cooper's Hawks (*Accipiter cooperii*) in Victoria, British Columbia

2:20 pm ***Scott A. Graham** and Mark R. Fuller
Barred Owl Diet in the Central Coast Range of Western Oregon

2:40 pm ***Kristen L. Keyes**, Marcel A. Gahbauer, Keith A. Hobson, Steven L. Van Wilgenburg, and David M. Bird
Short-eared Owl (*Asio flammeus*) Spatial Origins Across North America: A Stable Isotope Approach

3:00 pm ***Tricia A. Miller**, Michael J. Lanzone, Todd E. Katzner, David Brandes, Charles Maisonneuve, Junior Tremblay, Jeff Cooper, Kieran O'Malley, and Robert P. Books
Striking a Balance: Modeling Migration of Golden Eagles (*Aquila chrysaetos*) Through Wind Energy Developments of the Central Appalachian Mountains, U.S.A.

3:20 – 3:40 pm Coffee Break

3:40 pm ***Kyle E. Pias** and Wiley M. Kitchens
Foraging Ecology of Breeding Snail Kites (*Rostrhamus sociabilis plumbeus*) on the Kissimmee Chain of Lakes, Florida

4:00 pm ***Ben R. Skipper** and Clint W. Boal
Is Aggressive Nest Defense by Urban Mississippi Kites (*Ictinia mississippiensis*) Triggered by Landscape Features?

4:20 pm ***Douglas J. Tempel** and Ralph J. Gutierrez
Site Occupancy Dynamics of a California Spotted Owl Population (*Strix occidentalis occidentalis*) in the Central Sierra Nevada

4:40 pm ***Jean-Francois Therrien**, Gilles Gauthier and Joel Bety
Avian Predators Play a Key Role in Population Regulation and Energy Flux of the Arctic Tundra Food Web

5:00 pm Andersen Judge's Meeting

6:00 - 8:00 pm **Poster Session in VIKING ROOM**

Evening Speakers — Great Hall 1 & 2

Moderator: Dan Varland

8:00 - 8:30 pm **William Clark**, Unusual Raptor Plumages: Albinism, Melanism, Hybrids, Dilute Plumage, and Others

8:30 - 9:00 pm **Denver Holt**, Snowy Owls: An Overview of Twenty Years of Breeding Season Research in Barrow, Alaska

Friday, October 7

SYMPOSIA

Ecology and Conservation of Eastern North American Golden Eagles — Great Hall 1

Moderator: Charles Maisonneuve

8:00 am **Todd Katzner**, Brian W. Smith, Tricia A. Miller, Robert P. Brooks, David Brandes, Jeff Cooper, Michael Lanzone, Dan Brauning, Christopher Farmer, Sergio Harding, David E. Kramar, Craig Koppie, Charles Maisonneuve, Mark Martell, Elizabeth K. Mojica, Bryan D. Watts, Charlie Todd, Junior A. Tremblay, Maria Wheeler, Brady Porter, David F. Brinker, Tony E. Chubbs, Rolf Gubler, Kieran O'Malley, Scott Mehus, and Keith L. Bildstein
Status, Biology and Conservation Priorities for North America's Eastern Golden Eagle (*Aquila chysaetos*) Population

8:20 am Francois Morneau, Benoit Gagnon, Sandie Poliquin, Pierre Lamothe, Natalie D'Astous, and **Junior A. Tremblay**
Breeding Status and Population Trends of Golden Eagles in Northeastern Québec Over a 14-yr Period

8:40 am **Charles Maisonneuve**, Junior A. Tremblay, Trish Miller, Todd Katzner, Mike Lanzone, and Dave Brandes
Variation in Home Range Sizes of Golden Eagles (*Aquila chrysaetos canadensis*) Breeding in Québec

9:00 am **Tricia A. Miller**, Michael J. Lanzone, David Brandes, Charles Maisonneuve, Jeff Cooper, Kieran O'Malley, Robert P. Brooks, and Todd E. Katzner
Characteristics of Spring Migration of Golden Eagles (*Aquila chrysaetos*) through Eastern North America as Determined by GPS-GSM and Conventional Satellite Telemetry

9:20 am **David Brandes**, Charles Maisonneuve, Junior Tremblay, Tricia Miller, Todd Katzner, and Michael Lanzone
Influence of High-Latitude Warming on Fall Migration Timing of Eastern Golden Eagles (*Aquila chrysaetos*)

9:40 am **Jeff Cooper**, Trish Miller, Todd Katzner, Michael Lanzone, David Kramar, Kieran O'Malley, Charles Maisonneuve, and Junior Tremblay
Winter Ranging Behavior of Golden Eagles (*Aquila chrysaetos*) in the Central Appalachian Mountains

10:00 – 10:20 am Coffee Break

10:20 am **Mark Martell**, Elizabeth K. Mojica and Scott Mehus
Tracking Golden Eagle Migration on the Geographic Outskirts of the Eastern North American Population

10:40 am **Maria Wheeler**, Brady Porter and Todd Katzner
Assessing the Genetic Diversity and Distinctness of Eastern North American Golden Eagles

11:00 am **Craig A. Koppie** and Brian A. Millsap
U.S. Fish & Wildlife Service Perspectives on the Golden Eagle (*Aquila chrysaetos*) in the Eastern United States

11:20 am **Renee Rivard**, Dave Bittner, Chris Meador, Jeffrey L. Lincer, and Jim Hannan
Conducting Aerial Surveys for Golden Eagles (*Aquila chrysaetos*): Techniques for Optimal Data Collection and Interpretation

11:40 am **Kyle H. Elliott** and John E. Elliott
Bald Eagles and Chum Salmon: Reduced Winter Survival and Breeding Success Leads to Density-Dependence

12:00 – 1:40 pm Lunch (Shuttles to Hawk Ridge)

GENERAL SESSION II

Bald and Golden Eagles — Great Hall 1

Moderator: Renee Rivard

1:40 pm **Chris B. Meador**, John Oakley, Dave Bittner, James Newland, Jim Hannan, Jeffrey L. Lincer, Renee Rivard, Jeff Laws, and Jeff Wells
Prey Selection of Nesting Golden Eagles (*Aquila chrysaetos*): The Rich Diversity Documented During Nest Content Data Collection in and Around San Diego County

2:00 pm **Stephen B. Lewis** and Michelle Kissling
Bald Eagle (*Haliaeetus leucocephalus*) Space Use in a Recently-Deglaciated Coastal Fjord, Icy Bay, Alaska

2:20 pm **Cathleen D. Monson**, Kelly J. McKay, Robert R. Bryant, Brian P. Ritter, Jason L. Monson, Brian L. Blevins, Jennifer A. Rothe, Marc J. Bolinger, and Ryan T. Schmitz
Summary and Results of the Milan Bottoms Bald Eagle Night Roost Survey Project

2:40 pm **Adam E. Duerr**, Tricia A. Miller, Michael Lanzone, Jeff Cooper, Phil Turk, Todd Katzner
High Frequency GPS-GSM Telemetry to Measure Migration Speed: Do Golden Eagles Migrate Faster When Using Orographic or Thermal Lift?

3:00 pm **Renee Rivard**, Dave Bittner, Chris Meador, Jeffrey L. Lincer, James Newland, Jim Hannan, and Jeff Wells
Evaluating Population Proportions: Golden Eagle (*Aquila chrysaetos*) versus Red-tailed Hawk (*Buteo jamaicensis*) and Great Horned Owl (*Bubo virginianus*) Active Core Nesting Areas in Desert Environments

3:20 – 3:40 pm Coffee Break

GENERAL SESSION III — Great Hall 1

3:40 pm **Chris B. Meador**, Dave Bittner, James Newland, Jim Hannan, Jeffrey L. Lincer, Renee Rivard, Jeff Laws, and Jeff Wells
Golden Eagle (*Aquila chrysaetos*) Nesting Ecology: A Detailed Look in San Diego County Using a Data Set from Over 100 Years of Nesting History

4:00 pm **Michael N. Kochert** and Karen Steenhof
Long-term Reproduction of Golden Eagles in Relation to Habitat Alteration in Southwestern Idaho

4:20 pm **Frank B. Isaacs** and Robert G. Anthony
Bald Eagles (*Haliaeetus leucocephalus*) Nesting in Oregon and Along the Lower Columbia River, 1978-2007

4:40 pm **Steve K. Windels**
Bald Eagles as Agents of Cormorant Control in Northern Minnesota

5:00 pm **Peter P. Datema**, William W. Bowerman, William C. Bridges, Teryl G. Grubb, and Lisa L. Williams
A Reevaluation of Great Lakes Fish Passage and Effects on Bald Eagles Nesting along the Au Sable, Manistee and Muskegon Rivers

SYMPOSIA

Pesticides and Metals in Raptors — Great Hall 2

Moderator: Jeffrey Lincer

8:00 am **Steven Bradbury**
Raptors and the Regulation of Pesticides

8:20 am **William W. Bowerman**, David A. Best, Latice Fuentes, William C. Bridges, James G. Sikarskie, Teryl G. Grubb, and Leland A. Grim
Monitoring Concentrations of Organochlorine Pesticides in Plasma of Nestling Bald Eagles (*Haliaeetus leucocephalus*) in the Great Lakes Region

8:40 am **L. Joseph Burnett**, Kelly J. Sorenson, Joseph Brandt, David B. Crane, Kathleen Regaldo, and Robert W. Risebrough
Eggshell Thinning of California Condors Reintroduced to Central California

9:00 am **Robert W. Risebrough** and L. Joseph Burnett
Exposure of Raptors to Environmental Organic Contaminants: Unanswered Questions

9:20 am **Sofi R. Hindmarch**
Investigating the Potential Risk of Secondary Rodenticide Poisoning to Urban Owls Inhabiting and Foraging in Urban Landscapes of Lower Mainland, British Columbia

9:40 am **Ruth E. Tingay**
The Effect of Carbofuran Poisoning and Other Illegal Persecution Methods on Raptor Populations in Scotland

10:00 – 10:20 am Coffee Break

10:20 am **John E. Elliott** and Laurie K. Wilson
Insecticide Poisoning of Raptors in Agricultural Areas of Southwestern British Columbia

10:40 am **John W. Nichols**, Richard S. Bennett, Ronald Rossman, John B. French, and Keith G. Sappington
A Physiologically-based Model for Methylmercury Uptake and Accumulation in Female American Kestrels

11:00 am **Michael Fry**
Mitigating the Injurious Effects of Rodenticides to Raptors

11:20 am **Michael Fry**
Pesticide Exposure Case Files of Raptors in the Avian Incident Monitoring System (AIMS) Database of American Bird Conservancy

11:40 am **Jeffrey L. Lincer**
Round Table Discussion Synthesizing the Chemical Threats to Raptors

12:00 – 1:40 pm Lunch (Shuttles to Hawk Ridge)

SYMPOSIA

Raptors and Wind Energy — Great Hall 2

Moderator: Anna Peterson

1:40 pm **Dave Bittner**, Chris Meador, Jim Hannan, Jeffrey L. Lincer, Jeff Laws, James Newland, Renee Rivard, and Jeff Wells
Natal Dispersal of Golden Eagles (Aquilla chrysaetos) from Southern California 1988 – 2011

2:00 pm **David Brandes**, Luis Barrios and Alejandro Rodriguez
Modeling the Interaction of Terrain and Wind to Quantify High-Risk Conditions for Eurasian Griffon Vultures (*Gyps fulvus*) at Wind Farms

2:20 pm **Allen E. Graber**, Thomas J. Koronkiewicz, Eric W. Koster, and Chad L. Cross
Pre-Construction Methodologies Used for Assessing Golden Eagle Use at Proposed Wind Energy Development Sites in the Western United States

2:40 pm **Heidi Seeland**, Gerald Niemi, Ronald Regal, and Anna Peterson
Methods for Determination of Raptor Migratory Pathways over a Large Landscape

3:00 pm **Anna Peterson** and Gerald Niemi
The Conservation of Airspace and Habitat in a Major Migration Corridor

3:20 – 3:40 pm Coffee Break

3:40 pm **Torgeir Nygård**
Movement Patterns and Collision Risks of Juvenile White-tailed Eagle (*Haliaeetus albicilla*) Studied by GPS Satellite Telemetry at Smøla Wind Power Plant, Norway

4:00 pm **Joel E. Pagel**, Brian A. Millsap, Eric Kershner, Scott Covington, and Robert Murphy
Known Eagle Mortality at Wind Turbine Technology Facilities in the Western U.S.

4:20 pm **Laura R. Nagy**, Richard Young and Kevin Harper
Use of Behavioral Data of Wintering Bald Eagles to Alter Wind Turbine Locations at the Rockland Wind Farm, Idaho

4:40 pm **Joseph B. Platt**
Lessons Learned from Raptor Interaction with Wind and Transmission Projects

5:00 pm **Carol L. McIntyre**, Jeff P. Smith, Michael W. Collopy, David C. Douglas, and Jon Paynter
Potential Conflicts Between Energy Development Projects and Migratory Golden Eagles (*Aquila chrysaetos*): A Northern Perspective

Saturday, October 8

GENERAL SESSION IV — Great Hall 1

Moderator: Mark Martell

8:00 am **Sara J. Miller**, Cheryl R. Dykstra, Melinda M. Simon, Jeff L. Hays, and James C. Bendarz
Use of Video Monitoring to Study Nesting Ecology of Red-shouldered Hawks (*Buteo lineatus*) in Suburban Cincinnati, Ohio

8:20 am **Michael Lanzone**, Casey Halverson, Tricia A. Miller, Phillip J. Turk, David Brandes, and Todd E. Katzner
High Frequency GSM Telemetry Provides New Insights into Raptor Behavior and Ecology

8:40 am **Eric G. Nolte**, Julie A. Heath and Gregory S. Kaltenecker
What Effect Does Detectability Have on Statistical Power in Analysis of Raptor Migration Counts?

9:00 am **Katherine E. Koch**
Advancing Conservation of Raptors through the Midwest Coordinated Bird Monitoring Partnership

9:20 am **Oliver Krone** and Miriam Nadjafzadeh
Food Composition and Seasonal Preferences of White-tailed Sea Eagles (*Haliaeetus albicilla*) in Northern Germany

9:40 am Troy J. Bader and **James C. Bednarz**
Parental Care and Diet of Mississippi Kites (*Ictinia mississippiensis*) in Eastern Arkansas

10:00 – 10:20 Coffee Break

GENERAL SESSION VI — Great Hall 1

Moderator: Mark Martell

10:20 am **John D. Baldwin**, Jason W. Bosley, Lori Oberhofer, Oron L. Bass, and Brian K. Mealey
Long-term Changes in Bald Eagle Reproduction in Florida Bay, Southern Coastal Everglades, 1958-2010

10:40 am **Jason W. Bosley**, John D. Baldwin and Erik G. Noonburg
A Territorial Occupancy Model for Bald Eagles (Haliaeetus leucocephalus) in Florida Bay, Everglades National Park

11:00 am **Matthew R. Hanson**, John D. Baldwin and O.L. Bass
Food Habits of Breeding Bald Eagles (*Haliaeetus Leucocephalus*) in Florida Bay, Everglades National Park

11:20 am **David M. Bird** and Dominique Chabot
Unmanned Vehicle Systems: A Future Tool for Raptor Research and Management?

11:45 – 12:45 pm **RRF Business Meeting** in GREAT HALL 1

GENERAL SESSION V
Great Hall 2

Moderator: Chuck Priestley

8:00 am **Rebecca Perkins**, Clint Boal and Dale Rollins
The Use and Results of a Trained Northern Goshawk (*Accipiter gentilis*) to Study Predator-Prey Interactions

8:20 am **David E. Andersen**, Jason E. Bruggeman, James E. Woodford, and Clint W. Boal
Northern Goshawk Population Size in the Western Great Lakes Region

8:40 am **James R. Klucsarits** and Joshua J. Rusbuldt
Nest Box Selection in Eastern Pennsylvanian American Kestrels (*Falco sparverius*): What Constitutes an Ideal Next Box Habitat?

9:00 am **Joseph G. Barnes** and Jef R. Jaeger
Assessing Peregrine Falcon (*Falco peregrinus*) Predator-Prey Dynamics in Lake Mead National Recreation Area

9:20 am **Dave Bittner**, Chris Meador, Renee Rivard, Jeffrey L. Lincer, Brittany Schlofeldt, and Jeff Wells
Peregrine Falcon (*Falco peregrinus*) Nesting Increases in Southern California, Baja and Nevada Desert Environments 2009-2011

9:40 am **Jean Lapointe**, Louis Imbeau, Marc J. Mazerolle, Junior A. Tremblay, and Charles Maisonneuve
The Impact of Corn and Soybean Fields on Habitat Use of Female Peregrine Falcons (*Falco peregrinus anatum*) During the Breeding Season

10:00 – 10:20 am Coffee Break

GENERAL SESSION VII — Great Hall 2

Moderator: Chuck Priestley

10:20 am **Sean McCann**, Tanya Jones, Onour Moeri, Gerhard Gries, and Sean O'Donnell
Is the Red-throated Caracara Chemically Defended from its Stinging Prey?

10:40 am **Eric D. Forsman**, Robert G. Anthony, Katie M. Dugger, and Elizabeth M. Glenn
Population Demography of the Northern Spotted Owl (*Strix occidentalis caurina*)

11:00 am **Jane Noll West**
Owl Occurrence in Several of El Salvador's Protected Areas

11:20 am **Christian Hagenlocher**
Breeding Ecology of Cliff-nesting Peregrine Falcons in Southern Illinois

11:45 – 12:45 pm **RRF Business Meeting** in GREAT HALL 1

**NOTE: Icons next to Paper Abstracts denote inclusion in Special Symposia:


RAPTORS AND WIND ENERGY


ECOLOGY AND CONSERVATION OF EASTERN NORTH AMERICAN GOLDEN EAGLES


BREEDING ECOLOGY, DISTRIBUTION, AND MOVEMENTS OF *AEGOLIUS* OWLS


SHORT-EARED OWLS: THE NEED FOR A CONTINENTAL CONSERVATION PLAN


PESTICIDES & METALS IN RAPTORS


ANDERSEN AWARD

Paper Abstracts

Northern Goshawk Population Size in the Western Great Lakes Region

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Northern Goshawks (*Accipiter gentilis*) are a species of special conservation concern at both the federal and state levels in much of the western Great Lakes region. However, in part because they generally occur at relatively low breeding densities over broad areas and inhabit forested landscapes where they are difficult to detect and survey, there are no reliable goshawk population estimates at a regional scale. Therefore, we derived estimates of goshawk breeding population size for the western Great Lakes region by combining results of a regional goshawk occupancy survey conducted in 2008, estimates of goshawk breeding home-range size based on telemetry data from northern Minnesota, detection functions derived from call-broadcast surveys near goshawk nests, and distribution of potential breeding habitat. Furthermore, because it is not known how goshawk intra-specific defense behavior varies within territories, we developed three conceptual models based on goshawk biology: (1) goshawks defend their entire breeding territories uniformly and territories do not overlap, (2) goshawks defend the core of breeding territories (simulated using 50 - 95% fixed-kernel home ranges) uniformly, but outside this core breeding territories overlap, and (3) intensity of defense of breeding territories by goshawks is a function of distance from the territory center. In Scenario 1, our estimates of the number of occupied goshawk territories in the western Great Lakes region ranged from 1,325 (based on 95% fixed-kernel home range size estimates) to 5,290 (50%). Estimated number of territories ranged from 203 (95%) to 3,228 (50%) for Scenario 2 and from 209 (95%) to 3,277 (50%) for Scenario 3. Our results provide a range of plausible population sizes for breeding goshawks in the western Great Lakes region and suggest that this population is larger than previously thought. However, additional information about how goshawk defense behavior varies within territories is required to further refine these estimates.

Long-term Changes in Bald Eagle Reproduction in Florida Bay, Southern Coastal Everglades, 1958-2010

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The population of Bald Eagles (*Haliaeetus leucocephalus*) breeding in Florida Bay, located within Everglades National Park, has been the subject of one of the longest running monitoring programs for any large raptor species world-wide, with reproductive data collected for 49 breeding seasons since 1958. The overall reproductive trends in this breeding population indicate that the population has transitioned from historically stable and considered to be at carrying capacity, to one in current decline, with territory occupancy decreasing as much as 43% from historical highs. This is in sharp contrast to observed trends for the state of Florida where populations have increased at least 300% over the past 25 yrs. The rate of breeding attempts has remained high (0.83 + 0.11 SD), territories active/occupied) in Florida Bay over the period and overall productivity rates yielded a mean annualized brood size of 1.48 + 0.16 (young per successful territory) and a mean reproductive rate of 0.81 + 0.21 (young produced per occupied territory), which are comparable to other Bald Eagle populations. What is unique is that there are significant increases in ratios of active/occupied, successful/occupied, and young/occupied, despite decreased occupancy. Increases in these rates have al-

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lowed overall production of the population to remain stable to date, but is not believed to be sustainable with continued decreases in occupancy. These changes in Bald Eagle reproductive parameters correspond with significant ecological changes documented in Florida Bay and southern coastal Everglades and may serve as possible long-term indicators for the health and recovery of the southern coastal Everglades as restoration efforts progress.

Assessing Peregrine Falcon (*Falco peregrinus*) Predator-Prey Dynamics in Lake Mead National Recreation Area

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We assessed Peregrine Falcon (*Falco peregrinus*) diet in Lake Mead National Recreation Area using prey attempt observations and prey remains collection. We recorded prey attempts (n = 220) during territory visits and at foraging grounds from 2004–2010. Additionally, we collected prey remains (n = 217) at eyries and nearby perches from five territories during 2008–2010. Pooled results indicate peregrines targeted at least 70 distinct prey types (observed = 37, collected = 56). Prey observations, categorized by month, indicate peregrines proportionately selected aquatic birds at levels mirroring abundance, with aquatic bird abundance determined within the recreation area by a parallel study conducted from 2004–2009. The disparity in mean categorical prey mass (aquatic birds = 511 g, terrestrial and riparian birds = 98 g) would seem to pose energetic demands on hunting peregrines, especially as aquatic bird numbers typically decline by over 90% at the time resident peregrines are feeding young. Compellingly, mean prey mass observed at territories far from open water (≥ 640 m) was over three times less than that near water, and the breeding success rate at territories far from water (n = 27; 59%) was just 70% of that documented near water (n = 66; 85%). By gender, peregrines showed variable prey selection with solo attempts by females (n = 55) targeting prey over twice as heavy as those of males (n = 80; 370 g vs. 166 g), although males were more successful (31% vs. 24%). Interestingly, tandem hunts (n = 42) targeted smaller prey than either gender alone (mean = 134 g) and resulted in only a moderate success rate of 28%. Combining prey attempt observation with collection data allowed a more accurate assessment of prey dynamics, which helps explain recent population increases in an area not historically known to contain breeding peregrines.

Parental Care and Diet of Mississippi Kites (*Ictinia mississippiensis*) in Eastern Arkansas

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Few studies have quantified parental care patterns and diets of Mississippi Kites (*Ictinia mississippiensis*). Using video-recording systems, we quantified and analyzed parental care and food delivery of nesting Mississippi Kites in eastern Arkansas. During the incubation period, male kites appeared to spend more time (mean = 311.8 min/d, SE = 30.27) on the nest than did females (249.6 min/d, SE = 30.62), though the difference was not statistically significant. Females spent significantly more time on the nest during the brooding period than did males. Female kites also spent significantly more time shading nestlings than males. Females stayed on the nest overnight during the incubation (mean = 886 min/night) and brooding periods (mean = 815 min/night) longer than males (means = 806 and 739 min/night, respectively). Male kites delivered more food items (58%) than females (42%) and also delivered significantly more vertebrate food items than females. Insects were the most common type of food items (80%) delivered to nests. Vertebrates made up 5% of the food items, and the remaining 15% could not be identified. Our data indicated differential sex-division in parental contributions by male and female Mississippi Kites, and a similar contribution in terms of overall parental effort.

Unmanned Vehicle Systems: A Future Tool for Raptor Research?

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Small unmanned vehicle systems (UVS), formerly exclusive to militaries, are rapidly advancing in sophistication and availability to civilians. Ranging from hand-launched autonomous airplanes and miniature self-stabilized helicopters to terrestrial and underground machines, they are increasingly being employed in such areas as agriculture, emergency services, meteorology, oceanography and geophysics. A number of potential applications for small UVS can be also envisioned in the field of wildlife research and management, for example conducting population surveys, tracking radio-tagged animals, sensing and observing animals in sequestered or dangerous places, mapping and monitoring wild habitats, and deterring nuisance species. The objectives of this talk are to introduce Unmanned Vehicle Systems to raptor researchers and managers, to discuss both the positive aspects and their current limitations, and to offer some potential applications to studies of birds of prey.

Peregrine Falcon (*Falco peregrinus*) Nesting Increases in Southern California, Baja and Nevada Desert Environments 2009-2011

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Peregrine Falcons (*Falco peregrinus*) have been increasing as a breeding bird in cities and along the coasts of California since reintroductions in the 1970s and 1980s. Since 2009 we have observed Peregrines nesting in desert environments in southern California, southern Nevada and Baja, Mexico, and in some cases displacing established Prairie Falcon (*Falco mexicanus*) pairs. We documented from aerial surveys and photographs, the locations, interactions and increases in Peregrine Falcons throughout southern California, southern Nevada and Baja, Mexico. These documentations are from over 300 hrs of helicopter surveys conducted specifically for raptors in areas that no Peregrine Falcons had been recorded nesting since our ground and helicopter surveys began in 1988.

