



Raptor Research Foundation *and* Hawk Migration Association of North America

JOINT CONFERENCE



KITTATINNY

12-16 September 2007

*Holiday Inn Conference Center, Lehigh Valley
Fogelsville, Pennsylvania*



HAWK MOUNTAIN *HOSTED BY* Hawk Mountain Sanctuary



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Hawk Migration Association of North America
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Raptor Research Foundation *and* Hawk Migration Association of North America

JOINT CONFERENCE

12-16 September 2007



HOSTED BY Hawk Mountain Sanctuary

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MISSION: To conserve raptor populations through the scientific study, enjoyment and appreciation of raptor migration.

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Hawk Mountain Sanctuary is proud to welcome
The Raptor Research Foundation
and the
Hawk Migration Association of North America
to eastern Pennsylvania

Mission: To conserve birds of prey worldwide by providing leadership in raptor conservation science and education, and by maintaining Hawk Mountain Sanctuary as a model observation, research, and education facility.

Visit us at www.hawkmountain.org



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GENERAL INFORMATION

About the Lehigh Valley

Located in east-central Pennsylvania, the Lehigh Valley is located less than an hour north of Philadelphia and is an easy two-hour drive from New York City. The region lies south of the Kittatinny Ridge, the southernmost ridge of the central Appalachians and a key raptor and songbird migration flyway. It is the largest *Important Bird Area* in Pennsylvania extending from New Jersey to just shy of the Maryland border.

With the Appalachian Trail and many hawk watch sites located along its precipice, hundreds of thousands of people annually visit the ridge for outdoor recreation.

For more about outdoor recreation and other visitor activities, please call the Lehigh Valley Convention and Visitors Bureau at 1-800-747-0561 or visit the front desk.

Climate

East-central Pennsylvania enjoys mild weather during September, with daily highs reaching the 70s and 80s. Nights can be cooler. It is always best to dress in layers during field trips, as mountaintop areas may be five to ten degrees cooler.

Travel from Hotel

The Holiday Inn Conference Center provides free shuttle between 6am-11pm for hotel guests to nearby attractions, restaurants, and the airport. Contact the front desk to arrange trip, but schedule all airport transfers well in advance to ensure availability. Shuttle meets in the lobby. For more information on shuttle or taxi service, visit the front desk.

Conference Venue and Lodging

The Holiday Inn Conference Center Lehigh Valley offers 173 spacious guest rooms and two Jacuzzi Suites. The Americus restaurant seats 100 guests and The Tap Room hosts music several nights a week. Other amenities include outdoor pool, fitness center, and concierge service with a visit specialist to help plan day trips. All meeting activities will be held on the main floor in Presidential Ballroom or Foyer behind the front desk.

Business Center (open 24 hours)

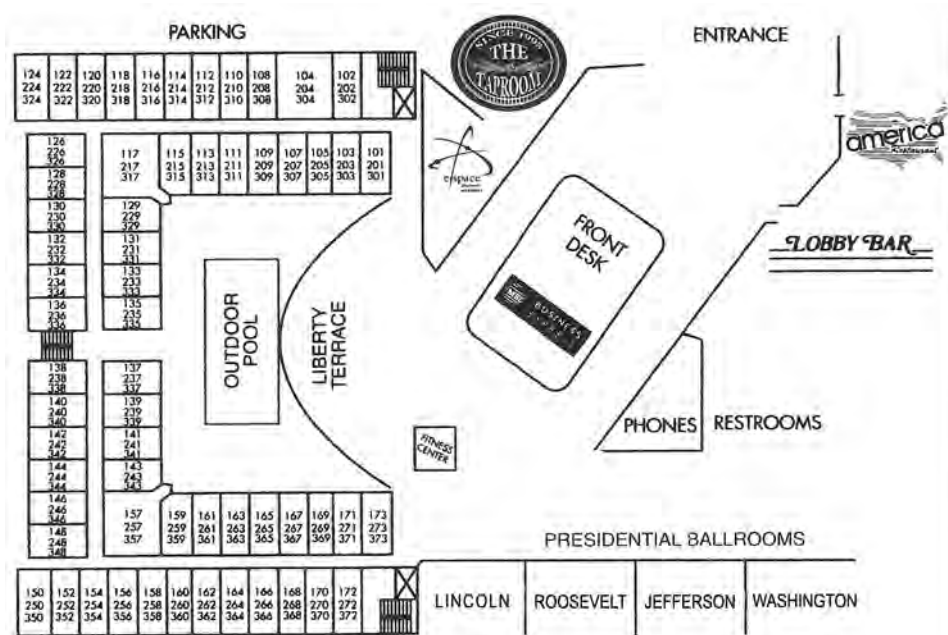
Computer, printer, copier, and fax machine are available in the hotel business center just across from the Lincoln Room on main floor.