Natal Dispersal of Golden Eagles (*Aquilla chrysaetos*) from Southern California 1988 - 2011

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The Wildlife Research Institute, Inc. has been studying Golden Eagles (*Aquilla chrysaetos*) since 1988 and has banded and tagged 421 Golden Eagles to study their movements, migration, life history, territory usage, and causes of mortality. From 1991-1996, we placed 38 U.S. Fish & Wildlife Service (USFWS) bands on nestling Golden Eagles. Beginning in 1997 and continuing through 2011, we attached 408 patagial tags on Golden Eagles in California, New Mexico, Nevada and Montana along with USFWS leg bands. Of these 408 patagial-tagged Golden Eagles, 110 also received VHF transmitters and 45 received satellite platform transmitter terminals (PTT). This report is a current summary of the results of the returns, mortalities and travels of these birds across the landscape of western North America from 1991-2011. The project is ongoing and we continue to band 40-50 eagles each yr. Seventeen satellite transmitters are currently active and transmitting data while approximately 50 of the VHF transmitters are on living eagles and still transmitting. Golden Eagles with natal areas in southern California have been tracked south to La Paz, Baja California and Guadalajara, Mexico, east to Arizona and Colorado, and north to Nevada, Utah, and Wyoming and many points in between.

Overview of Awards Given by the Raptor Research Foundation, and Introduction to the Andersen Award Special Session

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Each year the Raptor Research Foundation makes available several awards for professionals and students. These awards range from non-monetary recognition for outstanding achievement in raptor research and conservation, such as the Fran and Frederick Hamerstrom Award and the Tom Cade Award; the Leslie Brown Memorial Grant, the Dean Amadon Grant, and the Steven R. Tulley Grant which support research, and the James R. Koplin travel grant and the William C. Andersen Awards for best student presentation and posters. These awards are all named in honor and memory of raptor researchers, many of whom are no longer with us. Some of these awards have been offered for two decades, yet many members of the organization do not know the people for which these awards are named. I will briefly introduce the membership to the history of these awards, the people for which they are named, and how they can play a role in making sure these awards continue to recognize worthy raptor researchers into the future. Finally, I will review changes in the Andersen Paper Award and introduce the judges and participants for the 2011 competition.

Lessons from the Alaska Short-eared Owl Migration Study

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The Short-eared Owl (*Asio flammeus*) has undergone a steep, long-term, and range-wide decline tantamount to a 70% reduction in population size in North America since 1966. The greatest conservation threat to the species is thought to occur on its wintering grounds, particularly for birds that breed in the northern extent of the species' range where habitat remains largely intact. Therefore, we harnessed 26 Short-eared Owls with solar-powered satellite transmitters in western and interior Alaska in 2009 and 2010 to identify wintering areas and migration routes, and to describe migration strategies of Alaska's Short-eared Owls. Owls established wintering areas from southern Canada south to central Mexico and from California east to Kansas. Straight-line migration distances ranged from 2,000 – 6,000 km. Of three birds that remained on the air during their second summer, none returned to Alaska. Short-eared Owls used two principal flyways: an inland route through the Prairie Provinces and Great Plains states and a coastal route through Southeast Alaska and British Columbia. Thirteen of 17 harnessed owls (76%) that migrated to southern Canada or beyond moved through or remained in Alberta or Montana, suggesting habitat conservation in these states may be particularly beneficial to Alaska's owls. With significant help from collaborators across the continent, we recovered seven of the 26 transmitters. Four appeared to have been depredated by raptors (57%); the cause of death for the other three owls was unclear. These data document the clear need for tri-national efforts to conserve this declining species, highlight the potential importance of Alberta and Montana for Alaska's Short-eared Owls, and provide important novel information on the species' movement ecology.

A Territorial Occupancy Model for Bald Eagles (*Haliaeetus leucocephalus*) in Florida Bay, Everglades National Park

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Bald Eagles (*Haliaeetus leucocephalus*) in Florida Bay, Everglades National Park have undergone a decline in territory occupancy patterns despite a historically stable population. Using field data collected annually since 1958, a Markovian simulation model was developed to explore territorial occupancy dynamics. For all yrs the level achieved by an individual territory is defined by one of the following four states: unoccupied, occupied (adults present, but not breeding), active (adults present and breeding), or successful (adults present and young successfully fledged). An-

nual transition matrices were built based on the probability of occupying any of the four states over subsequent yrs. We observe an inverse relationship between the damping ratio and time to equilibrium, suggesting that a population with a higher damping ratio is more resilient to changes in the environment. The stable state distribution (SSD) is contingent on individual transition probabilities yet independent of the initial territory occupancy. Territories with high turnover probabilities approach a SSD in less time than territories with lower turnover probabilities. The proposed model establishes relative importance to transition probabilities that increase the overall number of successful territories, provides useful insight into the effects of stochastic and anthropogenic events, and can be used to simulate scenarios to help direct ongoing management actions.

Monitoring Concentrations of Organochlorine Pesticides in Plasma of Nestling Bald Eagles (*Haliaeetus leucocephalus*) in the Great Lakes Region

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The detrimental effects of DDT and other organochlorine pesticides to populations of many raptors globally are well described in the literature. Some of the first species where widespread population declines were observed included eagles of the genus Haliaeetus, and Peregrine Falcons (*Falco peregrinus*). Bald Eagles (*Haliaeetus leucocephalus*) have been used as biosentinel species of the effects of organochlorine pesticides since the early 1960s. While unhatched eggs of Bald Eagles were utilized to measure exposure (i.e., concentrations) in the environment, and document effects (egg shell anomalies), their lack of availability both spatially and temporally, lead to the use of plasma from nestlings as an alternate media. Systematic annual nest surveys across the state of Michigan and Voyageurs National Park have occurred since 1961 and 1973, respectively. Nests with young are banded and blood and feather samples are collected from nestlings. These collections began in 1986 and were standardized in 1999 into the Michigan Wildlife Biosentinel Program. Overall results have shown that samples from nestlings from nests near the Great Lakes are consistently greater in concentrations than those from interior lakes. Recent findings however have observed both an increase in dieldrin in samples collected from Voyageurs National Park, and a change in the ratio of DDT to p,p'-DDE in some regions of the Great Lakes. Further explanation for these results are ongoing, but may include atmospheric transport of these compounds from other areas of the northern hemisphere.

Raptors and the Regulation of Pesticides

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Within the context of the EPA's mission, the Office of Pesticide Programs (OPP) protects human health and safeguards the environment from potential risks associated with pesticide use. The primary statute regulating pesticides in the United States is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) which requires the EPA to ensure pesticide use will not result in unreasonable adverse effects to the environment, including potential effects on raptors. The EPA conducts ecological risk assessments to determine what potential risks to the environment are posed by various pesticides, and whether changes to the use or proposed use of such pesticides are necessary to protect the environment from unreasonable adverse effects. Regarding raptors, the primary concern is the potential impact from secondary exposure to pesticides (i.e., the ingestion of prey or carrion that contains pesticides). Some recent specific EPA decisions that have the potential to reduce risks to raptors include cancellations of azinphos-methyl, carbofuran,

aldicarb, and endosulfan and banning the sale of second generation rodenticides to residential consumers. In addition to these chemical-specific activities, the EPA is currently working on a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service to promote the conservation of migratory birds in the context of pesticide regulation; is participating on the Federal inter-agency Council for the Conservation of Migratory Birds and the Migratory Bird Conservation Commission; and with the U.S. Departments of Agriculture, Interior and Commerce, has requested the National Research Council to convene a committee of independent experts to review scientific issues related to performing ecological risk assessment for endangered species.

Modeling the Interaction of Terrain and Wind to Quantify High-Risk Conditions for Eurasian Griffon Vultures (*Gyps fulvus*) at Wind Farms

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Raptors and other soaring birds fly most frequently near the rotor swept zones of wind turbines when using terrain updrafts rather than thermals for lift, so an improved quantitative understanding of the interaction of wind, topography, and flight behavior is needed to predict collision risk. Eurasian Griffon Vultures (*Gyps fulvus*; hereafter "Griffons") are one of several species of raptors known to be susceptible to collisions with wind turbines. Griffons are large birds with high wing loading (thus low climb rates) and are known to use updrafts and slope-soaring within wind farms for lift. We use a spatially explicit high resolution model of updrafts at two wind farms near the Strait of Gibraltar to quantitatively investigate several hypotheses regarding underlying mechanisms for Griffon mortality. We apply the model to predict which wind farm will have higher collision rates and the locations and wind conditions for which collisions are most likely. Preliminary modeling results appear to show agreement with spatial variation in mortality and flight behavior data recorded at the sites. We propose that spatially explicit modeling of orographic updrafts can be used to predict locations of relatively high and low collision risk for Griffons and other raptors, and thus can be used to site turbines more effectively.

Influence of High-Latitude Warming on Fall Migration Timing of Eastern Golden Eagles (*Aquila Chrysaetos*)

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Golden Eagle (*Aquila Chrysaetos*) fall migration in eastern North America has a distinct seasonal pattern. However, the overall timing of the migration may shift markedly between yrs. The fact that high latitudes are warming rapidly with significant changes in some ecosystems already documented adds a new dimension to the temporal dynamics of Golden Eagle migration. Furthermore, Golden Eagles are known to be fairly plastic in their migratory behavior, with some sub-populations highly migratory (Alaska and eastern Canada), and others non-migratory (southwestern U.S., southern Europe, Scotland). In this paper we use archived weather data from northern Québec and raptor migration counts along with recent GPS satellite telemetry to investigate variability in seasonal timing of eastern Golden Eagle fall migration. We focus on the past five seasons, because of highly variable weather conditions and the availability of telemetry data for this period. We show that: (1) anomalously high autumn temperatures in northern Québec such as occurred in 2006 and 2010 are correlated with later Golden Eagle migration timing based on migration counts, and (2) migration timing of individual telemetered birds does not appear to correlate as closely with temperature trends, suggesting that other mechanisms such as local food availability have a strong influence on individual migration decisions. With long-term trends unequivocally toward warmer fall conditions within the breeding range of eastern Golden Eagles, increased monitoring of December migration movements are needed in eastern North America.

Eggshell Thinning of California Condors Reintroduced to Central California

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From 2006 through 2010 we recorded 16 nestings by nine pairs of reintroduced California Condors (*Gymnogyps californianus*) in central California and recovered eggs or eggshell fragments from 12 nests. Shell thinning and breakage of the first wild-laid egg in 2006 prompted a protocol that replaced wild-laid eggs with zoo-laid eggs whenever possible. Mean eggshell thickness among the 12 nests was 0.46 mm, 34% lower than the average thickness of fragments recovered from nine successful nests in interior southern California in 2007-2009. The outer crystalline layer was greatly reduced or absent in the central California eggshells. We attribute eggshell thinning to feeding on carcasses of California sea lions (*Zalophus californianus*) containing the DDT compound, DDE; a food source exclusive to the central California flock. Concentrations of DDE in five failed eggs ranged from 170 to 500 parts per million lipid weight, levels associated with reproductive failures of other species. We predict that thickness of eggshells of California Condors will increase to a normal level as DDE contamination of the California coastal environment continues to decline.

Diet of Urban Breeding Cooper's Hawks (*Accipiter cooperii*) in Victoria, British Columbia

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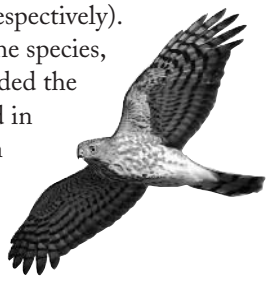
High nesting densities and reproductive success reported in urban Cooper's Hawks (*Accipiter cooperii*) could be related to the abundance and type of prey available in cities. However, there has been only one detailed dietary study of urban breeding Cooper's Hawks to date. We used collection of prey remains, direct observations of hawks with prey, and video of two nests to assess the frequency of occurrence and biomass of prey species taken by breeding Cooper's Hawks in the city of Victoria, British Columbia, Canada. We found that small- to medium-sized bird species contributed the majority (79-94%) of prey recorded from the collection of 3,231 prey remains, 437 direct observations, and 783 video items at 87 nest sites. These birds also contributed over half of prey biomass recorded in the direct observations and video data (57% and 93%, respectively). Of the avian prey identified to the species, one native and two exotics provided the bulk (over 85%) of prey recorded in all samples: the American Robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), and House Sparrow (*Passer domesticus*). Exotic prey species were an important component of the diet, contributing over half of items able to be identified as exotic or native in all samples. Mammals were inconsequential in terms of frequency and biomass, except at nests in or near the University of Victoria campus where European rabbit prey (*Oryctolagus cuniculus*) was recorded for nearly all observations.



Owls in Bangladesh – Past, Present and Future

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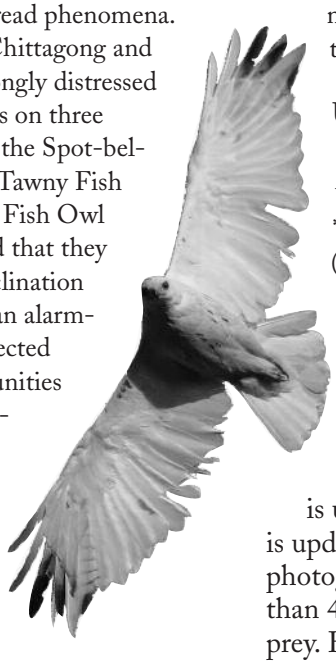
There are 17 owl species in Bangladesh, of which two are endangered, one is vulnerable, five are not sufficiently studied to identify a conservation status, and two are of undetermined migratory status: Short-eared Owl (*Asio flammeus*) and Brown Wood Owl (*Strix leptogrammica*). Village vegetation and forests are the prime habitat for owls in Bangladesh. No in-depth study has thus far been initiated or conducted on owls since 1971, when Bangladesh became a sovereign country. Field study, questionnaire survey, literature review, interview, meeting with local community people and relevant institutions were the

main methods used for this review. Natural resource collection from the owl habitats was an enormous undertaking which lead to conflicts with human beings. A significant number of community members who co-exist with owls and surrounding ecosystems have a negative attitude toward in situ owl conservation. Inventory data on the rate of key owl habitat changes are scanty. More than 50% of owl habitat has been lost during the last three decades. Forest covers are highly fragmented, and transformation of forest-land into agricultural-land is a widespread phenomena. Shifting cultivation practices in Chittagong and Chittagong Hill regions have strongly distressed its owl population. Recent studies on three threatened owl species, including the Spot-bellied Eagle Owl (*Bubo nipalensis*), Tawny Fish Owl (*Ketupa flavipes*) and Brown Fish Owl (*Ketupa zeylonensis*), have revealed that they are susceptible to extinction. Declination rates of these species are more than alarming. Hunting and trapping of selected owl species by some tribal communities also leads to severe declination, although such practices are prohibited by Bangladesh wildlife conservation laws. A new approach is needed to stop the decline of owl populations and their habitat by involving researchers, academics, and local people at all stages of the development process.



Harlan's Hawks Are and Have Been Breeding within the Red-tailed Hawk Range in Western Canada

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Harlan's Hawks (taxon *harlani*) differ in adult plumage from adults of (other races of) Red-tailed Hawks (*Buteo jamaicensis*), especially their tails, as well as in the frequency of color morphs and the extent of bare tarsus and are distinguishable in the field and hand. I will first review Harlan's Hawk's taxonomic history and known breeding range. Then I will describe cases of light-morph adult Harlan's breeding and both morphs occurring in the western Canadian range of (presumably) *B. j. calurus*, and a few cases of adult Red-tailed Hawks occurring in the Harlan's breeding range. These are based on museum specimens, photographs in the field, and published records. Some of the light-morph adult Harlan's are breeding with adult Red-tailed Hawks; others with possible adult hybrids that show traits of both taxa. I also show photographs of some dark-morph Harlan's Hawks taken and captured in western Canada during the breeding season. I finish with a possible scenario for the evolution of Harlan's Hawk, a discussion of hybridization and its phenotypic and taxonomic significance for these taxa, and suggestions for further field and DNA research.

Unusual Raptor Plumages: Albinism, Melanism, Hybrids, Dilute Plumage, and Others

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Mr. Clark has compiled a vast array of photos of unusual plumages of North American raptors, including partial albinos, dilute plumage, melanism, hybrids, and other odd plumages. This presentation is used for teaching raptor identification and is updated regularly. Bill Clark is a researcher, photographer, author, and lecturer with more than 45 years experience working with birds of prey. He regularly teaches evening and weekend courses on raptor field identification and biology, in the USA and Canada, and frequently presents lectures on raptor subjects. Bill is a coauthor of the *Photographic Guide to North American Raptors* and the completely revised *Peterson Series Guide: Hawks*. He has written a raptor field guide for Europe, and is writing two others for Africa as well as guides for Mexico and Central America.

Winter Ranging Behavior of Golden Eagles (*Aquila chrysaetos*) in the Central Appalachian Mountains

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Golden Eagles (Aquila chrysaetos) from northeastern Canadian source populations migrate south to their wintering grounds in the Central Appalachian Mountains (CAM). The core of these wintering grounds is centered on the highlands of West Virginia, Virginia and adjacent states. In order to better understand winter ranging behavior and winter ecology of eastern Golden Eagles in the CAM, we outfitted 29 eagles with telemetry systems (both conventional satellite and high frequency GPS-GSM transmitters) during the winters of 2006-2010. Satellite telemetry systems collected locational data at 1-hr intervals and GPS-GSM transmitters collected locational data at 15-min intervals. Satellite telemetry units collected on average 998 + 141 points per unit and GPS-GSM units collected on average 2,886 ± 387 data points per unit. We used the Local Convex Hull (LoCoH) non-parametric kernels to assess winter home range shape and size as well as resource use. Average winter range size was 304 ± 73 km2 and variation was high among individuals. Golden Eagles showed a preference for high elevation forests (>70% of all eagle locations) and individuals tended to avoid valleys dominated by agriculture and human dwellings. Eagles frequently exploited long linear ridges which provide optimal conditions for orographic and thermal lift, thus minimizing energy expenditures during foraging flights. Wintering areas of many individuals corresponded with proposed wind turbine facilities or areas where wind energy development potential is high. This study has documented previously unknown behavior of the wintering habits and resource use of eastern Golden Eagles. Further, data from this study gives researchers and resource managers the ability to identify high risk areas for Golden Eagles as it relates to wind energy, as well as provide site specific management guidelines for individual wind turbine facilities in order to minimize strike risk to eagles.

Effects of Lost and Discarded Fishing Tackle on Nestling Bald Eagles in Voyageurs National Park

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Voyageurs National Park (VNP) is a water-based park with abundant resources that attracts recreational fisherman from all over North America. There are growing concerns regarding the impacts of lost or discarded fishing tackle on the aquatic ecosystem. Because of the Bald Eagles' (Haliaeetus leucocephalus) diet and foraging behavior, they are susceptible to the ingestion of and entanglement in fishing tackle. Since 1989, annual banding activities on Rainy, Namakan, and Kabetogama Lakes have allowed for the evaluation of long term effects of anthropogenic activities on Bald Eagle productivity. The objectives of this study are to 1) evaluate the effects of discarded fishing tackle on nestlings, 2) report the presence of tackle, observed abnormalities and nest productivity, and 3) determine if there are any relevant correlations. From 1989 to 2010, 321 nests were visited and 440 nestlings were sampled. The average productivity at VNP was 1.40 nestlings per occupied nest. Field crews observed 34 instances of fishing tackle present. There were five instances where nestlings were found dead at or near the nest with two of these deaths directly caused by an encounter with fishing tackle. There was no significant difference among the means of the lakes for tackle incidence and prevalence, however, there were a significant increase in fishing tackle incidence ($F = 12.21$, $p = 0.0008$) and prevalence ($F = 12.24$, $p = 0.0008$). Injury prevalence and incidence over time had no significant difference ($F = 2.1807$, p

= 0.1440 and F = 1.9847, p = 0.1631 respectively). Death incidence and prevalence were not significant either (F = 0.8452, p = 0.3609 and F = 0.8100, p = 0.3711 respectively).

Dispersal of Black Vultures in Response to Culling

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Black Vulture (*Coragyps atratus*) populations in Virginia have grown at an annual rate of 8–12% since the 1960s and have become problematic at Dutch Gap, VA, where they congregate at a public boat ramp on the James River and at an adjacent power plant. Excrement that accumulates at the power plant requires expensive cleaning and creates risk of flashover and related power failures. Black Vultures also congregate at the boat ramp where they perch and defecate on parked vehicles and tear rubber and upholstery from windshields, wiper blades, and other parts of vehicles and boats. To reduce this damage, managers began an adaptive management program to reduce vulture damage in the fall of 2007. Initially, managers hazed vultures from the site by firing of pyrotechnics and paintballs, hanging effigies, and limited lethal reinforcement to displace vultures. The managers also counted vultures at Dutch Gap twice per week. Prior to the start of the hazing program, 100 vultures were captured and tagged with uniquely numbered patagial tags. The hazing program reduced vulture numbers, but damage, although reduced, continued. The second phase of the program included continued hazing and culling of 200 vultures from the area in July 2010. Prior to culling, an additional 100 vultures were individually tagged. Analysis of mark-recapture data showed apparent survival dropped by 0.75 (SE = 0.069) after culling. Modeling of vulture movement into and out of Dutch Gap provides estimates of the number of vultures that cycle through the site. Prior to hazing, 2,400 vultures cycled through, during hazing 900 cycled through, and following culling fewer than 150 cycled through Dutch Gap. This pattern suggests that the sharp reduction in apparent survival is the result of both reduced survival (900 down to 700) and reduced fidelity (700 down to < 150) to Dutch Gap.

High Frequency GPS-GSM Telemetry to Measure Migration Speed: Do Golden Eagles Migrate Faster When Using Orographic or Thermal Lift?

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The speed at which raptors fly on migration is highly variable and is thought to be condition-dependent. The evolutionarily important measure of flight speed is the duration of time it takes to move between breeding and wintering locations. However, migration flights are not simply movement from point A to point B. Flights likely deviate from the straight-line or ideal path defined by A and B due to spatial and temporal variation in lift opportunities and other weather events (e.g., wind, fronts, etc.). To measure flight speed on migration, we captured eight Golden Eagles (*Aquila chrysaetos*) in the central Appalachians and applied telemetry units that collect GPS data at high frequencies (30 sec intervals) and transmit the data via the Global Mobile Communications network. Primary sources of lift for migrating Golden Eagles are either thermal or orographic (deflected air). We manually categorized flight movements by the type of lift apparently being used and compared flight speed (per unit distance) for birds in each behavior type. We also evaluated the amount of time required for birds to move through a pre-determined topographic region based on the proportion of time birds spent in different flight types. Golden Eagles moved faster than ex-

pected in thermal flight, suggesting that prevailing notions about the significance of orographic lift to migrating birds may not be accurate.

From Duluth to Duluth: How Has the Focus of Raptor Research Changed Since 1995?

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We identified how the focus of research on raptors has changed since the last time the Raptor Research Foundation meeting was held in Duluth, Minnesota in 1995. To do this, we reviewed over 1,300 Raptor Research Foundation Annual meeting abstracts (hereafter, abstracts) and 800 articles published in the Journal of Raptor Research from 1995 – 2010. Information collected from abstracts included study species, study location, number of authors, the topics covered in the abstract or article, and, for annual meeting abstracts only, whether the presenter was a student. Based on their frequency in meeting abstracts and Journal of Raptor Research manuscripts, the five species most commonly studied since 1995 were the Northern Goshawk (*Accipiter gentilis*), Bald Eagle (*Haliaeetus leucocephalus*), Golden Eagle (*Aquila chrysaetos*), Peregrine Falcon (*Falco peregrinus*), and American Kestrel (*Falco sparverius*). The number of authors listed on both articles and abstracts increased since 1995, whereas the mean number of student presenters showed a negative trend during the same period. We also will report on other temporal trends including species studied and the research topics.

Insecticide Poisoning of Raptors in Agricultural Areas of Southwestern British Columbia

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Since 1990, we investigated mortality of selected raptor species, particularly Bald Eagles (*Haliaeetus leucocephalus*), in southwestern British Columbia. Samples of blood, crop contents, and feces were collected from live birds, and all dead birds were necropsied and brains assayed for cholinesterase activity. To date we have examined >1,200 Bald Eagles and diagnosed anticholinesterase poisoning in 102 (8.5% of cases). In the Fraser River Delta, an area of both intensive agriculture and raptor wintering, of 183 Bald Eagles examined, 53 (29%) were poisoned by anticholinesterase insecticides. Most raptor poisonings occurred during winter and resulted from scavenging on waterfowl carcasses. The waterfowl were poisoned mainly from ingestion of registered organophosphorus (OP) or carbamate insecticides which had been applied the previous spring for control of invasive wireworm pests. We have shown that some OP and carbamate insecticides persist up to 9 mo after labeled application in the low pH conditions of the Fraser Delta. The first documented mortalities in 1990 were caused by carbofuran. Successive replacement of carbofuran (avian HD5 = 0.21 mg/kg) with progressively less toxic, but not necessarily less persistent, alternatives, phorate (HD5 = 0.34 mg/kg) and fonofos (HD5 = 3.86 mg/kg) failed to stop and in some cases increased annual poisonings of Bald Eagles and other raptors. Each of those chemicals has since been withdrawn from local use. Since 2000, chlorpyrifos (HD5 = 3.76 mg/kg) has not been related to raptor mortality. However, we documented raptor poisoning each yr as a result of intentional and illegal use of insecticides to poison predators or "pest" birds. Increasing numbers of wintering Bald Eagles overall in the Pacific Northwest, particularly in the Fraser Delta, and increased scavenging of eagles on waterfowl factor into the long term and seasonal trends in poisonings. The risk to raptors and other birds from newer replacement insecticides will be examined briefly.

Bald Eagles and Chum Salmon: Reduced Winter Survival and Breeding Success Leads to Density-Dependence

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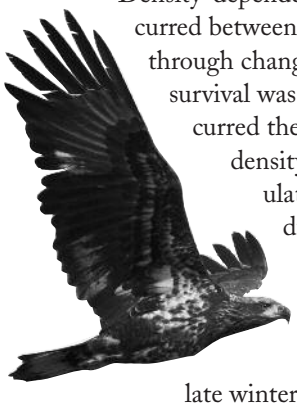
During the late 20th Century, due to decreases in both contaminants and persecution, Bald Eagle (*Haliaeetus leucocephalus*) populations increased dra-

matically. Currently, mechanisms regulating eagle populations are not well understood. To examine potential regulating processes in the Pacific Northwest, where eagles are no longer primarily regulated by contaminants or direct persecution, we examined bald eagle reproduction, breeding populations, winter populations, mortality and salmon stream use. Wintering and breeding eagle populations in south-coastal British Columbia (BC) quadrupled between the early 1980s and the late 1990s, and have since stabilized.



Density-dependent declines in reproduction occurred between 1986 and 2009, but not through changes in site quality. Mid-winter survival was crucial as most mortality occurred then, and models showed that density-dependent reductions in population growth rates were partially due to reduced survival. Wintering eagles in British Columbia fed heavily on chum salmon (Oncorhynchus keta) runs, and then switched to birds in late winter, when mortality was highest. Eagles tended to arrive after the peak in salmon availability at streams in BC as part of a migration associated with salmon streams from Alaska to northern Washington. Eagles were most abundant in southern BC during cold Alaskan winters and in yrs of high chum salmon availability. We suggest that eagle populations in the Pacific Northwest are currently partially limited by density on the breeding grounds and partially by adult mortality in late winter, likely due to reduced late winter salmon stocks forcing eagles to exploit more marginal prey supplies. Larger eagle populations have affected some local prey populations.

Population Demography of the Northern Spotted Owl (*Strix occidentalis caurina*)

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We used data from 11 long-term studies to assess temporal and spatial patterns in fecundity, apparent survival, recruitment, and finite rate of population change of Northern Spotted Owls (*Strix occidentalis caurina*) from 1985–2008. Our objective was to evaluate the status and trends of the subspecies throughout its range and investigate associations between population parameters and covariates that might be influencing observed trends. The average number of yrs of reproductive data from each study area was 19 (range = 17–24), and the average number of captures/resightings per study area was 2,219 (range = 583–3,777), excluding multiple resightings of the same individuals in the same yr. The total sample of 5,224 marked owls included 796 one-yr-old subadults, 903 two-yr-old subadults, and 3,545 adults (≥three yrs old). The total number of annual captures/recaptures/resightings was 24,408, and the total number of cases in which we determined the number of young produced was 11,450. We concluded that fecundity, apparent survival, and/or populations were declining in most study areas, and that increasing numbers of Barred Owls (*Strix varia*) and loss of habitat were partly responsible for these declines. However, fecundity and survival varied considerably in all study areas, little of which was explained by the model covariates we investigated. We believe our results reflect conditions on federal lands and private lands within the range of the Northern Spotted Owl because our study areas were: (1) large, covering about 9% of the range of the subspecies; (2) distributed across a broad geographic region and within most of the geographic provinces occupied by the owl; and (3) the amount of owl habitat was similar between our study areas and the surrounding landscapes. Retention of suitable habitat for Northern Spotted Owls is critically important if they are to have a chance of competing with the invasive Barred Owl.

A Comparison of the Breeding Biology of Wild and Captive Released Western Burrowing Owl (*Athene cunicularia*) in Southwest Manitoba

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The Western Burrowing Owl (*Athene cunicularia*) is designated as an endangered species in Canada due to its severe and ongoing population decline. Burrowing Owls once occupied most of the grassland Prairie

Provinces and the southern interior of British Columbia. No single factor has been identified as causing the decline of Burrowing Owls, however several factors are thought to limit their success, including: habitat loss and fragmentation, loss of burrows, decreased prey, and increased predation. In Manitoba, known nesting populations have declined from 76 pairs in 1982 to less than 10 pairs in recent yrs. The Species at Risk Act's recovery strategy for the Burrowing Owl in Canada outlines specific goals and objectives to promote the recovery of Burrowing Owls to their historic range. The long term recovery goal specifically for Manitoba is to reestablish a self-perpetuating, well-distributed, wild breeding population to their 1993 historical range (23 pairs). Due to limited data available in Manitoba about the species with no specific ecological examination of food habits, home range, and/or dispersal, fulfilling specific recovery goals is difficult. The short term goal of this study is to begin a reintroduction program to increase Burrowing Owl populations in Manitoba, and to identify limiting factors that affect the owl's survival in the province. The breeding biology of captive release and wild populations will be evaluated including diet, home range/habitat use, nesting and hatching success, survival, and dispersal. The long term goal of this study is to reestablish a self-sustaining Burrowing Owl population and range to 1993 Manitoba levels. This study will also define breeding habitat characteristics for Burrowing Owls in southwest Manitoba which will facilitate monitoring, adaptive management, and identify additional release sites for Burrowing Owls beyond the period of this research. A summary of data collected to date will be presented.

Mitigating the Injurious Effects of Rodenticides to Raptors

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Raptors are highly vulnerable to secondary poisoning by rodenticides used to control commensal rodents, prairie dogs, and voles when these pesticides leave intoxicated animals exposed and available for predation or scavenging. Additionally, when rodent eradication programs are conducted on seabird breeding colony islands, raptors are highly vulnerable to secondary poisoning, as many dead rodents are found on the surface after eradication. Raptors are particularly vulnerable to the "second generation" anticoagulant rodenticides, because rodents usually consume superlethal quantities of these rodenticides, and carcasses usually contain amounts of toxicant sufficient to lethally poison even large raptors such as eagles. In 2008, the U.S. Environmental Protection Agency (EPA) issued a mitigation decision designed to significantly reduce wildlife exposure to rodenticides, through limitation of use patterns, classification of the most hazardous rodenticides as "restricted use" pesticides, and eliminating the over-the-counter sales of second generation rodenticides. The use of bait stations to prevent non-target exposure and restricting most outdoor uses became effective in June 2011. Prairie dog control by licensed applicators with Rozol™ (chlorophacinone) still has resulted in many hawk and eagle poisonings in recent yrs, and has been challenged in U.S. Court by environmental groups. Eradication of rats from islands with brodifacoum presents high risk to scavenging raptors, and special precautions must be taken to avoid fatalities. Rat eradication in the Aleutian and Galapagos Islands demonstrate the risks and mitigation success. The rodenticide data in American Bird Conservancy's Avian Incident Monitoring System (AIMS) database demonstrate that the second generation rodenticides and strychnine present the greatest risks to raptors.

Pesticide Exposure Case Files of Raptors in the Avian Incident Monitoring System (AIMS) Database of American Bird Conservancy

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American Bird Conservancy (ABC) maintains a publically accessible database of pesticide exposure cases compiling data from EPA and 120 other sources, including State and Federal forensic labs. AIMS contains more than 2,500 cases, including 1,122 cases of pesticide exposure to raptors, with data on 31 species (including shrikes) exposed to 45 different pesticides. Most are lethal exposures, with residue analysis confirming specific pesticides. Carbofuran (famfur™) has been the single most common pesticide responsible for raptor exposure, with 240 cases. Other carbamates have been responsible for an additional 53 cases. Seventeen different organophosphorous nerve toxins were responsible for 186 cases from direct ex-

posure as well as secondary exposure of poisoned prey. Rodenticides (5 active ingredients) are responsible for 215 cases, with the second generation anticoagulant brodifacoum responsible for 141 cases. Strychnine, frequently used to poison coyotes, is implicated in 46 cases, with a majority of these affecting eagles. The legacy organochlorine pesticides including DDT, dieldrin, lindane, toxaphene and others were detected in 147 cases. Most were detected in small amounts, and were not concluded to be the cause of death, although dieldrin was responsible for lethality in more than 50 cases. Many of the identified pesticides have been recently cancelled by the U.S. EPA, including carbofuran, many of the organophosphates, and all of the organochlorines. Recent changes to the incident reporting regulations, however, have resulted in a precipitous drop in reported incidents. ABC has been very active in cancellation of hazardous pesticides, and in restoration of the incident reporting system at EPA.

Landscape Composition and Year Effects on Northern Saw-whet Owl Diet in Boreal Québec

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The Northern Saw-whet Owl (*Aegolius acadicus*) is usually associated with mature or old growth forest habitats. The progressive loss of this type of habitat in the boreal forest could eventually cause the Northern Saw-whet Owl population to decline. In 2005, 310 nest boxes were installed in Abitibi, Québec. The remains of 31 nest boxes used by Northern Saw-whet Owls were sorted to recover the remaining bones leftover from their prey. This data allowed the characterisation of this species' diet. This data also allowed for the verification of the hypothesis according to which the landscape composition surrounding nest boxes affects the net quantity and biomass of prey caught. A total of 2,657 owl prey items were identified to the family, genus or species. Despite the fact that no particular species appears to be dominant in its diet, a positive relationship was observed between the abundance of rodents captured and fledging success. The presence of prey usually associated with open sites suggests that the Northern Saw-whet Owl is resilient to the loss of old growth forests. In addition, the landscape composition in its home range does not influence the quantity of prey and the proportion of each species found in nest boxes. However, yearly variability does appear to influence its diet composition and biomass found within boxes. According to these results, forest management guidelines should be directed first to the preservation of senescent trees or trees with a large diameter to increase the availability of natural cavities.

Distribution and Status of the Pallas's Fish Eagle in Mongolia: A Cause for Conservation Concern?

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The Pallas's Fish Eagle (*Haliaeetus leucoryphus*) is considered to be the Northern Hemisphere's most poorly-studied eagle. As a species with an apparently complex partial-migratory system, it has a widespread distribution that includes large areas of central, southern and eastern Asia, but populations are thought to be declining across substantial parts of its range. Classified as 'Vulnerable' on the Red List of Threatened Species, these declines are attributed to the widespread loss, degradation and disturbance of wetland habitat, loss of potential nesting sites, pollution from agricultural and industrial chemicals and human persecution. According to several leading authorities, the three main breeding populations of Pallas's Fish Eagle are believed to be in China, Mongolia and the Indian subcontinent, although currently there are few quantitative data to support this claim. With reported "significant" population declines during the 20th Century in China, Pakistan, India, Nepal and Bangladesh, Mongolia is now considered as the main breeding population stronghold. As this assumption appears to be based largely on incidental and anecdotal evidence, our study aimed to collate existing data on historical and contemporary records of Pallas's Fish Eagle in Mongolia, and to field-survey as

many of these sites as possible, to assess the species' current distribution and status in Mongolia. Between 2005 and 2010, we made 195 visits to 75 wetland sites across the country. Thirteen sites were targeted as known historical sites and 64 sites were untargeted, but potential breeding sites. We located Pallas's Fish Eagles at eight sites, but evidence of breeding was not observed at any site. Whilst we do not consider our surveys to be comprehensive, we do consider these results to be the most widespread and up-to-date data currently available. We recommend urgent surveys and monitoring efforts throughout the species' range.

Pre-Construction Methodologies Used for Assessing Golden Eagle Use at Proposed Wind Energy Development Sites in the Western United States

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From 2010 to 2011 we conducted pre-construction studies to assess Golden Eagle (*Aquila chrysaetos*) use at proposed wind energy development sites encompassing > 2 million acres in the western U.S. Methods used to assess Golden Eagle use were selected based on the U.S. Fish and Wildlife Service Draft Eagle Conservation Plan Guidance (2010) and state agency recommendations. Methods included aerial transect and habitat-driven nest inventory, occupancy, and productivity surveys; yr-round point counts and fall migration studies to assess seasonal use by eagles; and home range analyses for select individuals affixed with transmitters. Using these techniques we logged thousands of survey hrs, located hundreds of nest structures, and affixed cellular transmitters to seven individuals to date with continued trapping efforts for at least eight additional individuals. The intention of this presentation is to provide an overall summary of the type and level of data that can be obtained from the use of each of these techniques and to provide a discussion of the relative merits of each technique for answering specific ecological assessment questions relative to potential eagle risk.

Barred Owl Diet in the Central Coast Range of Western Oregon

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Anecdotal information suggests competition with Barred Owls (*Strix varia*) for space and food resources is an important factor contributing to the continued decline of threatened Northern Spotted Owl (*Strix occidentalis caurina*) populations in the Pacific Coast region, United States. We described dietary composition and feeding-niche characteristics of Barred Owls in western Oregon during 2007–2009. Diets were based on 3,686 prey individuals revealed from 1,127 regurgitated pellets collected at 26 owl family areas. The diet included ≥ 85 taxa (33 mammals, 25 birds, four reptiles, four amphibians, one fish, three gastropods, one diplopod, one collembola, 12 insects, and one crustacean). Owl diets comprised 64.8% mammals, 2.9% birds, 1.0% reptiles, 9.8% amphibians, 0.3% fish, 6.6% gastropods, 0.2% diplopods, < 1% collembolans, and 14.4% insects. Mean mass of individual prey captured by owls was 55.8 g. Overall diet was predominated by coleopteran beetles, a variety of small forest insectivores including three mole species and four shrew species, and northern flying squirrels; the primary source of biomass, thus ranking highest in nutritional importance. Taxonomic richness of the diet provided an indication of the versatility of Barred Owls capable of preying on diverse taxa in the owl's expanding geographic range. The overall estimated food-niche breadth value was low and uneven, indicating use of a small variety of mammalian prey species. Diets varied among owl family areas, but were generally dominated by shrew and mole species, arthropods, amphibians, and flying squirrels. These Barred Owl diet data will be used in a comparative assessment of diet between the two owl species by research collaborators. Diet information will assist ecologists and land managers to better understand the ecological role played by Barred Owls in their new environment, including potential effects such as competition for food with other native fauna of the Pacific Northwest, especially Spotted Owls.

Breeding Ecology of Peregrine Falcons in Illinois

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Between 2009 and 2011, two pairs of Peregrine Falcons (*Falco peregrinus*) were found nesting between Alton and Grafton in Jersey County, Illinois. I found the first eyrie in March 2009 and the second was found in May 2011. Both nest sites were located on prominent limestone bluffs facing the Mississippi River. At the first eyrie discovered, I conducted regular observations during courtship and early incubation (late March) to assess occupancy and breeding activities, through late May, to determine hatching success, and collect prey samples. I also surveyed owl presence and distribution in the surrounding area, and detected a decrease in owl density over the three year period. In 2010, the male at the eyrie I observed chose a different cliff site and breeding attempts failed, and both birds abandoned that site. In 2011, the same male returned to the 2010 site and bred successfully with a different female, hatching four young. I collected prey samples weekly for a total of ten weeks in 2011. I identified a total of 21 different prey species, with Mourning Dove (*Zenaida macroura*) and Blue Jay (*Cyanocitta cristata*) being the most commonly found. During the peak of migration the composition of prey species found included more passerines. Continuing observations through fledging and comparing both eyries is planned for 2012. Peregrine Falcons successfully re-colonizing historical cliff sites along the Mississippi River show a complete recovery of this species to the area.

Food Habits of Breeding Bald Eagles (*Haliaeetus Leucocephalus*) in Florida Bay, Everglades National Park

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Beginning in the late 1980s, Florida Bay underwent dramatic ecological changes due to altered freshwater inflows from the Everglades that caused a cascade of effects, including changes in prey-fish assemblages. At the same time, local Bald Eagle (*Haliaeetus Leucocephalus*) populations began to decline and have continued ever since. We documented food habits of the struggling Bald Eagle population to look into the hypothesis that food is the limiting factor to their success. We used digital video equipment to monitor nest provisioning, collected prey remains from nest sites at the end of the breeding season, and compared these to historical data from the 1970s. About 4,500 hrs of video were recorded at four nests over two breeding seasons (2009 - 2010 and 2010 - 2011). Initial results showed that over 90% of deliveries were fish and were made about 2.5 times/chick/day. Prey remains of 571 individuals (30 species) and 34 collections at 21 nest sites were collected in 1973 - 1974, and 419 remains (22 species) from 13 collections at 11 nest sites were collected in 2010 - 2011. We found remains consisted of 81% fish and 16% birds in 1973 - 1974 and 77% fish and 21% birds in 2010 - 2011. Hardhead Catfish (Arius felis) made up the majority of prey remains in both time periods, and increased from 68% to 81% of fish and 55% to 63% of all remains from the 1970s to 2010 - 2011. Of the top five avian species most represented in 1973-74, only one, the Double-crested Cormorant (*Phalacrocorax auritus*), is one of the top five most common avian species in 2010 - 2011. Also, the two most present avian species in 1973 - 1974 were not present in 2010 - 2011. These results help support the theory that Bald Eagle food habits have changed due to altered prey assemblages.

Investigating the Potential Risk of Secondary Rodenticide Poisoning to Urban Owls Inhabiting and Foraging in Urban Landscapes of Lower Mainland, British Columbia

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Anticoagulant rodenticides are widely used to control pest rodents, and poisoning of non-target wildlife has been linked to these practices, including secondary poisoning of birds of prey, particularly owls. In this study, we investigate whether Barred Owls (*Strix varia*), Great-horned Owls (*Bubo virginianus*) and/or Barn Owls (*Tyto alba*) inhabiting and foraging in pre-

dominantly urban landscapes of the Lower Mainland, British Columbia, are at risk of consuming rodenticide-laden prey, such as rats and house mice. By conducting a pellet study, we found that urban Barred Owls had the largest proportion of rats in their diet, with some individuals' diet consisting primarily of rats. Urban Great-horned Owl pellets were also comprised mainly of rats, but there was a clear shift towards alternative prey base when urbanization within home ranges decreased. Field voles (*Microtus townsendi*) were the main prey item for Barn Owls, regardless of the amount of urbanization within their home range. For all three species, consumption of rats and house mice appears to coincide with increased urbanization within home ranges. The shift in the diet of owls living in urbanized areas may potentially lead to an increased risk of secondary rodenticide poisoning. Radio telemetry was deployed to further investigate which landscape features urban Barn Owls select as foraging habitat and whether they forage in proximity to buildings where rodenticide is applied. Urban Barn Owls were found to predominantly forage in grass strips along highway interchanges and verges, and untended grass patches within the city. The majority of foraging was done within 100 m of commercial buildings where rodenticide had been applied. These findings will be discussed in conjunction with previous research done on rodenticide residues found in the livers of deceased owls and the current and historic sales of rodenticides in the Lower Mainland, British Columbia.

The Fluctuations and Decline of Tengmalms's Owls in Northern Sweden

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Tengmalm's Owls (*Aegolius funereus*) breeding in nest boxes have been studied near Umeå in northern Sweden since 1980. Throughout the 30-yr time-series, numbers of breeding owls have fluctuated widely, more or less synchronously with the vole population in the region. However, the number of breeding owls has shown a long-term decline, with current peak breeding densities approximately 75% lower than in the 1980s. This mirrors a similar long-term decline in the vole population, which has also shown dampened population cycles in recent yrs. To ensure that the decline in owls was not caused by an avoidance of old nest boxes (i.e. is an inherent artifact of the longterm nest box study and ageing boxes) we experimentally tested whether the owls preferred new and relocated boxes. We found that the owls showed no preference for new or relocated nest boxes, and that the observed decline in numbers of breeding Tengmalm's Owls is of conservation concern.

Winter Destinations and Breeding Dispersal of Canadian Burrowing Owls

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The winter destinations and ecology of Burrowing Owls (*Athene cunicularia*) that breed in Canada was unknown when this study was initiated. We identified the winter locations of owls using aerial telemetry searches of south Texas and the Gulf Coast lowlands and central Mexico for signals from VHF transmitters that were attached to Burrowing Owls in Canada. We also utilized stable isotope analysis, light geolocators, and satellite Platform Transmitter Terminals (PTT). We have combined these records with all band recoveries to provide an up-to-date picture of what is known about winter distribution of 'Canadian' Burrowing Owls. We studied the over-winter survival, diet and habitat of the owls in one study area in south Texas, and two in central Mexico. The winter day time roosts used by the owls included vegetation, natural burrows, arroyos and wood piles. Winter habitats around roosts were also highly variable, much less open than breeding habitat in Canada, but always included at least 35% low vegetation within 1 km of roosts. In the winter, predators included Barn Owls (*Tyto alba*) and Short-eared Owls (*Asio flammeus*). Over-winter mortality was estimated at 17-30%. Survival in winter cannot explain why only 6% of juvenile owls return to Canadian study areas. The return rate of owls with attached data loggers was very low, but the one recovered indicated that Alberta nesting owls may migrate further west than owls from Saskatchewan and Manitoba. The satellite transmitter showed a new wintering area for 'Canadian' Burrowing Owls in Baja, Mexico, and has demonstrated a single long-distance breeding dispersal consistent with the concept that the decline of Canadian owls is due to short-stop migration in the U.S.

The Need for a North American Conservation Action Plan for the Short-eared Owl

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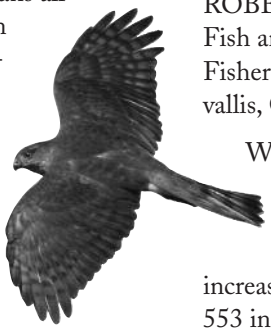
The status of the Short-eared Owl (*Asio flammeus*) in North America is difficult to monitor and is uncertain at best. Between 1966 and 2004, the 9% annual decline in Canada was significant, but the 3% decline in the U.S. was not significant. In Canada, the Committee on the Status of Endangered Wildlife has the species listed as 'Special Concern'. A management plan for this species will be drafted as required by the federal Species at Risk Act. The results of four workshops that were held in Winnipeg in November 2006, at the annual meeting of the Raptor Research Foundation in Pennsylvania in September 2007, at the World Owl Conference in Netherlands in November 2007 and at the annual meeting of the Raptor Research Foundation in Missoula in 2008 will be reviewed. Since those workshops, satellite telemetry and stable isotope studies have confirmed the ephemeral nature of this species that spans all three North American countries. Seven overall management objectives were developed at these workshops and will be presented in this talk. Audience feedback will be solicited to determine how to modify these objectives and how to get more collaboration between wildlife agencies and individuals in Mexico, U.S. and Canada to conserve this nomadic and ephemeral species. The results of these workshops will be included in the Canadian Management Plan.



Snowy Owls: An overview of twenty years of breeding season research in Barrow, Alaska.

DENVER HOLT

This large powerful owl is capable of killing Arctic Fox, King Eider, Glaucous Gull, and Pomarine Jaeger. It is also known to attack and drive off Caribou, Polar Bear, and Wolves that venture too close to its nests. However, in order to breed, the Snowy Owl is totally dependent on high populations of the 70-80 gram Brown Lemming. Indeed, over 90% of its breeding season diet is Brown Lemmings. Denver Holt will share some aspects of this owls breeding ecology that include: nest sites, nesting, parental care, growth, nest defense, satellite telemetry, and diet. He will also touch upon his observations and theories as to why Snowy Owls are white, and distinctly sexually dimorphic in color - an uncommon trait among all owl species. Finally, he proposes using Snowy Owls as indicators of a productive healthy Arctic environment in Barrow, and the avian icon for Arctic conservation. Denver Holt is a field researcher and founder of the Owl Research Institute (ORI), Charlo, Montana. The ORI is entering its 25th year. A major focus of the ORI has been long-term filed studies that include research on Barn, Flammulated, Snowy, Northern Hawk Owl, Northern Pygmy, Long-eared, Short-eared, Boreal, and Northern Saw-whet owls.