Meals during Conference

Conference registration fee includes coffee breaks and Wednesday and Thursday night receptions. Lunch and dinner are not included but the Holiday Inn Americus restaurant and several other restaurants are available within walking distance and range from fast food to fine dining. Route 100 is a very busy highway, so please cross only at the traffic light. Guests can schedule the hotel shuttle to cross the street and arrange pick-up at a later time. A list of restaurants in the area is provided in the registration material. For special needs or a shuttle trip consult the hotel staff.

Breakfast Buffet

Conference Breakfast Buffet (\$45) will allow attendees to pre-pay for quick access to a sumptuous help-yourself breakfast during the busy morning rush, from 6 to 8:30 am, Thursday, Friday, and Saturday. *Only attendees who have pre-paid* will be served. Breakfast will be served in the Foyer and seating is available in the Roosevelt Room. Tickets for buffet will be in your registration packet and will need to be handed to servers. Others may eat in the hotel dining room or at adjacent sites. Some tickets may be available at registration.



Sponsors and Vendors

RRF and HMANA encourage all meeting attendees to visit the Sponsors and Vendors displays in the Lincoln Room and main hall. Lincoln Room exhibits will be open Wednesday 6 to 9 pm, Thursday 9:30 am to 9 pm, Friday 9 am to noon, and Saturday 9 am to 2 pm. A list of Sponsors/Vendors is located in the front of this booklet. We thank them for their support of the meeting.

Conference Artwork

The logo for the joint meeting, depicted on the cover and title page, was designed by Hawk Mountain staff member, **Andrea Zimmerman** to represent the mountain bringing the two societies together. **Jim Lockyer** created the *Kettling on the Kittatinny* artwork displayed on the program cover and on the conference tote bag. Jim in addition designed the Conference Program and produced the graphics, illustrations, and photographs therein.

SPECIAL EVENTS *(in consecutive order)*

Keynote Address: *Raptors in Time and Space*, **Pat and Clay Sutton**,

Thursday at 8:30 am, Washington & Jefferson Rooms

The joint conference will kick off with a special address by Cape May naturalists Pat and Clay Sutton. Pat Sutton was the Program Director at the New Jersey Audubon Society's Cape May Bird Observatory for 21 years. Clay is a life-long resident of Cape May, where he has worked as an Environmental Program Administrator and Vice-President of an environmental consulting firm, and more recently as a self-employed naturalist and field biologist. Today, Clay and Pat are free-lance writers, naturalists, lecturers, and tour leaders, who have published papers in virtually every popular birding magazine. Clay is a co-author of the classic *Hawks in Flight* (Houghton Mifflin, 1988), and Clay and Pat together have co-authored *How to Spot an Owl*, *How to Spot Hawks and Eagles*, and *How to Spot Butterflies*, all published by Houghton Mifflin. Their book, *Birds and Birding at Cape May*, was published in December 2006 by Stackpole Books. The keynote address is titled "Raptors in Time and Space," and loosely subtitled "Cape May Connections—some obvious and some not so obvious—to the bigger, wider, wonderful world of raptors.

Raptor Research Foundation and Hawk Migration Association of North America Membership meetings

Thursday 4:15–5:15 pm, Jefferson Room

Join the Board of Directors of each group to hear

Scientific Program

All paper and poster sessions will be held in the Presidential Ballroom of the Holiday Inn. Room assignments are shown on the Schedule of Papers.

Program Presenter Previewing

All presenters should bring their digital presentations on memory sticks. Please upload your PowerPoint slides in Meeting Room 201 on the main floor of hotel the evening before the date of your scheduled presentation at the following dates and times:

Wednesday (12 September) at 5:15–6:00 pm,
Thursday (13 September) at 5:15–6:00 pm, Friday (14 September) at 5:30–6:30 pm

Poster Session and Reception

Thursday, 7:00–9:30 pm

Presenters are asked to put their posters up on easels in the Roosevelt Room between 5:00 and 6:30 p.m. on Thursday. Pins or tacks will be available.

reports on organization activities and programs. ***Members are strongly encouraged to attend and provide their input.***

Hawk Migration Monitoring Council Meeting

Thursday, 12:45–1:45 pm, Meeting Room 201

Host **Will Weber**, HMANA advisor.

HMANA invites site coordinators, hawk watchers and interested parties to a roundtable discussion on how HMANA can better serve the hawk-watch sites and site coordinators through a monitoring site advisory group. The discussion will be led by former HMANA Chair, Will Weber. All are welcome, bring lunch, and share your thoughts with HMANA board and advisors. We value your input!

Special RRF-HMANA Book-signing Event

Thursday 7:00–8:00 pm, Roosevelt & Lincoln Rooms

Pat and Clay Sutton, *Birds and Birding in Cape May*, and *Hawks In Flight*.

Keith L. Bildstein, *Migrating Raptors of the World*.

Authors **Pat and Clay Sutton** and **Dr. Keith L. Bildstein** will sign their most recent books during the poster reception. Books may be purchased at the Hawk Mountain Sanctuary vendor table for personalized inscription. MasterCard and Visa will be accepted.

Friday Night Reception and Raptor Art Show at Muhlenberg College Science Center & the Acopian Center for Ornithology

6:30–9:30 pm, Tickets required, Cost: \$30.

RRF and HMANA members may enjoy an indoor-outdoor reception at the newly-constructed Muhlenberg College Science Center and Acopian Center for Ornithology, hosted by the Biology Department of Muhlenberg College. The Friday night reception will begin with drinks and snacks at 6:30 p.m. and tours of the building's "green" features and the displayed raptor art work. Buffet dinner will be served at 7 p.m. This is one of few buildings in the country to use a special fritted glass to prevent bird window strikes. Tours of the building will include the Acopian Center for Ornithology, which holds the archives and private papers of Hawk Mountain's first curator, Maurice Broun.

Buses/vans will leave from the Holiday Inn Conference Center beginning at 6:15 pm., and begin returning to the Conference Center at 8:00 pm with the last bus leaving Muhlenberg College at 9:30 pm Pre-registration is required for this event. Price includes dinner, drinks, and round-trip bus transportation from Conference Center.

Raptor Art Show and Sale

Wildlife artists from across the country will gather for a special raptor art show and sale held within the Muhlenberg College Science Center on Friday evening during the reception. Organized by local artist David Hughes, many raptor artists have signed up to display as many as three pieces each for show or sale. Robert Bateman has contributed a signed Red-tailed Hawk print, which will be on display Friday and available for bidding at the Silent Auction on Thursday and Saturday. Pieces may be purchased using credit card (Visa and MasterCard), check or cash. Sales can be made Friday evening or at the Hawk Mountain Sanctuary vendor table anytime on Saturday. Shipping may be arranged for an extra fee.

Special Film Showing: Looking Skyward: A Passion for Hawkwatching

(17 minutes) Saturday, 1:30 pm Roosevelt Room.

Presented by **Shawn Carey**, Migration Productions.

This lively video examines why people watch hawks, explains its long, storied history, and explores some of the prime locations for viewing hawk migration (Hawk Mountain and Cape May). Video footage from Don Crockett (www.virtualbirder.com) includes a wide range of raptors in flight as well as interviews with Pete Dunne, Bill Clark, Jim Brett and others.

The Rosalie Edge Lecture in Raptor Conservation: Dr. Ian Newton

A long-term study of the Eurasian Sparrowhawk (Accipiter nisus).

Saturday 4:00 to 5:00 pm, Washington & Jefferson Rooms

Dr. Newton is the author of more than 250 papers and several books, including *Population Ecology of Raptors* (1979), *The Sparrowhawk* (1986), *Population Limitation in Birds* (1998), *The Speciation and Biogeography of Birds* (2003), and, most recently, *The Ecology of Bird Migration* (2007). He is chair of The Peregrine Fund and The Royal Society for the Protection of Birds, a past president of the British Ornithologists' Union and the British Ecological Society, and an Honorary Fellow of the American Ornithologists' Union.