Bald Eagles (*Haliaeetus leucocephalus*) Nesting in Oregon and Along the Lower Columbia River, 1978-2007

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We surveyed the breeding population of Bald Eagles (*Haliaeetus leucocephalus*) in Oregon and along the lower Columbia River from 1978 – 2007. The minimum size of the population increased from 66 occupied breeding areas in 1978 to 553 in 2007. We found indirect evidence of an approximately five-day advance in the egg-laying period for breeding areas west of the Cascades. Average annual productivity was > 1.0 young per occupied breeding area during the last decade of the study. Recoveries of Bald Eagles banded as nestlings in Oregon (n = 22) provided a longevity record for the study area of 26-yrs-3-mo and indicated that subadults moved further from natal areas than adults (438 km vs. 153 km, respectively). Encounters with marked Bald Eagles from outside Oregon (n = at least 62) involved eagles from six western states and Mexico. Ninety percent of occupied breeding areas were within 3.2 km (2 mi) of shorelines. Productivity decreased with increasing elevation on the west slope of the Cascade

Mountains. Low productivity coincided with mate changes (0.36 young per occupied breeding area) and establishment of new territories (0.29 young per occupied breeding area). Successful nesting attempts were followed by successes 69% of the time (n = 4,498) and failed attempts followed failures 47% of the time (n = 2,793). The cumulative number of Bald Eagle nest trees within breeding areas increased with time ($r = 0.928$, $p < 0.01$) from approximately one the first yr a breeding area was known to approximately five after 30 yrs. Nest and nest tree "survival" averaged 97% per yr over 28 yrs, and 16% of nest trees discovered in 1978 still held nests in 2007. We observed use of Bald Eagle nests by seven other avian species, with most use by Canada Geese (Branta canadensis).

Status, Biology and Conservation Priorities for North America's Eastern Golden Eagle (*Aquila chysaetos*) Population

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Eastern Golden Eagles (*Aquila chysaetos*) are a distinct segment of a declining North American population that is increasingly at risk from threats on breeding, migration and wintering grounds. With increasing interest in energy development throughout the species' range, Canadian and U.S. Government agencies are re-evaluating management strategies for its protection. Many ornithologists are unaware of the significance of and threats to eastern Golden Eagles. This talk summarizes a background of information known about this population, and it's legal and conservation status. We then identify key management and conservation priorities for Golden Eagles in eastern North America as a mechanism to introduce the speakers in the eastern Golden Eagle symposium occurring at this meeting. We also identify key research and management questions on which effort should be focused moving forward. This presentation is by the recently formed "Eastern Golden Eagle Working Group," a group of scientists and land managers from across the populations' range, convened to develop research and conservation programs for this species, and to raise awareness about the eastern population within the ornithological and conservation communities.

Short-eared Owl (*Asio flammeus*) Occupancy, Detectability and Habitat Use Across Seasons on Amherst Island and Wolfe Island in Eastern Ontario, Canada

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In general, population trends of North American Short-eared Owls (*Asio flammeus*) have been based on monitoring schemes that are not designed to detect crepuscular species. The lack of management plans is due in large part to a scarcity of information on important habitat during the wintering and breeding seasons. We therefore developed and evaluated a visual survey protocol, and investigated yr-round habitat use based on comparison of 'used' and 'available' sites. Weekly surveys were conducted at 45 sites for 25 wks between November 2009 and July 2010. Using the program Presence to assess occupancy (i.e. proportion of sites occupied) and detectability (i.e. probability of detecting Short-eared Owls during a single survey, given at least one is present), the model that assumed constant detectability was a poorer fit than that which accounted for the effects of differing site and survey characteristics. According to the survey-specific model, our protocol was precise; observed and predicted occupancy was similarly low during the winter (0.18 (O), 0.19 ± 0.06 (P)), and during the breeding season (0.24 (O), 0.25 ± 0.07 (P)). Detectability was generally low based on the constant model (wintering 0.31 ± 0.05; breeding 0.31 ± 0.05), but was quite variable depending on the week (wintering 0.00 to 0.83 ± 0.15; breeding 0.00 to 0.79 ± 0.19), thus indicating the need for repeated surveys. We used logistic regression to investigate correlation of 12 habitat variables with Short-eared Owl presence or absence. During the winter, the forest cover class was weakly significant and negatively correlated (P = 0.09) with occurrence; grazed grassland and scattered trees were both significantly (P ≤ 0.05) and positively correlated with occurrence during the breeding season. We advocate the careful consideration of these habitat variables in future management plans, and suggest wide use of this protocol to monitor population trends.

Short-eared Owl (*Asio flammeus*) Nest Site Characteristics, Success and Associated Threats on Amherst Island and Wolfe Island in Eastern Ontario, Canada

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In recent decades, the Short-eared Owl (*Asio flammeus*) has experienced a severe population decline across North America. Little information exists concerning nest site characteristics, nesting success, or causes of reproductive failure. We monitored seven breeding territories on Amherst Island and Wolfe Island during the breeding seasons of 2009 and 2010. On Amherst Island, territories were concentrated in the south-central region of the island in 2009 and towards the eastern end in 2010, indicating a possible inclination for loose nesting aggregations. Five of seven territories were located on grazed grassland where vascular plants typically grown for pasture and/or hay were common. The combination of wooden fence posts and page wire fencing was frequent on territories, possibly due to a preference for wooden versus metal posts for perching, an avoidance of electric or barbed wire fencing, and/or because this type of fencing commonly surrounded sites where owls nested. Of four nests discovered, all were within 540 m of a wetland, and within 1,500 m of a human dwelling. Mean elevation and vegetation height at nests discovered at the egg and/or nestling stage were 81.3 m asl and 54.8 cm, respectively (n = 3). A general decrease in vegetation height was observed with distance from the nest, but relative elevation was variable. Mean composition of vegetation at these nests consisted of 70% grasses, 25% herbs and 5% bare ground; percentage cover of grasses was less away from the nest, but that of herbs and bare ground was greater. The Short-eared Owl appears to use nest sites that provide greater concealment and protection

from predators. Five of seven nests fledged young and mean fledgling success was 2.1 young per nest. Causes of nestling and fledgling mortality included mammalian (i.e. raccoon, *Procyon lotor*) depredation, avian (i.e. Great Horned Owl, *Bubo virginianus*) depredation, and nest destruction by farm machinery.

Short-eared Owl (*Asio flammeus*) Spatial Origins Across North America: A Stable Isotope Approach

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Many aspects of Short-eared Owl (*Asio flammeus*) natural history are poorly understood, including the extent to which the species may be nomadic, migratory and/or philopatric. Deuterium stable isotope analysis is a commonly used technique for addressing such ecological questions, based on defined latitudinal trends in precipitation (Dp) that are incorporated into feathers (Df). We employed this approach to study Short-eared Owl spatial origins across continental North America. Using museum samples from 46 juveniles at known locations, we calibrated two species-specific feather isoscapes based on a growing season deuterium isoscape and a raptor-specific deuterium isoscape (Dr). Slightly more variation was explained by a regression analysis of Dp and Df than that of Dr and Df (i.e. r2 = 0.69 vs. 0.64), thus the growing season deuterium isoscape was used to investigate spatial origins. We prepared two maps to graphically represent the frequency of Short-eared Owl occurrence. The first map represented results of all feathers sampled (n = 147), thus all previous locations, and the second map displayed results of the first primary feather (P1) (n = 69), which is most likely to be grown on the breeding grounds. Maps were similar, with the greatest concentration of Short-eared Owls appearing to be within central Alaska and across western Canada. However, this is partially a result of sampling locations. At least three owls were sampled in each of 10 locales (i.e. specific geographic areas such as eastern New York state), and results from five locales within the yr-round range indicated that breeding likely occurred at more northerly latitudes. However, an examination of differences between two generations of feathers from five owls indicated possible site fidelity within the yr-round range. Thus, our results suggest that different movement strategies may exist regionally across North America, and we advocate further use of this technique to better understand Short-eared Owl movements.

Nest Box Selection in Eastern Pennsylvanian American Kestrels (*Falco sparverius*): What Constitutes an Ideal Next Box Habitat?

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Various studies of habitat selection in American Kestrels (*Falco sparverius*) nesting in boxes have been reported. Studies have examined nest box characteristics immediately surrounding or supporting the box as well as analyzing landscape features. Over the past twenty yrs we have observed nest box use and success of American Kestrels in Eastern Pennsylvania. Previous work showed how a relatively small number of nest boxes are used more than others, and that these nest boxes produce the greatest number of nestlings per reproductive season. In the summer of 2011, we took field measurements and photographs of forty nest box locations emphasizing various nest box characteristics directly surrounding or supporting the box, as well as microhabitat factors. "Traditional" nest box parameters that were previously examined that we included were: nest box mounting substrate, box orientation, box height, and percent of cover around the nest box hole. In addition, the distance to farm buildings, road surface, and the nearest tree or forested area were also measured. We are using ArcGIS Explorer and GoogleEarth to estimate and

analyze macro-habitat factors to identify habitat types surrounding a 1 km2 area around each box. Parameters for assessment will include the percentage of cultivated land versus natural habitat, as well as estimates of patch size. Our goal is to examine associations between nest box and landscape characteristics to nest box use and reproductive success. We will present the nest box site or habitat factors associated with high use nest box locations to identify whether they differ significantly from low use, unused, or heavily predated/abandoned box locations. We hope to help explain why some locations are more reproductively successful than others so that we can improve our conservation efforts to increase nest box use and success with current and future nest box site selections.

Advancing Conservation of Raptors through the Midwest Coordinated Bird Monitoring Partnership

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Monitoring is essential to successful bird conservation planning, guiding design of on-the-ground activities and evaluation of implementation practices to inform adaptive management. Bird monitoring programs have proliferated under the direction of government agencies, universities, and non-governmental organizations. In 2009, the Midwest Coordinated Bird Monitoring Partnership became established to fully integrate monitoring programs into bird conservation decision making throughout the region (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio and Wisconsin) and beyond. This coordinated approach increases our collective ability to detect spatial patterns and temporal trends while placing local results in a regional context. Additionally, gains in efficiency will reduce costs of monitoring and can enable greater attention to traditionally under-surveyed species. Our regional network is predicated upon a well-developed framework, regular workshops, interactive website, registry of Midwest bird monitoring programs, focused working groups, and a state-of-the-art system for archiving, analyzing, and accessing data (the Midwest Avian Data Center). In particular, our Midwest Nocturnal Bird Working Group strives to provide standardized status and trend information, causes of population changes, evaluation of conservation efforts, and data-driven conservation design. Our regional network is aligned to help raptor conservationists, diurnal and nocturnal alike, to: 1) integrate monitoring into bird management and conservation; 2) broaden the scope of monitoring for species most at risk or for which we lack adequate information to make effective decisions; 3) coordinate programs among organizations and across spatial scales; 4) improve survey design, field methods and data analysis; and 5) deploy modern data management strategies to effectively package monitoring information for managers. Through our commitment to informed bird conservation decisions, we provide a means to help wildlife professionals better understand and interface raptor conservation needs with climate change, energy development, land use practices, and food production across the Midwestern landscape.

Long-term Reproduction of Golden Eagles in Relation to Habitat Alteration in Southwestern Idaho

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We assessed occupancy and productivity at Golden Eagle (*Aquila chrysaetos*) nesting territories in the Morley Nelson Snake River Birds of Prey National Conservation Area (NCA) from 1971 to 2011. Preliminary results show that the number of occupied territories declined significantly decreasing from 35 territories in the early 1970s to 25 in 2011. Pairs occupying territories reproduced above the long-term mean in 2011, producing 1.1 young per territory for a total of 28 young for the year. We observed no trend in total number young or young per territory between 1971 and 2011. The lack of a trend in productivity in spite of a declining trend in number of pairs suggests that less productive territories in the NCA have become vacant and a core of productive territories may be producing most of the young. We recorded four incidences where pairs subsumed a neighboring vacant territory, and in three cases productivity increased in these territories. Preliminary results suggest that only 14 (35%) of the 40 historical territories produced 60% of the total number of young, with the four most productive territories producing

20% of the young. Highly productive territories did not appear to be clustered in any part of the NCA, and 57% of the productive territories occur in extensively burned areas. Continued high production in some territories in extensively burned areas suggests an adaptation by eagles to altered habitats in heavily burned areas.

U.S. Fish & Wildlife Service Perspectives on the Golden Eagle (*Aquila chrysaetos*) in the Eastern United States

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In September 2010, the U.S. Fish & Wildlife Service and U.S. Geological Survey organized a Golden Eagle (*Aquila chrysaetos*) science meeting in Ft. Collins, CO. The meeting was a collaborative critique of the status, trends and threats to the Golden Eagle population in the western states. One of the primary objectives was to outline a strategy for the development of a Golden Eagle Conservation Plan in collaboration with our State, Tribal, and international partners. What became apparent at that meeting was the need to address a national landscape-level Golden Eagle population that included the lesser known population within the eastern United States. These individuals comprise a significant migratory wintering population derived from a breeding contingent in eastern Canada. This presentation will provide discussion on several fronts as to how the Service intends to develop a conservation plan to protect Golden Eagles in the eastern U.S. It will focus on the federal regulatory statutes as they are currently written to protect western Golden Eagles and address potential deficiencies or discrepancies that may affect long-term sustainability of the Golden Eagle in the eastern portion of its range.

Food Composition and Seasonal Preferences of White-tailed Sea Eagles (*Haliaeetus albicilla*) in Northern Germany

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The White-tailed Sea Eagle (*Haliaeetus albicilla*) is considered opportunistic in its food choice, taking what is available, but detailed data on the seasonal diet composition and individual foraging behavior are lacking. We examined the relationship between diet of White-tailed Sea Eagles and food availability. We found that fish were the primary prey and waterfowl and game mammal carcasses were important alternative food components. When fish availability sharply declined, eagles switched to waterfowl and carrion. They used individual foraging tactics, adjusted to local food supply, such that they maximized profitability. The consumption of game mammal carrion increased over autumn and winter and was positively correlated with a concomitant seasonal increase in the incidence of lead poisoning in eagles. Stomachs of lead-poisoned eagles predominantly contained ungulate remains. These results suggest that game mammal carcasses were the major sources of lead fragments. The link between raptor foraging tactics and lead poisoning is the specific functional response of raptors to changing food availabilities or poor habitat quality, leading to scavenging on lead-contaminated carrion. Conservation management of scavenging birds would be substantially improved if carrion were free of lead bullet fragments.

High Frequency GSM Telemetry Provides New Insights into Raptor Behavior and Ecology

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Animals engaging in long-distance migration develop strategies to minimize energetic costs of endurance travel, conferring selective advantages. Research into this fundamental component of the emerging field of movement ecology previously has been constrained by data limitations. Until recently, satellite telemetry has long been the standard for tracking many larger species of raptors. While these data have allowed researchers to track animals across the world and have provided remarkable insight into natural history, data collection is at hourly intervals (about 12-15 data

points/day) which limits the ability to evaluate detailed flight mechanics. We developed several lightweight GSM tracking devices capable of collecting data at user determined intervals as short as one sec. These telemetry systems allow collection of detailed data on raptor movement and provide potential for new analytical approaches. The fine scale resolution of these tracking data not only opens up new horizons in the field of telemetry studies, but also allows for validation and refinement of models describing animal behavior, home range and movement. To illustrate the capabilities of this new technology we present preliminary tracking data from several species of raptors, including Bald (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*). As an example of one potential application of these data, we evaluated flight response of migratory Golden Eagles to weather and topography. We show that ground speed in and between thermals was more variable than that when powered by orographic lift and eagles responded to weather by using thermals less and orographic lift more when winds were higher. These detailed data show weather-related energy minimization strategies and an unpredicted degree of stereotyping in flight behavior.

The Impact of Corn and Soybean Fields on Habitat Use of Female Peregrine Falcons (*Falco peregrinus anatum*) During the Breeding Season

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Intensive agriculture that seeks to maximize yield through the substantial use of pesticides and fertilizers may be seen to be causing a decline in the abundance and diversity of bird species in our agricultural environment. In Québec, the transition from traditional farming to intensive agriculture has resulted in a large increase in corn and soybean crops, with a corresponding decrease in forage crops and pastureland associated with milk production. From 2008 to 2010, we studied the habitat use of 12 adult female Peregrine Falcons (*Falco peregrinus anatum*) nesting in the southernmost part of Québec. We used logistic regressions and mixed models to estimate their use of corn and soybean fields, other farmlands, wetlands, urban areas, as well as other habitats that do not fall into these categories. After incubation, hunting adult females underutilized corn and soybean fields, when compared to other farmlands. Before the fledging of nestlings, adult females used corn and soybean fields at least 2.1 times less than they used other farmlands. After the fledging of nestlings, adult females did not visit corn and soybean fields that were located more than 13 km away from the nest. Such results suggest that prey biomass is less in corn and soybean fields and that an increase of this type of habitat may negatively affect the productivity of this species.

Bald Eagle (*Haliaeetus leucocephalus*) Space Use in a Recently-Deglaciated Coastal Fjord, Icy Bay, Alaska

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Recent glacial recession and subsequent vegetation succession can provide new nesting habitat for raptors and more habitats to support alternative raptor prey in glacial landscapes like Icy Bay, Alaska. During a study of the ecology of Kittlitz's Murrelet (*Brachyramphus brevirostris*), a candidate of listing under the Endangered Species Act, predation was found to be a potentially limiting factor affecting the population in Icy Bay. In fact, more radio-marked Kittlitz's Murrelets were found predated than were reproducing in the population. Bald Eagles (*Haliaeetus leucocephalus*) were potentially one of the biggest predators of Kittlitz's Murrelets in Icy Bay. Consequently, we set out to assess space use of Bald Eagles in and around Icy Bay, specifically quantifying overlap between Bald Eagle and Kittlitz's Murrelet space use. To date, we have captured six male (5 adult) and three female (2 adult) eagles, and deployed an ARGOS-GPS tag on each bird. Tags were programmed to take a location

every hr during daylight and transmit locations via the ARGOS satellite network every 3 d. Eagles confined their space use to relatively well defined territories during the breeding season while tending nests. However, if nests failed the birds were much less likely to remain on a territory and instead travelled extensively along the coast, likely utilizing seasonally-available food sources such as spawning salmon (*Oncorhynchus* species). Bald Eagles did show overlap in space use with Kittlitz's Murrelets, but did not prey extensively on the seabird.

A Contribution from the World Literature of the Short-eared Owl (*Asio flammeus*)

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The Short-eared Owl (*Asio flammeus*) is widely distributed, and that fact is attested to by there being nine subspecies, six of which are insular, in addition to the nominate race *flammeus*, which are commonly recognized. Because of this, the common names are diverse in the literature (with common names existing in over 80 languages or dialects). Knowledge of the history of the species regarding its distribution and population characteristics can most reliably be obtained from the literature. With the increasing availability of information being made available through improvements in information technology, there are expanding opportunities for the searching of literature that might formally have remained unsearched. An example would be the examination of literature dealing with associated aspects of this owl species such as the relationship between populations of this owl and microtine prey populations. While Short-eared Owls are viewed as a myophagic species in some locations, they are, in other locations an effective predator utilizing avian prey bases for their existence. These aspects are examined in this paper. An extensive bibliography is presented in order to encourage more effective use of the literature in broadening our understanding of the biology of Short-eared Owls and protecting them, the grasslands and other open habitats that they frequent in North America.

Variation in Home Range Sizes of Golden Eagles (*Aquila chrysaetos canadensis*) Breeding in Québec

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Seven adult Golden Eagles (*Aquila chrysaetos canadensis*) captured in Québec and in the eastern U.S.A. were equipped with Argos/GPS satellite transmitters. We used a 95% kernel density estimate with the reference bandwidth to identify home ranges of these birds breeding in the Gaspe Peninsula and assumed breeding in northern Québec. Mean home range size was 3,760 km2 (range 108 - 18392 km2). Previously reported home range sizes for four other eastern Golden Eagles breeding in the Hudson Bay, although slightly smaller, also indicate the use of vast areas: mean 898 km2, range 286 - 1585 km2. Although methods used to determine home range sizes may vary and influence the results, values reported for Golden Eagles breeding in the western U.S.A. are consistently much lower with ranges of 2-83 km2 in Idaho, 26-54 km2 Wyoming, 17 - 30 km2 in Utah, and a maximum value of 251 km2 reported in Nevada. These east-west differences within the geographic range of *A. c. canadensis* may be caused by differences in habitat or prey selection or availability within breeding ranges. This underlines the need for particular conservation actions targeted at this population.

Tracking Golden Eagle Migration on the Geographic Outskirts of the Eastern North American Population

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We studied portions of small and relatively unknown populations of Golden Eagles (*Aquila chrysaetos*) in North America residing east of the Mississippi River. Recent continent-wide declines in the species prompted telemetry studies of Golden Eagles to further understand current threats. We fit transmitters to eagles wintering in the geographic outskirts of the species range in the East: the unglaciated regions of Wisconsin and Minnesota and in the Chesapeake Bay region of coastal Maryland. We tracked adult (n = 2) and juvenile (n = 3) eagles between 2008 and 2011. Eagles fitted with transmitters in Wisconsin and Minnesota migrated north to summering and breeding territories on both the east and west side of the Hudson Bay (mean distance 4,482 km, range 2,710-5,146 km, mean travel time 71 d). Eagles trapped in Maryland migrated east of the Hudson Bay to summer on the shores of the Hudson Strait in Québec and Labrador (mean distance 4,199 km, range 2,947-6,528 km, mean travel time 41 d). Eagles exhibited nomadic behavior during summer months in Canada, but established smaller concentrated winter territories in the United States. We describe wintering areas and migratory routes outside of the Appalachian Mountains which host a majority of the wintering eagles in Eastern North America. This information will be important for management of the Eastern population under the United States Bald and Golden Eagle Protection Act.

Is the Red-throated Caracara Chemically Defended from its Stinging Prey?

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Red-throated Caracaras (*Ibycter americanus*) are unique among Neotropical raptors for being specialist predators of social wasps. Large numbers of social wasp nests of many genera are attacked and consumed by these birds every day, despite these prey being well defended with venomous stings and coordinated defenses that deter most predators. It has been hypothesized that wasps are deterred from counterattacking caracaras by an unknown, powerful chemical repellent. We investigated this hypothesis over four seasons of study at the Nouragues station in Central French Guiana. Using nest cameras, we determined that caracaras are indeed highly reliant on wasp prey for rearing young. Chemical analyses of samples taken from captured birds revealed several putative chemical repellent compounds; however bioassay of these against sympatric social wasps failed to demonstrate marked repellence. Finally, using camera trapping techniques, we investigated the behavior of caracaras while attacking social wasp nests and discovered that several behavioral strategies employed by these birds obviate the necessity for a chemical repellent.

Potential Conflicts Between Energy Development Projects and Migratory Golden Eagles (Aquila chrysaetos): A Northern Perspective

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Satellite tracking studies of fledgling Golden Eagles (*Aquila chrysaetos*) document that the yr-round range of long-distance migratory Golden Eagles extends across most of western North America. The number of new energy development projects planned in western North America has increased during the last decade and there is good reason to believe that more will be proposed in the future. Many of these developments occur in areas used by both resident and migratory Golden Eagles. Identifying which populations and age-classes of Golden Eagles are vulnerable to the threats posed by broad-scale energy projects (i.e., wind turbine farms and high-capacity electrical transmission lines) is important for protecting and conserving the species. While many new efforts are underway to identify the impacts of existing and proposed energy projects on raptors, most (but not all) studies are designed to assess and mitigate site-specific conflicts and do not include efforts to identify the origins of impacted populations. This is

of particular concern because naïve migratory birds may be at a higher risk of impacts from these developments than resident birds. We use data from two migratory Golden Eagle tracking studies to explore the geographic overlap between eagle movements and energy developments and areas with high potential for energy developments. We find that Golden Eagles originating at, or migrating to, northern latitudes would be exposed to multiple energy projects throughout their annual range. Our results provide initial information about areas where potential conflicts exist, as well as heighten awareness for conservation assessments to accommodate the spatial and temporal requirements of migratory raptor populations. Monitoring the movements of migratory Golden Eagles and their activity in energy development areas is going to be more important than ever, if we hope to develop estimates of cumulative effects and effective mitigation measures.

Prey Selection of Nesting Golden Eagles (*Aquila chrysaetos*): The Rich Diversity Documented During Nest Content Data Collection in and Around San Diego County

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The feeding ecology of Golden Eagles (*Aquila chrysaetos*), and specifically their food habits, has been well documented in numerous studies across the eagle's range. These studies have given insight into the opportunistic hunting practices used by Golden Eagles in prey selection. Few of these studies used long term data sets in analysis and none had a greater diversity of prey selection than those found from Golden Eagle pairs in San Diego County. The Wildlife Research Institute collected nest content data from over 160 Golden Eagle nests during banding from the yrs 1997 - 2011 representing 57 territories throughout the county and nearby. Over 250 prey remains were documented in nests representing over 50 different species of animals during the selected time period, more than any other similar study to date. New discoveries such as multiple species of fish as prey items make this study important in determining appropriate conservation measures for future Golden Eagle management. Additionally, during a short term study of nesting ecology, a nesting pair of Golden Eagles was documented repetitively delivering and consuming large-mouth bass at an active nest site, the first such known documented finding of its kind.

Golden Eagle (*Aquila chrysaetos*) Nesting Ecology: A Detailed Look in San Diego County Using a Data Set from Over 100 Years of Nesting History

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The Wildlife Research Institute houses an archive of Golden Eagle (*Aquila chrysaetos*) data stretching back to the late 1800s and has studied the Southern California population first-hand for the past 23 yrs. This extensive swath of data gives detailed insight into the complicated ecology of Golden Eagles and is relatively undocumented over such a long period of time. Specific territories will be selected from the data set and analyzed for trends such as nesting chronology, productivity, distance between nests and size of core nesting areas. We will take a deeper look into nesting chronology to learn how nests are used, or not used, over time and by comparing photographs from different time periods examining how nests and nest placement changes over time. Such basic long-term ecology information is critical for making objective long-term Golden Eagle management decisions.

Breeding Ecology of Northern Saw-whet Owls (*Aegolius acadicus*) at an Isolated Great Plains Site

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The breeding ecology of Northern Saw-whet Owls (*Aegolius acadicus*) was studied from 2003-2011 on the Custer National Forest in northwestern South Dakota. Previously, few breeding records and scant

breeding data were available for the Great Plains. This study area is isolated not only with respect to Saw-whet Owl breeding range, but also with respect to local habitat. The area is typified by isolated bluffs (surrounded by extensive grasslands) covered primarily with ponderosa pines, but with substantial deciduous growth (e.g., ash, oak) in ravines and draws. The number of nest boxes available ranged from 11 in 2003 to 93 in 2011. As is typical of Saw-whet Owls, the percentage of boxes occupied varied strongly from yr to yr, with a low of 4% and a high of 59%. Clutch size ranged from two to six, hatching success from 40% to 100%, and fledging success from 25% to 88%. 2011 was an exceptional yr, with high numbers of breeding owls, large clutch sizes, high hatching and fledging success, and a prolonged breeding season. This unusually good breeding season appeared to be in direct response to abundant prey resources, as evidenced by large caches of mice and voles in the nest boxes.

Use of Video Monitoring to Study Nesting Ecology of Red-shouldered Hawks (*Buteo lineatus*) in Suburban Cincinnati, Ohio

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We studied a large population of Red-shouldered Hawks (*Buteo lineatus*) inhabiting suburban areas around Cincinnati, Ohio. This suburban population of the eastern subspecies of Red-shouldered Hawks nests in woodlots and yards near houses, and is well-adapted to human disturbance. We used 24-hr video cameras mounted above or near nests to record adult and nestling behaviors, causes of nest failure, and prey deliveries. Mounting the cameras during the courtship phase, after the adults occupied the nest and lined it with green vegetation, did not disturb the birds, as all pairs laid eggs in the nests with cameras (n = 5 nests). We monitored a total of 11 nests with cameras, with an overall productivity rate of two nestlings fledged per active nest. Of the 30 nestlings we recorded, 22 of them fledged successfully (73.3%). Causes of nest failures in this population included eastern gray squirrel (*Sciurus carolinensis*), Great Horned Owls (*Bubo virginianus*), raccoons (*Procyon lotor*), and an absentee adult parent. Prey delivered to the nests included small mammals, frogs and other amphibians, snakes, and invertebrates, indicating that suburban Red-shouldered Hawks are generalist predators, as are other populations of this species that nest in more typical remote forested regions.

Characteristics of Spring Migration of Golden Eagles (*Aquila chrysaetos*) through Eastern North America as Determined by GPS-GSM and Conventional Satellite Telemetry

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Golden Eagles (*Aquila chrysaetos*) that breed in northeastern Canada winter in the central and southern Appalachian Mountains, U.S.A. Understanding characteristics of their migration is important to developing effective conservation efforts related to wind power and also increases our understanding of how weather and behavior affect counts at hawk watches in spring. Here, we present characteristics of migration of 29 eagles captured from Nov. 2006 – Feb. 2011. Seven birds were fitted with conventional GPS satellite telemetry collecting data every 1-4 hrs. Twenty-three birds were fitted with GSM-GPS telemetry units which collected data at 15 min or 30-60 s intervals. We examined timing, distance, flight speed, altitude, and the use of corridors predicted by hawk watch data at two scales, regional through

Pennsylvania and continental. The mean departure and arrival dates were 18 Mar. ± 3.4 d (range: 27 Feb. – 25 Apr.) (n = 22) and 4 Apr. ± 5.6 d (range: 8 Mar. – 17 May) (n = 10). Mean travel time was 23.7 ± 4.2 d (range 5 – 57 d). Average daily travel distance was 133 ± 14 km and mean in-flight instant speed was 25.6 ± 1.96 kph. Mean total travel distance was 2,921 ± 440 km (Range: 964 – 4,707 km). Our data suggest that migration is bimodal with adults migrating early and sub-adults and juveniles late. Moreover, this bimodal trend in migration results in a much wider migratory corridor through Pennsylvania in spring as thermal lift becomes more available. This directly links to hawk watching data, especially in late spring along the Lake Ontario shore. Furthermore, this difference in migratory behavior suggests that the adult portion of the population may be more at risk of negative interaction with wind power development because they are more concentrated along ridge tops where turbines are being sited.

Striking a Balance: Modeling Migration of Golden Eagles (*Aquila chrysaetos*) Through Wind Energy Developments of the Central Appalachian Mountains, U.S.A.

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Wind turbines are a known source of mortality to birds and certain turbines have caused significant mortality of local bird populations. Therefore, the rapid pace of wind energy development in the central Appalachians of the U.S.A. is of concern. Avian migrants are concentrated in this region because long-linear ridges provide orographic as well as thermal lift. Diurnal migrants can thus implement multiple energy-minimizing flight strategies, including thermal and slope soaring. Slope soaring can result in potential conflicts because birds fly at low altitudes often within the rotor swept zone of turbines. To improve siting of wind energy developments and reduce impacts on wildlife we tracked 16 Golden Eagles (*Aquila chrysaetos*) with high-frequency GPS-GSM telemetry devices during spring migration 2009, 2010 and 2011. We used these data to develop spatially-explicit models of migration. To identify areas of potential conflict, we compared these models to turbine habitat suitability models. Additionally, we compared our models to proposed and existing turbine developments. Our results indicate that several developments pose a risk to migrating eagles while others pose little to no risk. Within individual developments, not all turbines present the same level of risk, thus we can make site specific recommendations for reducing risk by modifying siting of individual turbines.

Summary and Results of the Milan Bottoms Bald Eagle Night Roost Survey Project

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Human development and activities continue to increase and encroach on the floodplain habitats of the Upper Mississippi River. For example, economic development is occurring immediately adjacent to the Milan Bottoms Complex in Rock Island County, Illinois. Evidence suggests that this area functions as a major night roost location for wintering Bald Eagles (*Haliaeetus leucocephalus*; hereafter "eagles"). Therefore we conducted a standardized night roost survey here during three consecutive winters (2005 - 2008), in order to document the importance of this site to wintering eagles. Each week, we conducted one evening and one morning survey from early December through late March (17 weeks). In 2005 - 2006,

we recorded a total of 10,386 observations of eagles entering or exiting the night roost. Of these, 32% were adults, 36% were immatures, and 32% were unaged. In contrast, only 2,553 eagle observations were reported in 2006-2007, including 44% adults, 32% immatures, and 24% unaged. Eagle numbers increased in 2007-2008 to 6,957 observations. Among these, 39% were adults, 27% were immatures, and the remaining 34% were unaged. During the first three yrs of this project, the majority of night roosting eagle observations occurred in December and January, with steadily decreasing numbers in February and March, respectively. The upstream end of Milan Bottoms (i.e. the widest track of floodplain forest habitat) appears to be the most heavily utilized portion of the study area for night roosting purposes.

Breeding Status and Population Trends of Golden Eagles in Northeastern Québec Over a 14-yr Period

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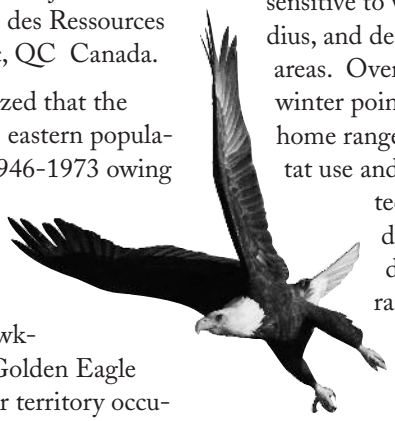
In North America, it is hypothesized that the Golden Eagle's (*Aquila chrysaetos*) eastern population declined during the period 1946-1973 owing to organochlorine pesticides and other anthropogenic causes of mortality. Since 1970, upward trends for the species have been observed at most eastern hawkwatches. To verify these trends, Golden Eagle counts were performed to monitor territory occupancy between 1994 and 2007 in an area in northeastern Québec. Aerial surveys were conducted during seven of the 14 yrs. During this period, the number of known nesting areas in the study area increased from 10 to 20, while the number of pairs rose from six to 14. The increase is attributed partly to investigators' increased experience in finding nesting areas, to their greater familiarity with the study area, and possibly to the growth of the regional population. Occupancy of nesting areas by pairs was very stable over the yrs. Annual mean percentage of laying pairs (or laying rate) was 48.0 (SD = 19.9), while mean number of fledglings per pair was 0.49 (SD = 0.35). These results are consistent with recent trends observed at eastern count sites, the organochlorine pesticides hypothesis and a significant decrease in the percentage of birds of prey shot in the province.



Analysis of Banding and Recovery Data for Evaluation of Habitat Characteristics and a Habitat Suitability Index Model for Boreal Owls (*Aegolius funereus*) in Western Newfoundland, Canada

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A habitat suitability index (HSI) model based on scientific literature and expert opinion was developed for the Boreal Owl (*Aegolius funereus*) in western Newfoundland, Canada. Preliminary analyses conducted on the model suggested outputs were most sensitive to variation in home range size, foraging radius, and density of living and dead stems in nesting areas. Over a 2-yr period, data were collected on 307 winter point count locations and nine Boreal Owl home ranges using radio telemetry to examine habitat use and test the HSI model. Owls were detected at 24% of point count locations during two winters. Home range sizes during breeding varied with a median range of 429 ha. Log-ratio compositional analyses of roost locations and home ranges indicated that Boreal Owls do not occupy these sites at random. For roost locations, owls selected old and young softwood stands and avoided bogs, disturbed stands and scrub. Owl home ranges favoured old softwood and disturbed stands and avoided old mixed and hardwood stands. HSI values produced by the original model did not differ significantly from those updated with local data on home range size. While owls were not occupying sites at random based on HSI values, the model was not able to predict boreal

owl presence at levels better than chance alone. The HSI model failed to produce values greater than 0.60 (out of 1.00) suggesting that input values from the literature for other parts of the Boreal Owl range may not be reflective of habitat suitability for Boreal Owls in Newfoundland. Further research is needed to address knowledge gaps about parameters identified as sensitive (nesting habitat and nest tree availability). The island of Newfoundland may also contain far less suitable habitat than other comparable areas of North America, or Boreal Owls in Newfoundland may be less habitat-specific than previously thought.

Eagle Fatalities in the United State: Data, Data Gaps, and Implications

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Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act. Changes in the permit structure now allow for permits for incidental take of eagles, which often includes the application of mitigation to offset take elsewhere. However, in order to determine where mitigation would be most effective, it is important to understand where take is occurring. We summarized the information that is available in the public domain about Bald and Golden Eagle fatalities. Our review of literature and databases concerning eagle fatalities found documentation of 6,956 Bald Eagle and 3,715 Golden Eagle fatalities recorded in the contiguous United States since 1960. For Bald Eagles, of the known causes of fatality, human- and non-human-caused fatality totals were approximately equal. The most common human causes of Bald Eagle fatalities were poisoning (37%), shooting (22%), electrocution (10%), and vehicle strikes (6%). Fatalities of Golden Eagles were dominated by human causes, primarily electrocution (50%), collisions with wind turbines at the Altamont Pass Wind Resource Area in California (21%), and poisonings (13%). Our review highlighted significant concerns and data gaps. First, most of the data presented were collected incidentally; therefore, they should not be interpreted as though the percentages reported here are representative of the population percentages. Second, 50-percent of all Bald Eagle fatalities and 33-percent of all Golden Eagle fatalities were attributed to unknown causes highlighting that there is limited understanding of relative contributions of different types of risks to eagles. Third, the data were collected over different lengths of time and cover multiple decades. Fourth, the data presented here are not comprehensive. Thus, although the data we have compiled provide useful context to identify causes of eagle fatalities, without systematic data collection they are biased and must be interpreted with caution to avoid erroneous conclusions.

Use of Behavioral Data of Wintering Bald Eagles to Alter Wind Turbine Locations at the Rockland Wind Farm, Idaho

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Ridgeline Energy sought to develop the Rockland Wind Farm near American Falls, Idaho, while minimizing the potential impacts to Bald Eagles (*Haliaeetus leucocephalus*) using two winter roost locations (Neeley Roost and Bowen Canyon) in the vicinity of the project. Therefore, Ridgeline conducted winter eagle behavioral surveys at both roost sites by counting eagles at each roost and then mapping flight paths as eagles flew into or out of the roosts during six surveys from January through March 2010. Bald Eagle use was concentrated in the eastern portion of the permitted project area for the wind farm and in areas between the Snake River and the Neeley roost. Consistent observations of Bald Eagles in these areas resulted in identification of a loosely-defined corridor of more concentrated eagle use associated with Bald Eagles traveling between the Bowen Canyon roost and the Snake River. Observations of Bald Eagles at Neeley Roost also suggest eagles primarily move between the Neeley roost and the Snake River, rather than across the wind resource area. The project layout originally proposed by Ridgeline included turbines within the area identified as a use corridor for wintering Bald Eagles as they traveled between the Bowen Canyon roost site and the Snake River. In response to concerns about collision risk for Bald Eagles and potential disturbance of the wintering eagles, Rockland Wind Farm relocated or eliminated 12 proposed turbines that were originally sited within the

eagle flight corridor. This case provides an example of how project plans can be modified to minimize risk to eagles while still meeting the requirements for a financially viable wind generating facility.

Summer Movements of Juvenile Northern Saw-whet Owls (*Aegolius acadicus*) at Whitefish Point, Michigan

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During July and August of 2006 Whitefish Point Bird Observatory (WPBO) conducted an exploratory summer owl banding project. This exploration resulted in the banding of 206 Northern Saw-whet Owls (*Aegolius acadicus*) and two Long-eared Owls (*Asio otus*) during the period 23 July-12 August. Of the 206 Northern Saw-whet Owls banded, 200 were in juvenile plumage. These results represented the first documentation of a significant incursion of juvenile Northern Saw-whet Owls during the post-fledgling period. The study period was expanded in 2007 and mist netting efforts in July and August 2006-2010 resulted in the banding of 1,525 owls; 1,511 Northern Saw-whet Owls, 13 Long-eared Owl, and one Barred Owl (*Strix varia*). The 1,511 Northern Saw-whet Owls captures were comprised of 239 (16%) adults and 1,272 (84%) juveniles. The timing of adult and juvenile movements progressed independently, with adult numbers peaking in early July, prior to the peak passage of juveniles in late July or early August. Significant annual fluctuations in juvenile captures were consistent with hatch-yr fluctuations experienced during the fall in eastern North America. The 1,272 banded juveniles generated sixty-three (5%) encounters. Twenty-three were recaptures at WPBO during later field seasons, and 40 were encounters from other banding sites. These 40 encounters occurred in 11 states and two provinces, documenting both intra and inter-flyway movements. Most juvenile Northern Saw-whet Owls were in active pre-basic molt during the study period and the progression of this molt was recorded for over 1,000 individuals.

A Physiologically-based Model for Methylmercury Uptake and Accumulation in Female American Kestrels

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A physiologically-based model was developed to describe the uptake, distribution, and elimination of methylmercury in female American Kestrels (*Falco sparverius*). The model was adapted from established models for methylmercury in rodents. Features unique to the model include methylmercury deposition into eggs and five feather compartments (primaries, secondaries, coverts, retricies, and body feathers). Where possible, model parameters and the timing of key events (egg laying, molting of each feather type) were determined using observations from American Kestrels or other Kestrel species. Additional parameters were fitted to describe the observed kinetics of methylmercury in controlled exposures of American Kestrels. The model reproduces trends observed in studies with Kestrels and other avian species, including declining methylmercury concentrations in sequentially laid eggs and rapid depletion of whole-body methylmercury concentration with the onset of feather molt. Because the model explicitly accounts for methylmercury deposition into feathers, it can be used to predict similarities and differences in kinetics among species with different molting patterns.

What Effect Does Detectability Have on Statistical Power in Analysis of Raptor Migration Counts?

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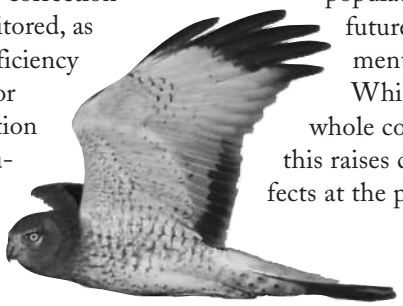
Power to detect trends is decreased by unexplained variation in raptor migration count data. One possible method to reduce unexplained variation is to adopt a sampling scheme which can account for varying detectability among birds which pass a lookout. Double-observer sampling is one such method. We conducted double-observer sampling at Idaho Bird Observatory's Boise Ridge hawkwatch during the fall migrations in 2009 and 2010. After estimating effect sizes for observers, species, distance and weather on detectability, we created individual-based simulations of 20 yrs of counts of Sharp-shinned Hawks (*Accipiter striatus*) and Northern Harriers (*Circus cyaneus*) with imperfect detectability, a population trend, and a degree of unexplained random variation in the number of birds passing the lookout. We ran 1,000 iterations with each parameterization of the simulation to estimate the power of linear regression to detect the true trend. The simulation results suggest that the migration counts of both species at this site meet or exceed the goal for land bird monitoring proposed by Bart et al. (2004), 80% power to detect a 50% decline in 20 yrs (two-tailed test, = 0.1). The power to be potentially gained by correcting for varying detectability increases dramatically when we attempt to detect a trend in fewer yrs, attempt to detect trends of lesser magnitude, or attempt to estimate trends with greater precision. The power to be gained from a detectability correction also depends on the species being monitored, as well as the degree to which observer efficiency varies between yrs. While correcting for detectability is not necessary for migration counts to be considered useful for population monitoring, in some circumstances doing so would improve power considerably.



Movement Patterns and Collision Risks of Juvenile White-tailed Eagle (*Haliaeetus albicilla*) Studied by GPS Satellite Telemetry at Smøla Wind Power Plant, Norway

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On the island of Smøla, Western Norway, at the site of a 150 MW, 68 turbine wind-power plant, 59 juvenile White-tailed Eagles (*Haliaeetus albicilla*) were satellite-tagged between 2003 and 2010. From August 2005 (when searches for dead birds started) to July 2011, a total of 41 White-tailed Eagles, more than half of them adults, have been found killed by collisions with turbines, four of which were satellite-tagged. Two of the satellite-tagged juveniles were killed during their first autumn, and two were killed during the next spring. Both sexes stayed within the Smøla area during their first winter, involving high collision risk with the turbines. Both sexes moved away from the area during spring in their second yr (March - April). Females dispersed further than males, often more than 800 km during summer, generally to the north. There was a return movement to the natal area during the second autumn, involving further risk of turbine mortality. The same pattern was repeated in the third and fourth yr for females, while the males showed a higher tendency of philopatry. The use of night roosts in the vicinity of the wind-power plant may add to the collision risk. A method for risk assessments based on GPS locations is proposed. The findings have implications in the context of population viability locally, and to the viability of the White-tailed Eagle population as a whole seen in the view of future plans for wind-power development along the Norwegian coast. The White-tailed Eagles are using the whole coastal landscape in Norway, and this raises concern of future cumulative effects at the population level.

Known Eagle Mortality at Wind Turbine Technology Facilities in the Western United States

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Bald and Golden Eagles (*Haliaeetus leucocephalus* and *Aquila chrysaetos*, respectively) have been killed by wind turbines in the western United States in recent yrs. We reviewed information available to the U.S. Fish & Wildlife Service to examine eagle mortality and injuries caused directly by wind turbine technology west of the 90th meridian. Our analysis also examined the ecological trends associated with those mortalities, difficulty of extrapolation of eagle mortality across the landscape to multiple projects, sampling design(s) and inherent bias involved with analysis of this data-set. We also discuss short and long-term ramifications involved with Bald and Golden Eagle mortality associated with the growing number of renewable energy facilities throughout the range of these species.

The Use and Results of a Trained Northern Goshawk (*Accipiter gentilis*) to Study Predator-Prey Interactions

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Attempts to understand predator-prey relationships are often focused on population level responses. Fewer studies have examined how predators select prey or how prey animals avoid predation. This is at least in part due to the difficulty of directly examining the interactions of highly mobile and secretive predators and their prey. The majority of predator-prey studies in raptor research are descriptive in nature and as such lacking in experimentation. We used a trained Northern Goshawk (*Accipiter gentilis*; hereafter "goshawk") to examine its attack behavior on, and the corresponding predator avoidance behavior of, Northern Bobwhite (*Colinus virginianus*). Out of 69 capture attempts on bobwhites, the goshawk had a success rate of 7.2%, with success related to initial bobwhite hiding cover ($P < 0.05$). The goshawk pursued bobwhites an average of 176 m with successful flights ranging from 10 to 146 m. The longest recorded chase without success was 330 m. Our best estimate of bobwhite flight speed was 15.6 m/sec. With both successes and failures through tail-chase we deduct that the goshawk's flight speed must be similar to the average bobwhite flight speed. Bobwhite responded to the raptor pursuits differently than to other experimental predation risks. Our results are comparable to existing literature on trained and untrained goshawk ecology, but provide new insights to bobwhite behavior and habitat requirements. Lastly, we discuss the use of trained raptors in the field of wildlife science with focus on research enrichment and method limitations.

The Conservation of Airspace and Habitat in a Major Migration Corridor

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A narrow strip of land paralleling the northern shore of Lake Superior, The North Shore Migration Corridor (NSMC), hosts a massive migratory bird movement that has previously been underestimated. The NSMC is also a priority area for wind turbine development, and habitat and airspace within the corridor are experiencing increased pressure from other forms of development. Our three-yr study of autumn migratory bird movement found that over 120 species utilized the NSMC, and estimates of individuals range into the millions. Time of day, seasonality, wind direction, recent weather patterns, and topography all played a role in the magnitude of migratory activity and flight paths. Migrant movement was nonrandom with more birds moving close to shore and on ridgelines. In addition, most migrant movement occurred at a flight height between the forest

canopy and 100 m, a height that directly corresponds with wind turbine and communication tower height. The results of this study will guide development of wind turbines and other structures by identifying migrant flyways and timing of movement, and by prioritizing areas for airspace and habitat conservation.

Foraging Ecology of Breeding Snail Kites (*Rostrhamus sociabilis plumbeus*) on the Kissimmee Chain of Lakes, Florida

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The Snail Kite (*Rostrhamus sociabilis plumbeus*) is a federally endangered raptor whose population in Florida has recently undergone precipitous declines. The remaining population remains heavily dependent upon the Kissimmee Chain of Lakes (KCOL), a group of lakes in central-Florida that is subject to many anthropogenic influences, including water and vegetation management. It is therefore crucial to gain an understanding of how the habitat on these lakes influences kite reproduction. We studied habitat use and foraging behavior of breeding snail kites on the KCOL by radio-tagging and observing birds by airboat. We calculated 90% home ranges using a kernel density estimator and quantified foraging effectiveness through time activity budgets. Our results indicate a relationship between home range size and kite foraging. Kites that have smaller home ranges have higher foraging rates and forage closer to the nest. Additionally, kites that utilized wetlands off the main body of Lake Tohopekaliga had relatively smaller amounts of foraging substrate within their home ranges. These results indicate the need for a holistic approach towards managing foraging areas and nesting patches.

Lessons Learned from Raptor Interaction with Wind and Transmission Projects

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Raptors have endured a long history of conflict with society. They have been persecuted as competitors by ranchers, poisoned by pesticides and now risk collision with wind turbines. While early projects made tragic mistakes in siting wind farms, the industry is learning how to reduce the risk of conflicts with raptors and other avian resources. Through the application of effective data collection techniques, an understanding of avian behavior, and the needs of wind technology, it is possible to design avian safe and economically sound projects. Specific projects and raptor issues will be presented.

Inferred Autumn Movements of Northern Saw-whet Owls (*Aegolius acadicus*) based on Stable Hydrogen Isotope Analyses of Feathers Collected at Beaverhill Lake, Alberta

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Autumn movements of Northern Saw-whet Owls (*Aegolius acadicus*) have generally been referred to as migration wherein birds that are assumed to have spent the most recent breeding season in the north are moving south to overwinter. Autumn Saw-whet Owl banding programs have become quite popular across North America. Population monitoring has often been one of the primary reasons cited for running these programs. We used stable-hydrogen-isotope analyses of feathers (N = 181) collected from Northern Saw-whet Owls in autumn at Beaverhill Lake, Alberta, to investigate natal and breeding origins. Stepwise multiple linear regression analysis was used to determine whether D values differed between hatch-yr (HY) and after-hatch-yr (AHY) owls, among sexes (male, female and unknown sex categories), and among yrs. D values did not vary by sex, but did vary by age (HY vs. AHY) and among yrs (2003, 2004 and 2005) ($R2 = 0.79$, $F3,177 = 96.565$, $P < 0.001$). Most of the Northern Saw-whet Owls caught in the autumn had D values that were significantly less depleted than -127.8‰, the average D value obtained from local nestling owls. Therefore, we concluded that most Northern Saw-whet Owls caught during the autumn at Beaverhill Lake had spent the most recent summer at more southerly latitudes. We proposed the following three hypotheses to explain this: (1) post-breeding dispersal northwards precedes southern autumn migration, (2)

Northern Saw-whet Owls are nomadic in Alberta, moving rather haphazardly, in response to prey availability and other factors and (3) different strategies are used to deal with seasonal change in prey across the owl's range. Until the pattern we found is better understood, trends obtained from autumn Northern Saw-whet Owl monitoring stations should be interpreted with caution.