Dr. Newton's lifelong interest in birds began during childhood, and continued through his studies in zoology at the University of Bristol. He later went on to Oxford for doctoral and post-doctoral studies in ornithology. He worked for the Natural Environment Research Council, a government-funded body concerned with research on the natural environment, including wildlife. As a field ecologist, he researched a wide range of bird species, but is best known for his work on raptors, including the effects of DDT, Dieldrin, and other pesticides and pollutants upon raptor populations. As part of his work, he conducted a 27-year study of a Sparrowhawk population nesting in southern Scotland, resulting in what many consider to be the most detailed and longest-running study of any population of birds-of-prey. This research will be the subject of his invited lecture.

Conference Banquet and Awards

6:15–9:30 pm Presidential Ballroom.

Ticket required, Cost \$38.

All conference attendees are encouraged to attend the culminating conference banquet. A cocktail hour with a cash bar will precede a sit-down dinner featuring selections of prime rib of beef, grilled salmon and a grilled vegetarian napolean. Special Awards and student paper awards will be presented.

RRF-HMANA Silent Auction

Thursday lunch to Saturday evening, Roosevelt Room

A silent auction will be held to help defray conference costs. Auction items will be open for bids Thursday lunch through Saturday cocktail hour. Bidding will close at the start of the banquet and all high bidders will be expected to purchase their item Saturday evening. Credit cards, (VISA and Master Card), checks and cash will be accepted. Each registrant will be given a bid number with their name tag or may use their last name to place bids. A list of items will be available in the Roosevelt Room. **All members and attendees are encouraged to help cover student fees and other conference expenses and participate in the silent auction!** If an item is too large to carry, shipping will be available for an extra fee. Bid high, bid often and have fun! Items include Robert Bateman print, signed books, gift certificates, and more.

Conference Broadwing WATCH!



During breaks and lunch, Thursday, Friday, and Saturday we will hold a **BROAD-WING WATCH** outside the Holiday Inn (ask at the registration desk for the exact location).

In 2006, over **9,000** Broad-winged Hawks were seen just north of this site!

The Broad-wing Watch counts will be posted daily at the registration desk.

COME OUT and JOIN US!

FIELD TRIPS

All field trips depart from the front of the Holiday Inn Conference Center promptly at time indicated. Trips with low registration will be cancelled at discretion of Conference Committee and full refunds given. Check the signs by the registration desk the day before your trip to be sure it is still going.

○ ▲ Conference Field Trip: Hawk Mountain Sanctuary, World's First Refuge for Birds of Prey. Friday, September 14th, 12:15–5:45 pm

All conference attendees are invited to spend an afternoon at the world-renowned Hawk Mountain Sanctuary, the first refuge for birds of prey and the site of the longest running hawk count in North America. The visit is timed for the peak of Broad-winged Hawk migration when several thousand migrants may be seen in one day. Hawk Mountain is a full-service facility that includes Visitor Center with, "Wings of Wonder" gallery, nature gift shop, and up to half a dozen scenic overlooks from which to observe a possible 13 species of migrants at this time of year. Hawk Mountain educators will present optional "Introduction to Hawk Mountain" at 1:30 p.m. in the Visitor Center. Attendees will be treated to a special tour of the Acopian Center for Conservation Learning, Hawk Mountain's research and training center, from 4:15 to 5 p.m. Buses depart from the Holiday Inn at 12:15 p.m. Box lunches and water bottles will be provided. Buses will depart from the Visitor Center at 4 p.m. to transport guests to the Acopian Center, two miles away. Buses will leave the Acopian Center at 5 pm. to return to the Conference Center by 5:45 p.m. **Cost: \$30, pre-registration required, extra tickets may**

be available Thursday at registration desk. Includes transportation, box lunch, water, and trail admission. Wear hiking boots/shoes and bring binoculars. Some binoculars may be rented on site.