Exposure of Raptors to Environmental Organic Contaminants: Unanswered Questions

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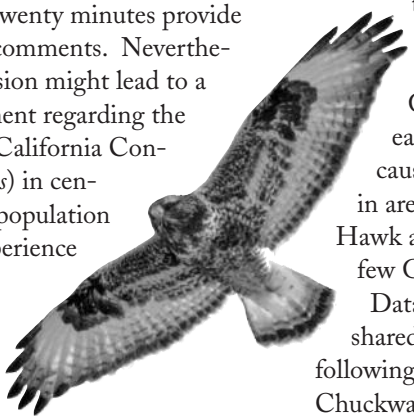
We comment on the status of several questions arising from the exposure of raptors to environmental organic contaminants that presently appear to lack adequate answers, although twenty minutes provide time for only the briefest of comments. Nevertheless, we hope that any discussion might lead to a modest degree of enlightenment regarding the following questions: 1) Are California Condors (*Gymnogyps californianus*) in central California the last avian population anywhere in the world to experience severe eggshell thinning induced by DDE? 2) Might early embryonic deaths in this population be caused by a 'new' contaminant such as a fluoroquinolone antibiotic? 3) If not, what is/are the cause(s) of early embryonic deaths? 4) Do polybrominated diphenyl ethers pose a significant long-term threat to any raptor population? 5) What is the evidence that PCBs have contributed to a decline of any raptor population? 6) Is there any credible evidence that a factor or factors other than DDE has/have reduced eggshell thickness below historical values? 7) Has the DDE/dieldrin controversy about which was the primary factor causing the decline of Peregrine Falcon (Falco peregrinus) populations been resolved? A future symposium might consider the evidence that use of pesticides, whether herbicides or insecticides, has affected any raptor populations by reducing the biomass of any portion of their supporting food webs.



Evaluating Population Proportions: Golden Eagle (*Aquila chrysaetos*) versus Red-tailed Hawk (*Buteo jamaicensis*) and Great Horned Owl (*Bubo virginianus*) Active Core Nesting Areas in Desert Environments

***RENÉE RIVARD** (rrivard@wildlife-research.org), DAVE BITTNER, CHRIS MEADOR, JEFFREY L. LINCER, JAMES NEWLAND, JIM HANNAN, Wildlife Research Institute, Inc., Ramona, CA U.S.A., JEFF WELLS, U.S. Forest Service, San Diego, CA U.S.A.

Over the last 23 yrs, the Wildlife Research Institute has been conducting Golden Eagle (*Aquila chrysaetos*) research in Southern California, and more recently Southern Nevada, and has accumulated Golden Eagle and other raptor population data across 22 different mountain ranges in the Mojave and Sonora Deserts. The data revealed a trend of few to no Red-tailed Hawk (*Buteo jamaicensis*) and Great and Great Horned Owl (*Bubo virginianus*) nesting areas in ranges that contained active Golden Eagle territories. Predation by the eagles on these two raptors is the suspected cause of the population variance. Additionally, in areas with a high proportion of Red-tailed Hawk and Great Horned Owl active territories, few Golden Eagle active nests were documented. Data and population distribution maps will be shared that reflect these proportions across the following mountain areas: Hodges, Mule, Palo Verde, Chuckwalla, Little Chuckwalla, Orocopia, Big Maria, Little Maria, McCoy, Coxcomb, Palen, Eagle, Cottonwoods, Hexie, Santa Rosa, San Jacinto, Clark, Lucy Grey, McCullough, Sheep Hole, Highland and the Granite complex.

Conducting Aerial Surveys for Golden Eagles (*Aquila chrysaetos*): Techniques for Optimal Data Collection and Interpretation

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In addition to following U.S. Fish & Wildlife Service recommendations noted in the 2010 Interim Golden

Eagle technical guidance (Pagel et al. 2010) and the Draft Eagle Conservation Plan Guidance (Gould and Schmidt 2011), important lessons that have helped the Wildlife Research Institute develop robust aerial survey methods will be shared. Examples of various techniques that are critical for documenting, assessing and confirming observations made in flight will be reviewed including the use of digital cameras with high-quality zoom lenses, post-survey review of photographs by at least two Golden Eagle (Aquila chrysaetos) biologists, appropriate nest and territory criteria for classifying occupancy and productivity status, the importance of experience and proper aerial survey training of Golden Eagle biologists, a powerful yet versatile helicopter and experienced pilot, as well as pre-survey mapping, virtual flights, and preparation for possible constraints. The Wildlife Research Institute's Golden Eagle Team has accumulated thousands of hrs of Golden Eagle aerial survey experience across desert and mountain environments throughout Southern California, Nevada and Baja California, Mexico, while conducting its Golden Eagle research over the last 23 yrs.

The Potential for Long-term Monitoring of Gyrfalcon and Peregrine Falcon Breeding Populations using Undergraduate Students: an Apparent Inexhaustible Source of Funding

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Climate change has caused many recent and rapid changes in the Arctic ecosystem, where ecological consequences of climate change are globally underreported. Predicting and managing for future ecological consequences will require establishing integrated, long-term monitoring studies in a pan-Arctic network. Unfortunately, conducting field work in the Arctic is logistically and financially difficult. Here we describe a means to extend baseline research on Arctic falcons with long-term funding provided by volunteer undergraduate students. We used teams of six to ten undergraduate students from the University of Wisconsin at Stevens Point to principally collect non-intrusive genetic samples, and to determine occupancy and productivity at historical nest sites of Gyrfalcon (*Falco rusticolus*) and Peregrine Falcons (*F. peregrinus*) on long-term study sites on the Yukon Delta National Wildlife Refuge, Alaska, and near Kangerlussuaq, West Greenland, respectively, in each of four yrs during 2003 – 2010. Students received initial, on-site training, and were then minimally supervised. All field objectives were completed by all student groups, but some additional effort by experienced researchers was needed in Alaska. Students prepared a final report that detailed all logistics and findings. This student research required their enrollment in an arctic ecology course and their special course fees, totaling about $100,000 (US dollar) for all four yrs, covered theirs and the senior author's travel (to, from, and within study sites), lodging, food, and personal camping equipment costs. The senior author readily attracted more student applicants than could be enrolled in any of the four yrs of research. We recommend the use of undergraduate student coursework as a means to procure long-term funding for and to monitor historical nest sites of Gyrfalcons and Peregrine Falcons in the Arctic. Such an endeavor will also serve as an example of how to educate upcoming biologists about Arctic systems.

Methods for Determination of Raptor Migratory Pathways over a Large Landscape

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Each autumn, tens of thousands of raptors travel along the northern shore of Lake Superior on their southbound migration. While this annual movement is well known, it has not been quantified. To address this issue, we counted migratory raptors from 24 observation sites along eight transects perpendicular to the shoreline between Duluth and the Minnesota-Canada border from mid-Aug. through mid-Nov. 2008. Our objectives were to design a methodology to determine the effects of weather, temporal, and landscape factors on migratory pathways and to present results on the usefulness of this methodology in conservation planning and the protection of migratory pathways. A total of 4,303 raptors of 14 different species were recorded during the 2008 migration

season. Exploratory analyses suggested that migratory raptors concentrate near the shoreline of Lake Superior, particularly mid-day when winds are westerly. Average migration height differed between buteos and accipiters, with > 40% of buteos observed higher than 100 m above the tree canopy and ≥ 30% of accipiters observed lower than 100 m above the tree canopy. Multiple regression identified significant factors ($P < 0.05$) associated with total raptor migration to be wind direction, hr, temperature, and antecedent wind ($R2 = 0.22$, $n = 564$). Significant factors associated with buteo migration included wind direction, hr, temperature, and period ($R2=0.26$, $n=564$) and those associated with accipiter migration included hr, temperature, antecedent wind, wind direction, and period ($R2 = 0.29$, $n = 564$). With the increasing popularity of wind power, the cumulative impacts on birds are of conservation concern. To avoid large scale negative effects on migrating birds, it is imperative that migratory pathways be identified. Using this methodology, we were able to quantify the magnitude, timing, weather conditions, and pathways associated with raptor migratory movements over a large landscape.

Is Aggressive Nest Defense by Urban Mississippi Kites (*Ictinia mississippiensis*) Triggered by Landscape Features?

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Mississippi Kites (*Ictinia mississippiensis*) have become a common breeding raptor in many areas of the Southern Great Plains. This range expansion has resulted in an increase in the number of human-kite conflicts in urban areas, typified by kites repeatedly swooping at, and occasionally striking, pedestrians in an effort to drive them from the nesting area. Currently, our understanding of which kites are predisposed to cause conflicts and/or what features of the urban landscape elicit defensive behaviors is limited. In 2009, we initiated a study to examine patterns of aggression in a population of kites breeding in Lubbock, Texas. Specifically, we focused on vegetative and anthropogenic characteristics of kite nesting areas that may be predictive of aggressive behaviors and examined correlates of site and mate fidelity with aggressive behaviors in a banded subpopulation of kites. Nest sites with aggressive and passive kites were similar for most variables measured except for nest-tree height and distance to nearest building. Nests where aggressive behaviors were consistently displayed were more likely to be re-occupied by at least one individual from the previous yr than passive nests (83% vs. 33%, respectively). Additionally, mate fidelity was greater at aggressive nests than passive nests. Taken together, our data suggest that aggression in kites is shaped more by characteristics of individual kites than by environmental features such as vegetation and anthropogenic structures.

Autumn Roost Site Selection in Migrant Northern Saw-whet Owls (*Aegolius acadicus*) in the Central Appalachians

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Little has been published about stopover behavior and ecology in migrant Northern Saw-whet Owls (*Aegolius acadicus*). Using radio-telemetry over nine seasons (Oct.-Jan.), we located 203 diurnal roost sites in the central Appalachian Mountains of Pennsylvania, assessing habitat preferences and roost characteristics. In early autumn, owls used both hardwood and evergreen species, switching to almost exclusively evergreens following leaf-drop; conifers comprised 83% of roost sites overall, with pitch pine (*Pinus rigida*) comprising 59% of all roosts, followed by eastern white pine (*P. strobus*, 22%) and various oaks (*Quercus* spp., 8%). Owls rarely used the same roost more than 2 d consecutively, moving up to 7 km between roosts, but often returning to previously used roost sites over the course of time. Roost height varied from ground level to 32 m, averaging 12.5 m. On two occasions, different individuals occupied the same roost branch on consecutive days. Average canopy height, canopy cover, average shrub height, and understory stem density at roost sites were compared with randomly selected locations.

Short-eared Owl Occurrence on Grassland Bird Surveys in Seven Midwestern States During 1988-2010

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We conducted > 7,000 unlimited width daytime transects (> 3,600 km of walking) of butterflies and grassland birds during 1988-2010 in units of native prairies and old fields in seven midwestern states (IL, IA, MN, MO, ND, SD, WI). The most Short-eared Owls (*Asio flammeus*) were recorded at Buena Vista and Leola Grasslands, two Wisconsin state wildlife areas managed primarily for Greater Prairie-Chickens. We also found small numbers of Short-eared Owls at Osage Prairie, MO, and Ordway Prairie, SD, but none on walking transects at any other site. Relative abundance of Northern Harrier (*Circus cyaneus*) on these surveys approximately corresponds to that of Short-eared Owls, but Northern Harriers occurred on more sites and had smaller fluctuations in abundance than Short-eared Owls. Units where we recorded presence of Short-eared Owls that yr had higher mean dead plant litter scores than other units at the site, significantly so at Buena Vista and nearly so at Leola. Mean plant litter in the non-owl units at Short-eared Owls sites was also higher than mean litter in other non-Short-eared Owls sites, grouped by type (prairie, old field) and state. Primary management at most other sites is large-scale rotational burning with some brush-cutting. A few sites have relatively little management, and during our study period in MO (1992-99) a number of sites were managed primarily with rotational haying. Management at Buena Vista and Leola is noteworthy for the relatively small management units given the large size of these grasslands, relatively little managed per yr, the considerable effectiveness of brush control, and the variety of management types used but often zoned to remain as long-term graze-only, hay-only, burn-only, or idled units.

Site Occupancy Dynamics of a California Spotted Owl Population (*Strix occidentalis occidentalis*) in the Central Sierra Nevada

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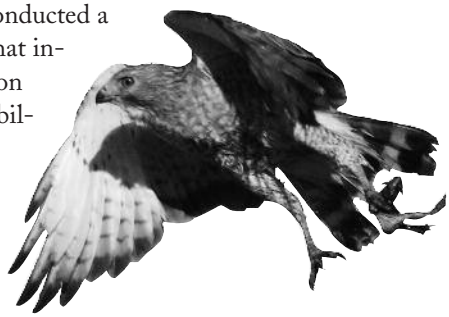
I assessed the site (i.e., territory) occupancy dynamics of California Spotted Owls (*Strix occidentalis occidentalis*) over an 18-yr period in the central Sierra Nevada. I conducted a multi-season analysis that incorporated site extinction and colonization probabilities to estimate long-term trends in site occupancy and to identify factors that may influence detection probabilities. The best model, which had 100.0% support based on Akaike's Information Criterion model weights, indicated that site extinction increased over time in a log-linear trend while site colonization declined in a log-linear trend. Thus, site occupancy probability steadily declined over my study and was correlated with the observed numbers of territorial owls on the study area. The initial site occupancy probability (1993) was estimated to be 1.00 (SE = 0.00), compared to an occupancy probability in the study's final yr (2010) of 0.61 (SE = 0.06). These results were not an artifact of my sampling design (i.e., surveys only being conducted at occupied sites in the early yrs of the study) because the entire study area was surveyed in 1993 and owls did not colonize any "new" territories after 1997. I also found that within-yr detection probability increased strongly after owls were initially detected at a site (initial = 1.13, 95% C.I. = 0.91 to 1.36) and when owls were nesting at a site (repro = 1.41, 95% C.I. = 1.12 to 1.69). The occupancy decline I detected was contrary to recent mark-recapture analyses that suggested the population has been stable during my study period. This discrepancy should be investigated further because it may affect this subspecies' current status under the Endangered Species Act. The U.S. Fish and Wildlife Service has twice denied listing of the subspecies, partly due to mark-recapture studies (including this one) which suggested that populations in the Sierra Nevada were stable.



Avian Predators Play a Key Role in Population Regulation and Energy Flux of the Arctic Tundra Food Web

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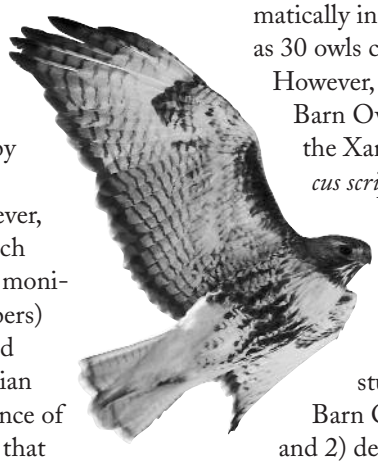
At the top of food webs, birds present a diverse suite of predators in many ecosystems. In the Arctic tundra, the Snowy Owl (*Bubo scandiacus*), the Rough-legged Hawk (*Buteo lagopus*), the Peregrine Falcon (*Falco peregrinus*), the Long-tailed Jaeger (*Stercorarius longicaudus*) the Parasitic Jaeger (*S. parasiticus*) and the Glaucous Gull (*Larus hyperboreus*) all feed on small mammals such as lemmings (*Dycrostonyx* and *Lemmus* sp.), the main herbivores. It has been suggested that predation pressure by those predators could limit or even regulate herbivore numbers. However, empirical data aiming to answer such questions are rare. Since 2004, we monitored numerical (variation in numbers) and functional (variation in diet and consumption rates) responses of avian predators in relation to the abundance of prey. Our results provide evidence that predation pressure is substantial and could limit herbivore numbers during the snow-free period. Moreover, by tracking Snowy Owls with satellite transmitters, our results suggest that those birds could limit herbivore numbers on a broad continental scale, given their long-distance post-breeding movements. Furthermore, the satellite tracking allowed us to show that Snowy Owls, known specialist predators of the terrestrial ecosystem, rely on marine resources during winter. Those observations suggest that allochthonous subsidies from the marine ecosystem could ultimately affect the functioning of the tundra food web by supporting dense populations of predators when terrestrial resources are unavailable.



Population Dynamics and Diet of an Island Population of Barn Owls (*Tyto alba*)

***SARAH K. THOMSEN** (sthomsen@sfu.ca), Simon Fraser University, Burnaby, BC, Canada, and A. LAURIE HARVEY, Channel Islands National Park, Ventura, CA, USA

Barn Owl (*Tyto alba*) distribution includes many islands worldwide, including Santa Barbara Island, which is located 60 km off the coast of California and at 2.6 square km is the smallest of five islands comprising the Channel Islands National Park. We describe the population dynamics and diet of cliff-nesting Barn Owls on this island in response to varying densities of their primary prey, an island endemic subspecies of deer mouse (*Peromyscus maniculatus elusus*), and the seasonal influx of nesting seabirds. Deer mice are the only mammal on the island and exhibit cyclic dynamics during which they can reach extremely high densities (over 900/ha) followed by sharp declines. Barn Owl abundance increases dramatically in response, from a low of three to as many as 30 owls counted along a 7.5 km trail transect. However, in years when mice are less numerous, Barn Owls also prey on nocturnal seabirds such as the Xantus's Murrelet (*Synthliboramphus hypoleucus scrippsi*), a state Threatened species. Since over half the world's population of this small alcid nests on this island, mortality of breeding individuals could have a significant impact on an already declining population. Therefore, we initiated studies in 2011 to 1) describe habitat use of Barn Owls (with line transects and telemetry) and 2) describe rodent prey availability in various habitats (with track tubes) in order to investigate how predation on murrelets varies with the availability of alternative prey and with habitat use of Barn Owls. We report results from the pilot season, a year with relatively high mouse density and low murrelet predation. Track tube indices showed greater mouse activity in murrelet nesting areas than habitats further away from the shoreline, and Barn Owls were also more frequently detected on line transects through murrelet habitat. We will discuss the implications of our results for this island ecosystem.

The Effect of Carbofuran Poisoning and Other Illegal Persecution Methods on Raptor Populations in Scotland

***RUTH E. TINGAY** (dimlylit100@hotmail.com), Wildlife International Network, UK.

Raptors in the UK have been subjected to poisoning and other methods of persecution for several centuries. Legal persecution was particularly prominent during the late 1800s, coinciding with the popularity of driven grouse shooting. During this period, raptors were considered to be 'vermin' and a threat to the survival of game birds reared for sport shooting on private estates. As a result, many raptors were systematically eradicated with catastrophic population-level effects. By the early 1900s, several species had become extinct in Scotland, including the White-tailed Sea Eagle (*Haliaeetus albicilla*), Goshawk (*Accipiter gentilis*), Red Kite (*Milvus milvus*) and Osprey *(Pandion haliaetus*). Other species managed to avoid extinction, but suffered severe range contraction as a direct result of persecution, including the Hen Harrier (*Circus cyaneus*), Peregrine (*Falco peregrinus*), Eurasian Buzzard (*Buteo buteo*) and Golden Eagle (*Aquila chrysaetos*). Legal protection for raptors was first introduced in 1954, and over the following 50 yrs society's perception of birds of prey improved. Several raptor re-introduction projects continue to aid the recovery of some species such as the White-tailed Sea Eagle and the Red Kite, along with further national and international legislation designed to prevent raptor persecution. However, such legal protection is only effective if it is properly policed and enforced with adequate resources. Multiple peer-reviewed studies published during the last ten yrs demonstrate that illegal raptor persecution is widespread and relentless in 21st Century Scotland, and it is affecting the recovery of several important raptor populations, including Golden Eagles, Red Kites, Hen Harriers and Goshawks. Poisoning, and particularly the use of baits laced with carbofuran on grouse moors, is central to this issue.

Nocturnal Activity Range and Behavior in Migrant and Wintering Northern Saw-whet Owls (*Aegolius acadicus*) in the Central Appalachians

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Little has been published about activity range size and nocturnal behavior in migrant and wintering Northern Saw-whet Owls (*Aegolius acadicus*). Using triangulation telemetry, we tracked 15 owls over two autumn and winter seasons (Oct.-April) to plot their movements, activity ranges and roost sites. We found Northern Saw-whet Owls using up to 351 ha over a 12-night period, and traveling up to 4.5 km and 190 m in elevation between roost sites and hunting locations; overlap between foraging areas and roost sites was rare. Tracked activity suggests a bimodal foraging pattern, with active hunting occuring 1-3 hr after dark and 1-3 hr before dawn. Tracked owls showed an avoidance of edges and forest openings, at variance with previously published studies of western populations.

Owl Occurrence in Several of El Salvador's Protected Areas

***JANE NOLL WEST** (jane_west@fws.gov), U.S. Fish & Wildlife Service Midwest Regional Office, Bloomington, MN U.S.A.

I studied owl occurrence (number of individuals per km of trail/night) from spontaneous calls and responses to broadcast vocalizations in three of El Salvador's protected natural areas: Parque Nacional Montecristo, Parque Nacional El Imposible and Bosque Nancuchiname. Sixty permanent survey stations were spread at 200 m intervals over six; 2 km trails (10 stations per trail) with each protected area having two transect routes. During 2002, the transect routes with stations were set up and a test of the spontaneous calls method was run for the 60 stations. A total of 73 repetitions of each survey method were completed in March and April of 2003-2005 and 2007-2011 (eight yrs). Nine species of owls were heard (*Tyto alba, Megascops trichopsis, Megascops*

cooperi, Bubo virginianus, Glaucidium brasilianum, Strix fulvescens, Ciccaba virgata, Pulsatrix perspicillata, c.f. Asio stygius) in the protected areas. Vocalizations of seven species (*Tyto alba, Megascops cooperi, Bubo virginianus, Glaucidium brasilianum, Strix fulvescens, Ciccaba virgata, Pulsatrix perspicillata*) were recorded. The maximum number of individuals of a species heard at a transect point was six *Ciccaba virgata* at an El Imposible transect point during 2004.

Assessing the Genetic Diversity and Distinctness of Eastern North American Golden Eagles

***MARIA WHEELER**
(maria.s.wheeler@gmail.com), BRADY PORTER, Department of Biological Sciences, Duquesne University, Pittsburgh, PA U.S.A., TODD KATZNER, Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV U.S.A.

This study examines the extent to which historical reintroductions of western Golden Eagles (*Aquila chrysaetos canadensis*) into eastern North America have influenced the genetic structure of contemporary eastern populations. Though geographically and potentially reproductively isolated from their western U.S. counterparts, the eastern Golden Eagle population was augmented by multiple independent translocations of western birds between 1981 until 2006. We are evaluating the level of genetic distinction between eastern and western populations via comparing sequences of the mitochondrial cyt b gene and of ten microsatellite loci. Genetic material has been acquired primarily from naturally shed feathers from contemporary wild and captive birds as well as from historical museum specimens, to allow comparison of these two populations both before and after the reintroductions. Average cyt b sequence divergence between populations is 0.303%, with 0.314% sequence divergence across all specimens. The two most divergent individuals vary by 1.02%, from two contemporary eastern birds. Similarly, Bayesian analysis of microsatellite data has not revealed any definitive clustering of populations. These data indicate that the modern populations of eastern and western Golden Eagles are not currently distinct from one another. Work with historic specimens is beginning to compare genetic differences pre-introductions with those in the present population. Results of this study have the potential to impact not only the management of Golden Eagles in the eastern U.S., but also conservation planning for other species.

Conservation Status of Short-eared Owls (*Asio flammeus*) in the United States and Canada

***DAVID A. WIGGINS**
(david.wiggins@gmail.com), Hallkved, Uppsala, Sweden.

Short-eared Owls (*Asio flammeus*) are considered a species of conservation concern in many areas of their North American range, but coordinated conservation efforts have not yet taken place. A major factor keeping this species "off the radar" of responsible Federal, Provincial and State agencies is that accurately monitoring breeding (and wintering) population trends is difficult given the species' nomadic nature. Nonetheless, the available long-term data suggest significant declines across the North American range. Probable causes for these declines (in some areas of the species' range) include habitat loss, habitat degradation, disturbance during the breeding season, and collisions with automobiles, transmission lines, and wire fences.

Bald Eagles as Agents of Cormorant Control in Northern Minnesota

***STEVE K. WINDELS** (steve_windels@nps.gov), Voyageurs National Park, International Falls, MN U.S.A.

Double-crested Cormorant (*Phalacrocorax auritus*; hereafter "cormorant") populations have rebounded dramatically throughout the Great Lakes region over the last 40 yrs since DDT and other contaminants were banned. In many areas, cormorants are actively managed to reduce conflicts with human uses. Bald Eagles (*Haliaeetus leucocephalus*) have also experienced a population increase throughout much of their range in the Great Lakes region as contaminant levels declined. Bald Eagles are primarily known as fish-eaters or scavengers, but they also have been known to predate on cormorants and other colonial waterbirds. Recent evidence from the Voyageurs National Park area suggests that Bald Eagles may be causing local declines in the cormorant population directly through predation and indirectly through disturbance to nesting adults. Mortality of four of 25 adult radio-

tracked cormorants was attributed to Bald Eagles in 2008-2009, with at least three of the events happening away from the cormorant colony. More than 30% of Bald Eagle nests surveyed in June 2009 (n = 30) and 2010 (n = 30) contained feathers or bones from adult or nestling cormorants. Bald Eagles were implicated in predating more than 150 cormorant chicks over several days in August 2009 at one cormorant colony, causing complete failure of that breeding colony. Repeated disturbance by visiting eagles caused two local colonies to abandon before most eggs could hatch in 2010. Adult cormorants will flush from the nesting colony when Bald Eagles approach or land, exposing eggs and small chicks to predation by co-nesting gulls. Similar data collected in 2011 will also be reported.

Plenary Speaker

Dr. SCOTT LANYON

Insights from the Avian Tree of Life: Raptor Stories.

Are vultures more closely related to storks or to hawks? Are falcons and hawks thought to be closely related? You are probably thinking to yourself, "Who knows! The classification keeps changing so often I can't remember who is related to whom!!" Dr. Lanyon will review recent advances in uncovering the evolutionary relationships of modern species and how our changing understanding of these evolutionary relationships leads to changes in raptor classification. He will also provide an update on discoveries made in recent years regarding where raptors fit on the Tree of Life and insights about their evolutionary history.

Scott Lanyon is currently serving as Head of the Department of Ecology, Evolution, and Behavior at the University of Minnesota, Twin Cities where, in his non-administrative time, he conducts comparative phylogenetic studies of behavioral and morphological evolution in birds. He is a second generation avian systematist having grown up at the American Museum of Natural History's Kalbfleisch Field Research Station where his father (Wesley Lanyon) was the field station's director and AMNH Curator of Birds. Scott received his Master's from Indiana University and Ph.D. from Louisiana State University. He served as Curator of Birds at the Field Museum of Natural History in Chicago for ten years before coming to the University of Minnesota in 1995 as Director of the Bell Museum of Natural History and as an Associate Professor in the Department of Ecology, Evolution and Behavior. He is a past Vice President of the American Ornithologists' Union, currently serves as Chair of the Board for Audubon Minnesota, and Chairs the Steering Committee for the Minnesota Breeding Bird Atlas.

SPECIAL SYMPOSIA

Raptors and Wind Energy

The current need to develop alternative energy sources has resulted in a steep increase in the amount of energy produced by wind turbines. As the number of turbines continues to proliferate worldwide, the potential for wind farms to adversely affect raptors, especially during migration can only increase.

Organizer: Anna Peterson (University of Minnesota Duluth, USA)

Ecology and Conservation of Eastern North American Golden Eagles

Golden Eagles in Eastern North America breed in Canada and winter in the Appalachian Mountains from Maine to Georgia and along the northern Mississippi River Valley. Historically this population bred in New England but was extirpated in the late 1990s. Compared to the population west of the Mississippi, the eastern population is small (300-500 breeding pairs), and remarkably poorly understood. Recent research on the breeding, migration, and wintering ecology of these eagles suggests that they may be behaviorally distinct from birds in the rest of the continent. The relatively small size of the eastern population makes it particularly vulnerable to threats such as lead poisoning, incidental trapping, habitat loss, and turbine collision. Presentations will address the history of the Golden Eagle in the East, breeding ecology, migration patterns and behavior, and wintering ecology, as well as genetic parameters that may distinguish this population.

Organizers: Libby Mojica (Center for Conservation Biology, USA), Dave Kramar (Virginia Tech, USA)

Breeding Ecology, Distribution, and Movements of *Aegolius* Owls

Two decades ago Aegolius owls were poorly understood across North America. A relatively simple concept, cooperative targeted migration banding of Northern Saw-whet Owls (*A. acadicus*) has begun to change that. Northern Saw-whet Owls are now the most banded owl in North America. While extensive research has been conducted on Tengmalm's Owls (*A. funereus funereus*) in Europe, the North American Boreal Owl (*A. f. richardsoni*) has received much less attention. The two other species in this genus the Unspotted Saw-whet Owl (*A. ridgwayi*) and Buff-fronted Owl (*A. harrisii*) are the least known in this group.

Organizers: David F. Brinker (Maryland Department of Natural Resources, USA), David H. Johnson (Global Owl Project, USA), Scott Weidensaul (Ned Smith Center for Nature and Art, USA).

Short-eared Owls: The Need for a Continental Conservation Plan

The Short-eared Owl is a species-in-decline with movements across the three North America countries. This symposium will focus on studies of survey techniques, ecology, satellite telemetry and conservation issues on this a wide spread, nomadic species. The symposium will be followed by an open round table discussion on techniques for using satellite telemetry on owl species.

Organizer: Geoff Holroyd (Environment Canada)

Pesticides and Metals in Raptors

Raptors often suffer elevated levels of chemical exposure due to their trophic position atop both aquatic and terrestrial food chains. In some cases exposure continues for years after an anthropogenic source is reduced or eliminated. In addition, new chemicals with different modes of action are continually introduced. We propose to bring researchers with expertise on legacy chemicals (e.g., organochlorines, PCBs) together with researchers working on contaminants of recent and current concern (e.g., organophosphates, endocrine disrupting compounds, anti-coagulant rodenticides, or organic Hg) to survey and evaluate the current threats to raptor populations from anthropogenic chemicals.

Organizers: Matthew A. Etterson (U.S. Environmental Protection Agency, USA), Gerald J. Niemi (University of Minnesota Duluth, USA)

Andersen Award

The William C. Andersen Memorial Award is given to both the best student oral and poster presentation at the annual RRF meeting. This award can only be given to a student once per degree (bachelor, master, or doctorate). To be eligible, a student must be senior author and presenter of the paper or poster.

The William C. Andersen Award was established in 1982 in memory of Bill Andersen, who drowned in 1980 while canoeing the Churchill River in Manitoba during a Peregrine Falcon survey. Dr. Andersen was a chemistry professor, but his first love was raptors. He established the Ornithology Research Center at Otero Jr. College in La Junta Colorado, as a medium for raising funds for the field research he conducted with his students. His interest in raptors of southeastern Colorado grasslands naturally evolved into developing a solution to the universal problem of raptor persecution. He established a rehabilitation facility and tirelessly lectured to service clubs and school groups about the benefits of raptors. He was a strong supporter of the RRF and a number of students accompanied him to each of the annual meetings. His enthusiasm, sincerity, and humor sparked an interest in raptors among many of his students and associates.

POSTER SESSION

Continental Movements of Short-eared Owls as Shown by Banding and Satellite Telemetry

CHRISTIAN ARTUSO, DEBBIE BADZINSKI, TRAVIS BOOMS, JIM R. DUNCAN, MARCEL A. GAHBAUER, GEOFF L. HOLROYD (geoffrey.holroyd@ec.gc.ca), JIM A. JOHNSON, PETER NYE, HELEN E. TREFRY, Environment Canada, Edmonton, AB Canada.

Short-eared Owls (*Asio flammeus*) breed from the arctic to southern U.S. and winter from southern Canada to central Mexico. This simple range description ignores the high variability in the occurrence of this species dependent on the abundance of small mammals, their primary food. Bird banding encounters provide limited information on the species movements. Small, 9.5 gm, solar powered satellite transmitters provide continuous and real-time information on the movements of Short-eared Owls. In the past three yrs transmitters have been placed on this species from Alaska to eastern North America. The transmitters indicate that some owls appear to have a 'migration', but many others are ephemeral with large scale breeding dispersal. This poster will summarize a wide variety of telemetry studies across the continent.

Analysis of Banding and Recovery Data for Red-tailed Hawks (*Buteo jamaicensis*) in the Northeastern U.S.A.

JASON M. BAIRD, JOAN L. MORRISON (joan.morrison@trincoll.edu), Environmental Science Program, Trinity College, Hartford, CT U.S.A.

Banding has been an effective long-term method for evaluating movement patterns and dispersal for some bird species, including raptors. We used band recovery data obtained from the USGS Bird Banding Laboratory to examine distances and directionality between banding and recovery locations for 787 Red-tailed Hawks (*Buteo jamaicensis*) banded in Connecticut, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont between 1925 and 2010. We investigated relationships between hawk age and distance travelled, and we discuss implications for understanding natal dispersal and philopatry. We also evaluated relationships between season and latitudinal movement. Hawks banded as nestlings in the Northeast were recovered from 27 U.S. states and four Canadian provinces. Hawks banded as adults tended to move shorter distances than younger hawks, and only 33% of adults were recovered outside the state in which they were banded, although individuals were recovered as far away as Florida and Alabama. Most recoveries took place in colder seasons than corresponding bandings. Hawks that were recovered in the winter following their summer banding showed a stronger directionality towards the south, and hawks that were recovered south of their banding site were recovered during a colder season than when they were banded. Along with limited information from radio-tagged breeding pairs of hawks showing yr round residence, information from this broader recovery dataset contributes to our understanding of movement and migration patterns in this common species.

Effects of Methylmercury on Reproduction in American Kestrels and Comparison to Effects Observed in Other Avian Species

RICHARD S. BENNETT (bennett.rick@epa.gov), U.S. Environmental Protection Agency, Duluth, MN U.S.A., PETER. H. ALBERS, WILLIAM.A. LINK, WAYNE. C. BAUER, JOHN.B. FRENCH, U.S. Geological Survey, Patuxent WRC, Beltsville, MD U.S.A., MICHEAL T. KOTERBA, U.S. Geological Survey, Maryland Science Center, Baltimore, MD U.S.A., RONALD ROSSMAN, U.S. Environmental Protection Agency, Grosse Ile, MI U.S.A., KEITH G. SAPPINGTON, U.S. Environmental Protection Agency, Washington, D.C. U.S.A.

To assess the effects of methylmercury (MeHg) on the survival and reproduction of birds, several controlled-dose laboratory studies have been conducted over the yrs on a variety of avian species, but none of the previous studies measured reproductive effects in a flesh-eating species. In this study, breeding pairs of captive American Kestrels (*Falco sparverius*) were exposed to 0, 0.75, 2.0, 3.2, 4.6, or 5.9 ppm MeHg dry weight in the diet and subsequent reproduction was

measured. Egg production, incubation performance, and number of eggs hatched decreased markedly between 3.2 and 4.6 ppm MeHg dry weight in the diet. The percent of eggs hatched declined at doses above 0.75 ppm MeHg, with no eggs hatching at 5.9 ppm. Nestling survival and fledging success decreased in a dose-related manner for all treatments. Dietary concentrations of ≥ 4.6 ppm MeHg were associated with total fledging failure. Mercury concentrations in a set of 19 collected 'second' eggs were related to the reproductive responses of kestrels to dietary MeHg. Concentrations of Hg in eggs from the 5.9 ppm diet group (mean 19.1 ppm wet wt.) are higher than egg concentrations reported for wild birds, and higher than those from feeding studies using dry commercial food containing 5 ppm MeHg. The relationships between MeHg dietary exposure and reproductive effects observed in this study will be compared to effects observed in studies using other avian species with a goal of refining the effects characterization needed for population-level risk assessment. This abstract does not necessarily reflect EPA policy.

Integrated Population Modeling of Sparse Data from an Open Population of Threatened Southeastern American Kestrels

JESSI L. BROWN (jessilbrown@gmail.com), Ecology, Evolution and Conservation Biology Graduate Program, University of Nevada, Reno, NV U.S.A., MICHAEL W. COLLOPY, Academy for the Environment, University of Nevada, Reno, NV U.S.A.

Integrated population models (IPMs) offer enhanced abilities to explore population dynamics, especially when considering sparse data sets commonly associated with threatened or endangered populations. We analyzed the recent population trends of a population of Southeastern American Kestrels (*Falco sparverius paulus*) associated with a network of nest boxes in north-central Florida, U.S.A. Although the subspecies is of conservation concern, little is known about demographic vital rates or population trajectories. We used Bayesian IPMs that simultaneously considered mark-recapture data sets, fledgling production, and population surveys to assess recent population growth rates, productivity, and demography. We further evaluated the potential of the nest box population to serve as a source to the surrounding population that used natural cavities by comparing local and overall population growth rates, apparent survival probabilities, and recapture probabilities between an IPM that explicitly modeled immigration and one that did not. Overall population growth rates suggested that the population was stable, even though immigration was apparently important with approximately 0.3 female immigrants per resident female kestrel each yr. Explicitly modeling immigration resulted in lower estimates of juvenile kestrel apparent survival probability, suggesting that a large proportion of locally produced juveniles emigrated rather than recruited locally. These results emphasize the utility of data sets from the monitoring of nest boxes, as well as the potential contribution of juveniles fledged from nest boxes to the regional population. The IPM approach allowed effective modeling of real-world data sets, including sparse data that are typically characteristic of threatened populations.

The 2010 Ontario Peregrine Falcon Survey – A Summary Report

JENNIFER CHIKOSKI (jenn.chikoski@ontario.ca) and LISA NYMAN, Ontario Ministry of Natural Resources, c/o Centre for Northern Forest Ecosystem Research, Thunder Bay, ON CAN

Ontario participated in the 2010 nation-wide Peregrine Falcon survey. This is the 9th national survey since 1970. Results of the 2010 Ontario Peregrine Falcon (*Falco peregrinus*) survey identified 119 territories; the highest number of territories to be confirmed in the province. The 119 sites were comprised of 71 confirmed nesting attempts, 29 territorial pairs, and 19 single birds occupying territories. There continues to be two types of nesting habitat in Ontario; Peregrine Falcons that nest on natural cliff habitat primarily in northern Ontario and Peregrine Falcons that nest on urban features including buildings, bridges and stacks in southern Ontario. Lake Superior Basin continues to support the highest number of cliff nesting birds with 69 cliff territories, two bridge territories and one territory located on a stack. Forty-one new sites were located in 2010 compared to the 2005 survey. Several previously documented sites were not active in 2010 and some sites were not able to be surveyed. Fifty of the 119 territories successfully produced young, the most ever recorded in Ontario, and at least 140 chicks were assumed to have fledged.

After the 2010 survey, three historical cliff nesting sites are now re-occupied in Ontario. An estimated productivity of 2.80 chicks per successful nest and 2.0 chicks/nest attempts were confirmed. There were 67 young Peregrine Falcons banded at both urban and cliff nesting sites. Twenty-six species of birds were identified as prey remains from 13 nest sites in northern Ontario. The results of this survey indicate that the Peregrine Falcon population in Ontario continues to expand and recover. There continue to be many historical nest sites and potential natural cliff habitat un-occupied.

Effects of Lost and Discarded Fishing Tackle on Nestling Bald Eagles in Voyageurs National Park

PETER P. DATEMA, LATICE FUENTES, Department of Forestry and Natural Resources, Clemson University, Clemson, SC U.S.A., HENRY T. PITTMAN, U.S. Geological Survey and University of Arkansas Fisheries and Wildlife Research Co-op Unit, Fayetteville, AR U.S.A., WILLIAM W. BOWERMAN, Department of Environmental Science & Technology, University of Maryland, College Park, MD U.S.A., WILLIAM BRIDGES, Department of Applied Economics and Statistics, Clemson University, Clemson, SC U.S.A., LELAND H. GRIMM, Voyageurs National Park, International Falls, MN U.S.A., TERYL G. GRUBB, U.S. Forest Service, Rocky Mountain Research Station, Flagstaff, AZ U.S.A.

Voyageurs National Park (VNP) is a water-based park with abundant resources that attracts recreational fisherman from all over North America. There are growing concerns regarding the impacts of lost or discarded fishing tackle on the aquatic ecosystem. Because of the Bald Eagles' (*Haliaeetus leucocephalus*) diet and foraging behavior, they are susceptible to the ingestion of and entanglement in fishing tackle. Since 1989, annual banding activities on Rainy, Namakan, and Kabetogama Lakes have allowed for the evaluation of long term effects of anthropogenic activities on Bald Eagle productivity. The objectives of this study are to 1) evaluate the effects of discarded fishing tackle on nestlings, 2) report the presence of tackle, observed abnormalities and nest productivity, and 3) determine if there are any relevant correlations. From 1989 to 2010, 321 nests were visited and 440 nestlings were sampled. The average productivity at VNP was 1.40 nestlings per occupied nest. Field crews observed 34 instances of fishing tackle present. There were five instances where nestlings were found dead at or near the nest with two of these deaths directly caused by an encounter with fishing tackle. There was no significant difference among the means of the lakes for tackle incidence and prevalence, however, there were a significant increase in fishing tackle incidence ($F = 12.21$, $p = 0.0008$) and prevalence ($F = 12.24$, $p = 0.0008$). Injury prevalence and incidence over time had no significant difference ($F = 2.1807$, $p = 0.1440$ and $F = 1.9847$, $p = 0.1631$ respectively). Death incidence and prevalence were not significant either ($F = 0.8452$, $p = 0.3609$ and $F = 0.8100$, $p = 0.3711$ respectively).

Evaluation of Raptor Density in the Agricultural Landscapes of Central Nebraska

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Wintering raptor populations were studied in Buffalo and Kearney counties in central Nebraska as part of a pilot project evaluating the application of variable circle plot methodology to an immense agricultural landscape. Distance data were collected from 114 plots distributed along county roads, covering approximately 318,000 hectares, using binoculars, laser range finders and hand-held GPS. While no raptors were detected at the majority of sample sites, 48 raptors were successfully identified with corresponding distance measurements. Species encountered included Red-tailed Hawk (*Buteo jamaicensis*), American Kestrel (*Falco sparverius*), Bald Eagle (*Haliaeetus leucocephalus*), Northern Harrier (*Circus cyaneus*) and Turkey Vulture (*Cathartes aura*) with calculated densities of 24.4 ± 9.2, 4.6 ± 3.9, 0.9 ± 0.6, 0.5 ± 0.3 and 1.8 ± 1.6 per 1,000 hectares ± SEM, respectively. Unfortunately, several species known to occur in the study area were not detected in any of the samples. These findings indicate that variable circle plot methods can be successfully applied to many species occurring in the study area; however, other methodology or modified methodology would be required to adequately sample difficult to detect species.

A Comparison of the Breeding Biology of Wild and Captive Released Western Burrowing Owl (*Athene cunicularia*) in Southwest Manitoba

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The Western Burrowing Owl (*Athene cunicularia*) is designated as an endangered species in Canada due to its severe and ongoing population decline. Burrowing Owls once occupied most of the grassland Prairie Provinces and the southern interior of British Columbia. No single factor has been identified as causing the decline of Burrowing Owls, however several factors are thought to limit their success, including: habitat loss and fragmentation, loss of burrows, decreased prey, and increased predation. In Manitoba, known nesting populations have declined from 76 pairs in 1982 to less than 10 pairs in recent yrs. The Species at Risk Act's recovery strategy for the Burrowing Owl in Canada outlines specific goals and objectives to promote the recovery of Burrowing Owls to their historic range. The long term recovery goal specifically for Manitoba is to reestablish a self-perpetuating, well-distributed, wild breeding population to their 1993 historical range (23 pairs). Due to limited data available in Manitoba about the species with no specific ecological examination of food habits, home range, and/or dispersal, fulfilling specific recovery goals is difficult. The short term goal of this study is to begin a reintroduction program to increase Burrowing Owl populations in Manitoba, and to identify limiting factors that affect the owl's survival in the province. The breeding biology of captive release and wild populations will be evaluated including diet, home range/habitat use, nesting and hatching success, survival, and dispersal. The long term goal of this study is to reestablish a self-sustaining Burrowing Owl population and range to 1993 Manitoba levels. This study will also define breeding habitat characteristics for Burrowing Owls in southwest Manitoba which will facilitate monitoring, adaptive management, and identify additional release sites for Burrowing Owls beyond the period of this research. A summary of data collected to date will be presented.

Geospatial Approach to Evaluating Bald Eagle Habitat and Carrying Capacity in the State of Michigan

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Since the sudden decline of the Bald Eagle (*Haliaeetus leucocephalus*) population in the mid 20th century, the species has been monitored extensively throughout the United States. Monitoring efforts in Michigan have resulted in the collection of 50 yrs of data. Productivity and spatial data show that the population has rapidly increased and expanded throughout the state primarily due to the banning of DDT and PCBs. Currently, there are over 900 breeding areas, each containing one pair of breeding adult Bald Eagles in the state of Michigan. With this success comes the necessity to adequately manage Bald Eagle habitat to promote the health of the population. A habitat suitability model (HSM) was developed for Bald Eagle breeding pairs using tools in ArcGIS to identify potential high-quality habitat. The total area of the highest quality habitat was approximately 50,000 km2 with a maximum theoretical carrying capacity of about 25,000 breeding pairs. These data assumed each pair was defending a 2 km2 breeding area, and breeding areas were adjacent and clustered in high-quality habitat. A circular packing coefficient of 0.9069 was applied in order to represent a more realistic breeding area shape which resulted in a carrying capacity of approximately 23,000 pairs. This information provided insight into the future of Michigan's Bald Eagle population and of possible density-dependent equilibrium or decline associated with reaching carrying capacity. In addition, wildlife managers and landowners alike can utilize this information to better manage property to enhance the success of the Bald Eagle population.

Challenges in Creating an American Kestrel Body Condition Index Based on Size-Adjusted Mass

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Size-adjusted mass is a common body condition index (BCI) used to estimate non-structural energy reserves (fat and protein). BCIs are calculated from ratios of mass divided by a morphometric(s) or residuals of a regression between mass and a morphometric(s). The morphometrics used in BCIs must accurately account for structural size to obtain accurate and precise energy reserve estimates and, ideally, BCIs should be validated with comparisons to true fat and protein reserves. Many studies of American Kestrels (*Falco sparverius*) have included BCIs in ecological analyses; unfortunately, few studies have reported how well morphometrics reflected structural size, or provided validation of BCIs relative to independent measures of energy reserves. We evaluated relationships among several commonly used and non-traditional morphometrics and mass to better understand which morphmetrics may best reflect structural size for two kestrel populations: captive birds at McGill University in Montreal and free-living kestrels in southwestern Idaho. We also compared BCIs based on different morphometrics with subjective fat scores. Our data showed few strong ($r > 0.5$) relationships among morphometrics and few positive relationships between each morphometric and mass. Moreover, correlations were dependent on gender and location. Morphometric(s) that accurately reflect kestrel structural size remains to be determined. Similarly, not all BCIs positively correlated with subjective fat scores and correlations were dependent on gender, suggesting that BCIs perform differently between sexes. Males and females will mostly likely have different size correction factors, and information from both genders should not be combined to create one size correction factor for kestrels. We suggest that future research explore alternative morphometrics to account for structural size and validate BCIs with direct fat and protein measures. Until BCIs are validated, mass and additional qualitative information, such as fat scores, may be the best approach for analyses of condition.

GPS Tracking of Golden Eagles on Proposed Wind Farm Sites and Reference Areas in Sweden

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In Sweden, large scale wind energy development may pose a threat to the Golden Eagle (*Aquila chrysaetos*), a protected species which breeds throughout much of the northern forest region. Using GPS tracking, we aim to study the movements and ranging behaviour of Golden Eagles in five territories before and after wind farm establishment, and in five unexploited reference territories. The aim of the project is to advise the wind energy industry on "eagle friendly" placement of wind farms. Juvenile and adult Golden Eagles have been fitted with solar-powered GPS units, which provide positions up to six times per hr. Dispersal of juveniles and ranging behaviour of territorial adults will be presented, and used to discuss implications for wind farm establishment.

Impacts of Wind Turbines on Buteo Nesting Success and Fledgling Mortality in the Columbia Plateau Ecoregion

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As wind energy development has expanded throughout the Columbia Plateau Ecoregion (CPE) and Columbia River Gorge, very little data has been published that pertains to the response of breeding hawks or their young to wind power development. Currently, most information on the relationship between raptors and wind turbines comes from pre-and post-construction nest surveys and mortality monitoring on wind project areas. Our study will use a gradient-response design to identify how the spatial distribution of wind turbines may affect nesting suc-

cess of breeding adult hawks and mortality of juveniles in three sympatric Buteo species. During the 2010 and 2011 breeding seasons, we located a total of 120 hawk nests [16 Ferruginous Hawks (*Buteo regalis*), 38 Red-tailed Hawks (*Buteo jamaicensis*), and 66 Swainson's Hawks (*Buteo swainsoni*)] within 5 km of the nearest wind turbines and monitored nests until juveniles fledged. Additionally, 60 nestling hawks (10 Ferruginous Hawks, 27 Red-tailed Hawks, and 23 Swainson's Hawks) were radio-marked over the two seasons and tracked until dispersal from the study area in order to record location information and determine sources of mortality. Of the 30 nestlings radio-marked in 2010, seven mortalities were documented, none directly related to wind turbines. We will report on final nesting success and juvenile mortality upon completion of the 2011 summer field season. This study will provide needed information on juvenile hawk mortality and other potential impacts to breeding hawks from wind turbines within the CPE, which may also be relevant to wind projects nationwide. In addition, the information will be useful to developers when determining where to place turbine strings in order to minimize potential impacts to breeding hawks.

Ageing Northern Saw-whet Owls (*Aegolius acadicus*) from Remigial Molt Patterns

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Molt patterns of migrant Northern Saw-whet Owls (*Aegolius acadicus*) were studied at three locations in the Great Lakes region (Stevens Point, WI; Whitefish Point, MI; and Duluth, MN). We used molt patterns of birds recaptured from a previous molt season that were originally aged as hatching-yr (no remigial molt). Of the 223 known age individuals, 128 (58%) were second-yr (SY), 61 (27%) were third-yr (TY), 30 (14%) were fourth-yr (4Y), 12 (5%) were fifth-yr (5Y), one (0.45%) was sixth-yr (6Y), and one (0.45%) was seventh-yr (7Y). Using these known age birds, we were able to identify definitive molt patterns for the SY, TY and 4Y age classes. One hundred and twenty-seven of our 128 (99%) known SY birds matched the previously published SY molt pattern. Of the TY birds, 36 (59%) fit the published TY molt pattern. Of the 30 known 4Y saw-whets, 19 (63%) were consistent with our 4Y pattern. Birds that exhibited the TY or 4Y patterns were correctly aged (> 95%), but not all birds in those age classes showed these patterns. We encountered some birds that matched an incorrect age category, including one 4Y that matched the SY category, two 5Y that matched the TY category, and one TY, one 5Y, and one 8Y that matched the 4Y category. Out of the entire sample of 223, six birds (2.6%) matched an incorrect age category.

Northern Goshawk (*Accipiter gentilis*) Breeding and Productivity Relative to Prey Abundance within the Sawtooth National Forest

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The health of an ecosystem is dependent upon the interactions within and among species. Predator-prey interactions often have a disproportionately larger influence on ecosystem health and ecosystem functions than other interactions. As a result, predator-prey interactions must be understood and evaluated as part of any ecosystem health monitoring program. As a top predator within the South Hills of Sawtooth National Forest, the Northern Goshawk (*Accipiter gentilis*) provides an ideal model for studying predator-prey interactions. The isolated nature of the mountain range and naturally fragmented forest structure found within the South Hills exhibit the constraints of island biogeography as the top identified food source of Northern Goshawks worldwide, tree squirrels of genera *Sciurus* and *Tamiasciurus*, are naturally absent. To better understand the current status and role of the Northern Goshawk in this unique ecosystem and its impact on ecosystem health we measured Northern Goshawk occupancy and productivity for comparison with historic measurements. In 2011, we located nine occupied nests located

within 22 historic territories, for an occupancy rate of 41% which is comparable to the 40% occupancy rate measured during a ten yr study between 1994 and 2003. While occupancy was near average, productivity fell short of historic benchmarks. We then related Northern Goshawk productivity and nest success to forest structure, forest health, and prey abundance to identify the most important ecosystem influences affecting Northern Goshawk success. This study provides novel data on Northern Goshawk prey consumption and the relationship of consumption to prey abundance, forest structure and forest health, all of which are important to our understanding of the status of Northern Goshawks and their role in the ecosystem. This study has had an important influence on future management actions within the South Hills of the Sawtooth National Forest.

A Unified Approach for Using Telemetry to Assess Risks To and Take of Golden Eagles (*Aquila chrysaetos*) in Renewable Energy Landscapes

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Telemetry is the primary tool for documenting spatial use patterns and mortality of Golden Eagles at renewable energy projects in the western United States. Telemetry units currently being used are mainly PTT (platform transmitter terminal) and GSM (global system for mobile communications) modules with GPS (global positioning system) capacity. I outline a draft protocol for field methods and data handling, and summarize approaches to assessing utilization distribution with emphasis on pre- and post-construction assessment of renewable energy facilities. Researchers using telemetry on Golden Eagles (*Aquila chrysaetos*), whether for renewable energy assessment or other purposes, must look beyond their study questions and consider how they can help address critical range wide information needs for the species, such as sources of mortality, age-specific survival rates, natal dispersal patterns, and evidence of regional breeding populations and connectivity. By incorporating simple, universal details into their methods, researchers can collaboratively support strong meta-analyses with broad inferential value and in many cases help support replicated study designs in an adaptive management framework. My summary of basic aspects and ongoing debate over telemetry applications for Golden Eagles includes a plea to researchers to incorporate universal design components in their studies and to share data.

Detectability of Migrating Raptors

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Annual counts of migrating raptors are used as indices of population size. To ascertain accurate trends from index counts over time, the proportion of the population being counted must remain constant. As such, sources of variation in the proportion counted should be identified and either corrected for or eliminated. Detectability, narrowly defined as the probability of a visible bird being recorded, is one source of error. We used a dependent double-observer method to quantify the detectability of raptors at the annual fall raptor migration count at Idaho Bird Observatory's Boise Ridge Hawkwatch in 2009 and 2010 (65 d, 390 hrs, n = 6,873). We modeled detectability with a suite of Huggins closed-capture removal models, then selected and averaged models according to Akaike's Information Criterion (AICc). Our model includes covariates for observer identity, apparent distance, species, day of the season, and weather. Individual detectability with two observers varied from 0.27 to 0.96 (median = 0.70, IQR = 0.16). By controlling factors that affect detectability, or by adjusting counts to account for detectability, raptor observatory organizations may be able to produce more confident trend assessments, thereby better informing timely management decisions.

Determining Reasons of Nesting Failure and Brood Reduction of Snail Kite (*Rostrhamus sociabilis plumbeus*) Nests on the Kissimmee Chain of Lakes

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When attempting to set up a management plan for an endangered avian species such as the Snail Kite (*Rostrhamus sociabilis plumbeus*), it is important to identify both the proximate and ultimate causes of the endangerment. An integral part of determining the proximate causes of a species' decline is determining causes of reproductive failure as well as assessing reproductive success. Along with juvenile survival and recruitment, nest success plays a fundamental role in population growth. Documentation of Snail Kite nesting failure occurred in the 2010 and 2011 breeding seasons within the Kissimmee Chain of Lakes with a focus on Lake Tohopekaliga, Florida. Throughout the breeding season, 12 causes of nesting failure and brood reduction were documented along with several other potential predators. The leading causes of nest failure were abandonment by the adults and predation by yellow rat snakes (*Elaphe obsoleta quadrivittata*). With these results and a greater working knowledge of snail kite nesting biology managers can then employ more accurate methods of protecting the critical nesting locations from competitors, predators, and from human disturbance.

How Landscape and Climate Change Affect Occupancy of Wintering Raptors in the Morley Nelson Snake River Birds of Prey National Conservation Area

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Anthropogenic activities are recognized as drivers bringing about global change. Shrub-steppe is one of the most threatened ecosystems in North America due to expanding human development and the presence of invasive species. How these processes impact raptor communities and intensify as a result of global climate change is an unresolved question. The goal of this research was to determine how landscape and climate change are affecting wintering raptor occupancy patterns in the Morley Nelson Snake River Birds of Prey National Conservation Area (NCA) of southwest Idaho. We conducted fixed-radius point counts at 100 sites in the NCA during the 2010 winter following protocols used to monitor these same point count sites from 1991-1994. We then compared raptor occupancy patterns, habitat changes via satellite imagery, and local and regional weather data to historical records from 1991-1994. Results show that the local climate of the NCA is moving significantly towards warmer, less severe winters ($F_{1,27} = 11.75$, $P = 0.002$), with less snow cover ($F_{1,27} = 8.45$, $P = 0.007$). Results also show wildfires have continued to support invasion by non-native grasses such as cheatgrass (*Bromus tectorum*). The most numerous raptor species observed during the 2010 winter were similar to the historical record. However, some species have shown changes in abundance, including: American Kestrels (*Falco sparvarius*), Golden Eagles (*Aquila chrysaetos*), Northern Harriers (*Circus cyaneus*), Prairie Falcons (*Falco mexicanus*), Red-Tailed Hawks (*Buteo jamaicensis*), and Rough-Legged Hawks (*Buteo lagopus*). American Kestrels showed a significant increase in occupancy from eight occupied sites in 1991 to 18 occupied sites in the 2010. This is consistent with other data on wintering kestrels in Idaho, and is likely a result of warmer winters facilitating increased winter residency in some species. While landscapes continue to lose native vegetation, climate change may be altering the winter range of several key North American raptors, influencing their conservation planning.

Raptor Surveys in Agricultural and Natural Habitats of Southern Florida Using Point Counts and Roadside Surveys

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We conducted four yrs of point counts in the Everglades Agricultural Area (EAA) and nearby natural habitat in southern Florida. The EAA consists of 280,000 hectares of sugarcane, rice, sod and winter vegetables. There are very few trees, brush or other vertical structures such as telephone poles throughout most of the area other than alongside the few paved roads and in small rural towns. Within the agricultural fields, roads are mainly unpaved and are bordered by low vegetation and crops. Nearly all raptor observations occurred in fall, winter and spring and consisted of non-resident individuals. We randomly established point count locations on transects along dirt and gravel roads adjacent to fields and separated by at least 500 m with most of the points occurring at

least 1,000 m apart. Point counts lasted five min and individuals were counted if they were perched or hunting, not when flying actively between points. We conducted roadside surveys from a moving vehicle along a main road (U.S. Route 27). We drove slowly along the road and stopped whenever a raptor was seen either perched or flying. Each observation was geo-referenced and the species was recorded along with habitat type. Both roadside surveys and point counts documented similar patterns of occurrence between natural and agricultural habitat for some species like Osprey (*Pandion haliaetus*) and Black Vulture (*Coragyps atratus*). Red-tailed Hawks (*Buteo jamaicensis*) and American Kestrels (*Falco sparverius*) were less frequently counted in agricultural habitat during point counts compared with roadside surveys, likely because perches were scarce or absent away from roads. More species were observed during point counts, possibly because uncommon species were detected more frequently by this method.

Sex Determination of Northern Saw-whet Owls (*Aegolius acadicus*) based on DNA Samples Collected at Beaverhill Lake, Alberta

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Considerable controversy has surrounded the determination of sex of migrant Northern Saw-whet Owls (*Aegolius acadicus*; herafter "owls"). We determined the sex of 363 owls caught in autumns of 2004 and 2005 in central Alberta using DNA extracted from feathers. We evaluated sexing criteria proposed by Weir et al. (1980); Buckholtz et al. (1984); and Brinker (2000) to identify error rates and sex ratios of birds in the unknown-sex category. Of the three sexing criteria, Weir et al. (1980) had the lowest error rate (1.9%) and the most evenly distributed unknown-sex category sex ratio (42% male; 58% female). Brinker (2000) had the highest error rate (7.4%), all incorrectly sexed owls were female and females comprised 90% of the unknown-sex category using Brinker (2000). A discriminant function which used wing chord length and body mass as independent variables had the lowest error rate and smallest percentage of owls in the unknown-sex category than wing chord or body mass alone. Therefore, a new sexing table was generated using these two measures. We recommend that DNA sexing of owls caught in autumn be repeated in eastern North America to determine if size varies geographically. In the interim, we suggest that the discriminant function presented here be used to sex Northern Saw-whet Owls.

Comparison of Reproductive Performance of Exurban and Urban Mississippi Kites (*Ictinia mississippiensis*)

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Mississippi Kites (*Ictinia mississippiensis*) have become a common breeding raptor in many exurban and urban areas of the Great Plains. Though Mississippi Kites are underrepresented in the primary literature, previous studies have indicated a general pattern whereby urban breeding Mississippi Kites have greater nest success and productivity than their exurban conspecifics. To date, however, there is no concurrent study of exurban and urban Mississippi Kites that supports this general pattern. In 2010 we initiated a study of exurban and urban Mississippi Kites breeding ecology in the Southern Great Plains of Texas. We located and monitored 61 nests (15 exurban and 46 urban) in 2010. Daily survival rate was marginally lower in the exurban population (0.986) than the urban population (0.995). Mayfield nest success was markedly lower in the exurban population (42.2 %) than in the urban population (73.5 %). Contrary to the general pattern, productivity (number of fledglings per successful nest) was greater in the exurban population (1.4) than in the urban population (1.0). Our preliminary data only partially support the general pattern of greater reproductive performance in urban over exurban areas. As low sample size may be driving our elevated productivity in the exurban area, we intend on incorporating data from 2011 into our final analysis.

Spatial Ecology of Threatened Northern Crested Caracara (*Caracara cheriway*) in South Central Florida

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Understanding the spatial ecology of animals is an integral component of conservation management providing information regarding home range size, habitat use and movements of individuals. Here we begin to assess the spatial ecology of Northern Crested Caracara (*Caracara cheriway*), a medium sized raptor that occurs in a small isolated population in South Central Florida and is listed as threatened as a result of habitat loss. By using two methods, VHF- and GPS- based telemetry in conjunction with Hawth's Tools in ArcGIS v. 9.3, we estimated 95% fixed density kernel home ranges and habitat use within home ranges of Northern Crested Caracara during the reproductive period. Estimated home ranges of Northern Crested Caracara ranged between 12.27 km2 and 27.04 km2, and had perimeter lengths between 12.52 km and 20.83 km. Within home ranges, Northern Crested Caracara showed preferential use of certain habitat types including improved pasture and rural open, although preferences were not consistent between home ranges. The results from this study provide valuable insight into the spatial ecology of Northern Crested Caracara and have important implications for the conservation of this threatened species in south-central Florida.

The Genetic Impact of the DTT-induced Bottleneck in a Naturally Recovered Population: an Example from Peregrine Falcons Breeding on the Colville River, Alaska

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The unprecedented crash of Peregrine Falcon (*Falco peregrinus*) populations during the last half of the 20th century resulted in complete extirpation of the species in some areas, including major former strongholds. Throughout most of North America, recovery was augmented by the introduction of captive-bred Peregrine Falcons, some of non-North American ancestry, between 1974 and 1999, to bolster remnant, or replace extirpated, populations. Within Alaska however, populations were allowed to recover naturally through recruitment and recolonization. Here we used microsatellite and mitochondrial DNA (mtDNA) loci to assess the impact of a severe and prolonged bottleneck on Peregrine Falcons breeding on the Colville River, Alaska, which were monitored prior to, and throughout the decline and subsequent recovery. The population bottleneck experienced by Peregrine Falcons breeding on the Colville River had a significant impact on genetic diversity. The historic population (pre-1960's) was significantly different from the 1980's (bottlenecked) and 2001 (contemporary) populations, based on mtDNA sequence data (FST = 0.115 and 0.111, ST = 0.195 and 0.133, respectively). In addition, private haplotypes were observed in the historic and contemporary populations. Although temporal variance in allelic frequencies was not observed among populations based on microsatellite loci, differences in indices of genetic diversity were observed. Private alleles were observed in all populations; the contemporary population has the highest number of private alleles and the bottlenecked population had the lowest. Observed levels of heterozygosity were similar across timescales, although the historic population had the highest observed heterozygosity, but allelic richness was highest in the contemporary population. In addition, a genetic signature of population growth was detected in the contemporary population whereas the bottlenecked and historic populations had a genetic signature of stability, further indicating that the bottleneck did impact levels of genetic variability in the recovered Colville population.

Genetic and Morphological Divergence among Cooper's Hawk Populations Breeding In North-central and Western North America

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Species characterized by wide-ranging distributions and that occupy a variety of habitats often exhibit intraspecific morphological variation that may result from spatial heterogeneity in selection or the stochastic process of genetic drift. Here we examined the spatial genetic structure and gene flow among Cooper's Hawk (*Accipiter cooperii*) populations breeding in the northern portion of their range to examine hypotheses associated with morphological diversification among populations. Cooper's Hawks appear to conform to the genetic pattern of an east-west divide. British Columbia is genetically differentiated from north-central populations (pairwise microsatellite FST = 0.128–0.189; mitochondrial DNA ST = 0.177–0.204) suggesting that Cooper's Hawks were restricted to at least two Pleistocene glacial refugia. The strength of the Rocky Mountains/Great Plains area as a barrier to dispersal is further supported by restricted gene flow rates between British Columbia and other sampled breeding populations. Divergence in morphological traits (PST) was also observed across study areas, with British Columbia and North Dakota differentiated from Wisconsin and Minnesota, a pattern not predicted based on spatial variance in allelic and haplotypic frequencies. Comparison of PST and FST estimates suggests that heterogeneous selection based on prey mass and migratory behavior appear to be influencing overall body size and wing chord. Despite intersite differences in tree stand density and forest cover, stabilizing selection appears to be acting on western and north-central populations although genetic drift could not be excluded as an evolutionary force influencing the observed divergence in tail length among north-central sites.

Preliminary Results from Satellite Tracking of Golden Eagles in the Colorado Plateau Region

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A decline in the western U.S. breeding population of Golden Eagles (*Aquila chrysaetos*) is suspected and threats to the population are increasing, but poor understanding of the species' population dynamics limit its conservation. In spring 2010, we began using satellite telemetry to study survival, sources of mortality, natal dispersal, and movements and home range use of Golden Eagles breeding at the center of the Colorado Plateau region. Four of five nestling and two of four adult Golden Eagles that were instrumented with Platform Transmitter Terminals (PTTs) in New Mexico and northeastern Arizona in the spring of 2010 (nestlings) and winter of 2011 (adults) remained alive on 1 July 2011. Ten of 11 nestlings instrumented in northwestern New Mexico and southwestern Colorado during the spring of 2011 had fledged by 1 July 2011. Three New Mexico 2010 juveniles spent considerable time in southwestern Colorado during their first yr. The fourth 2010 juvenile remained in northeastern Arizona until late May 2010, then within two weeks moved through Colorado, Wyoming, and Nebraska to southwestern South Dakota before retreating to southeastern Wyoming. Mid-winter home ranges (95% kernel) were about 9 km2 for adult females and 31 km2 for adult males. Two adults departed breeding territories for one to five week periods after early February

2011, moving more than 400 km, but returned and continued movements within the territories similar to those before they had departed. One adult female was apparently killed in aerial combat within her territory, the cause of death of the second adult female was still under investigation. Habitat selection and movement data will be presented.

Examination of Population Structure and Genetic Diversity in a Recently Declining Breeding Population of American Kestrels

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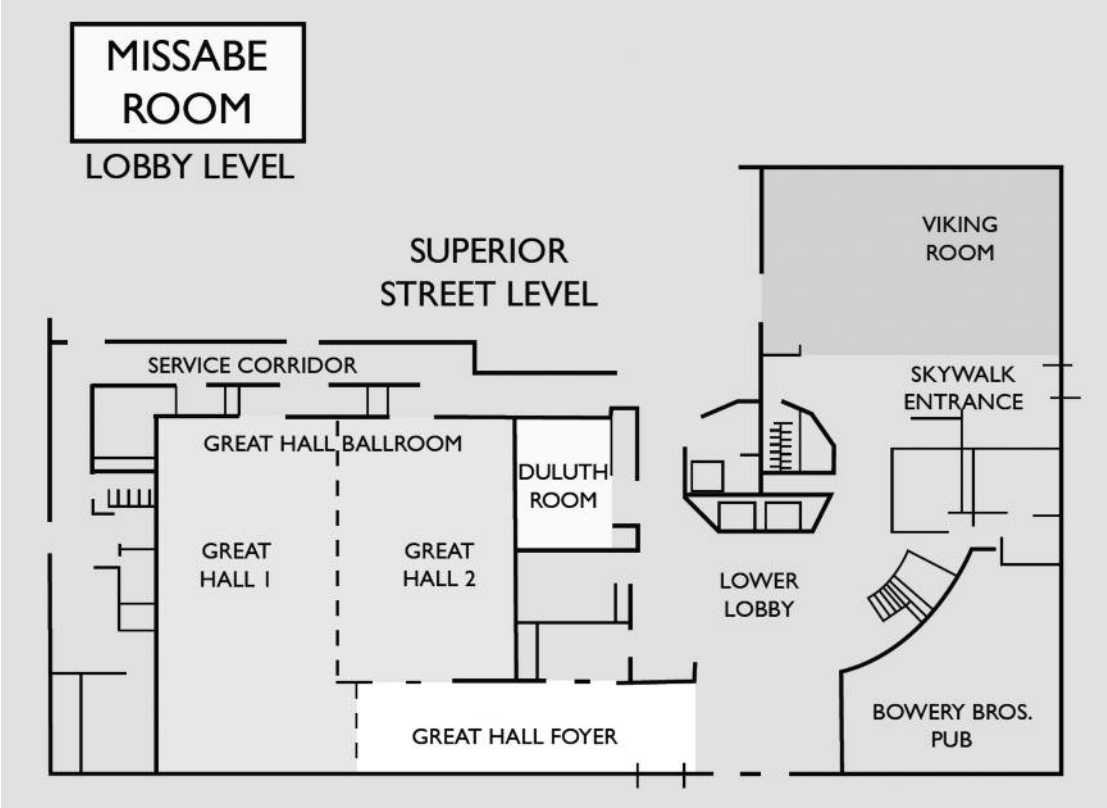
The American Kestrel (*Falco sparverius*) is North America's most numerous species of falcon. However, recent demographic data has begun to record a decrease in the number of individuals at both migration and nesting sites, especially in the eastern and northern sections of Canada and the United States. One important source of information that has not yet been utilized in this debate is genetic data. In this study we examined data from adults (n = 205) trapped at a breeding population in the boreal forest of Saskatchewan in 2007 and 2008. The nest box program in Saskatchewan has shown a significant decline in occupancy rates over the past 20 yrs. We used microsatellite data to look for a loss of genetic diversity in the population, which could be a sign of a population bottleneck, and represent genetic evidence in support of the idea that the North American subspecies of American Kestrel is declining in numbers in the northern portion of its range.

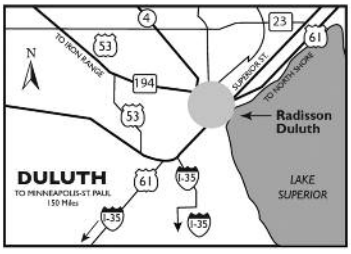
Notes for Presenters

- We will have two concurrent sessions running on Thursday, Friday and Saturday in the Great Halls 1 and 2.
- You may upload your presentation any time after 8am Wednesday, October 5. Upload computers will be available from 7am until 5pm on Thursday and Friday, and 7-8am on Saturday.
- We will have different uploading computers for each room. Please know which talk you are giving in each respective room before you begin uploading your presentation.
- The detailed schedule in the program outlines the room and time that you are scheduled
- Please upload your presentation no later than one hour prior to the beginning of your session, ideally before the first talk presented on the day you are scheduled to speak. NOTE: if you present at the 8am session, please do not plan to load your presentation that morning. Please be considerate to the volunteers working at the uploading computers and give them (and yourselves) time to work without pressure.
- Should you choose to upload your presentation in the minutes prior to your presentation, please be prepared to deal with any glitches or technical difficulties gracefully.
- Papers must be digital, Microsoft Power Point for PC format, and on a jump/flash drive or CD.
- Presentations in Mac format must be converted into PC format before you may load them.
- If you plan to use audio or video files, be sure to have them available as separate files when you load your talk. This facilitates re-embedding the files into your presentation on the conference computers if needed
- We strongly encourage you to run through ALL of your slides and animations to ensure that all of your slides, audio files, and video clips are loaded correctly.
- We will be placing the title slides of oral presentations into a rotating gallery on the Raptor Research Foundation's website. If you would like your title slide to be included in this gallery, please send your title slide only in .ppt or.pptx format to: jdwyer@edmlink.com.
- Very special thanks goes to James Dwyer, the RRF Scientific Chair for the dozens, if not hundreds, of hours he spent assessing and formatting abstracts for this conference. Over 100 people submitted abstracts for posters, paper sessions and symposia. JD and Nate Jones, both of EDM International, Inc., organized all of these into the schedule you'll find in this program. Thank you, gentlemen!

Speaker Index

Radisson Meeting Rooms





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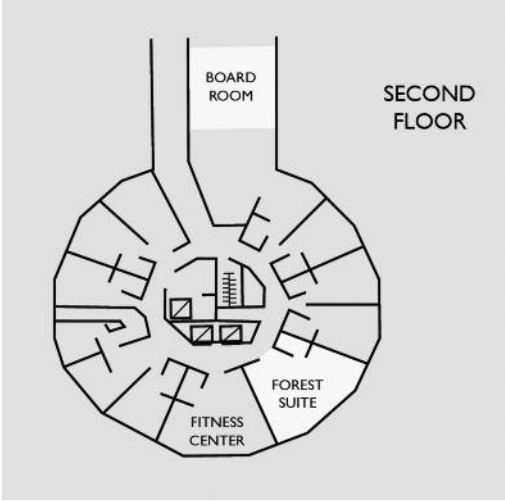

Graphic Design by Sparky Stensaas
interior page photos by Sparky Stensaas/www.ThePhotoNaturalist.com

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