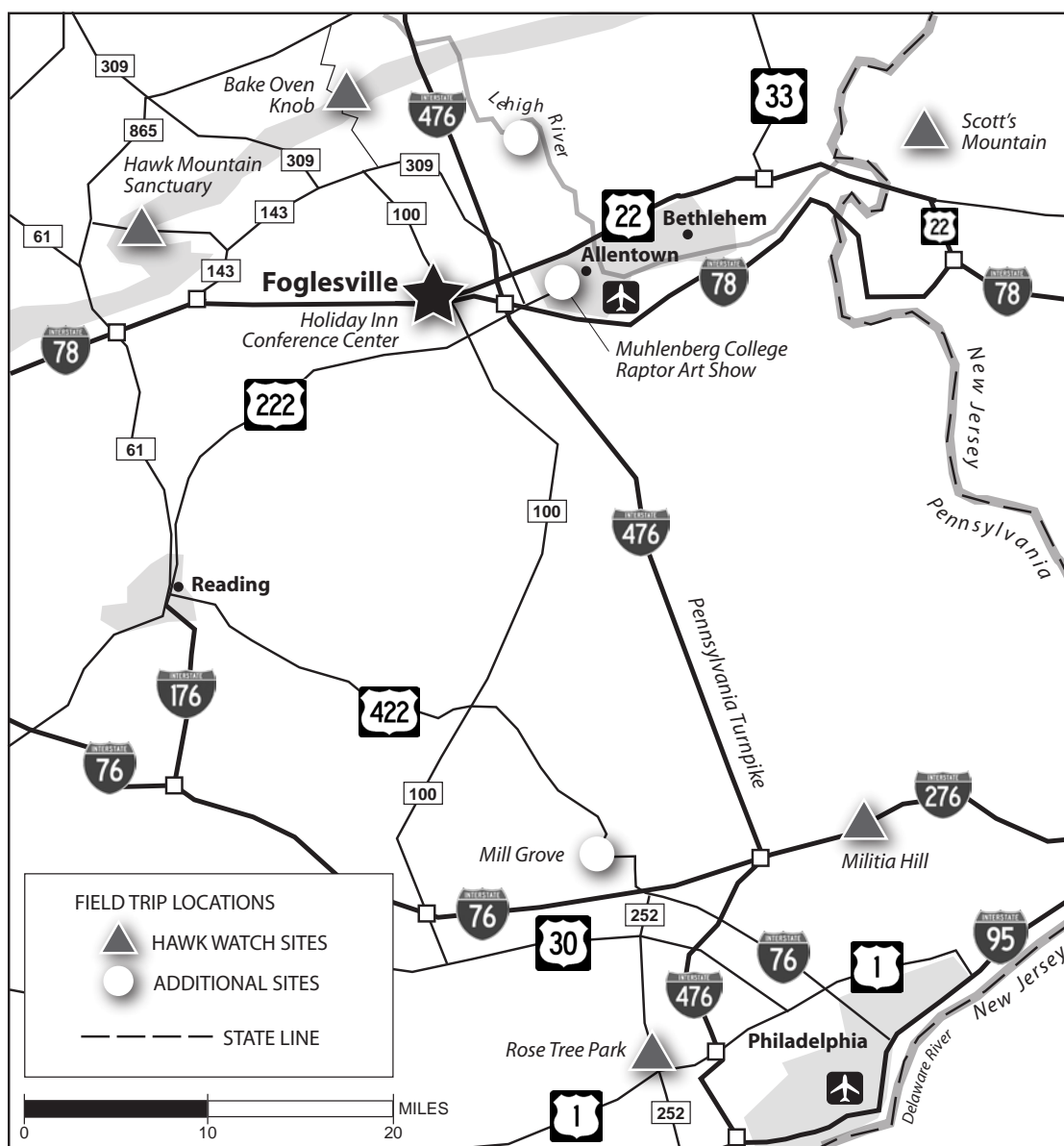
Morning Birding Trips: Thursday, Friday, Saturday, 6:30 am–8:15 am, leave from the Conference Center front doors. Pre-registration required. **Cost: \$14.**

Mid-September is the height of neo-tropical songbird migration in Pennsylvania. Join local birders to explore nearby hot spots and natural areas to look for the morning fallout of warblers and other migrants. Late sign-ups may be possible at registration desk up to noon the day before. Bring binoculars, dress for weather and wear comfortable walking shoes. Trips may be canceled with less than 4 people.

○ ▲ Bake Oven Knob Hawkwatching/ Lehigh Gap Nature Center

Wednesday, September 12, 8:30 am–5 pm, Cost \$25 includes transportation, box lunch, guide.

Take a hawkwatching trip to Bake Oven Knob, a Kittatinny Ridge site hawk migration study site for nearly 50 years. Shuttle to parking lot, and walk 0.4 mile of rocky, uphill trail to lookouts. Spend afternoon on the rocks with expert guide, and return to conference via Lehigh Gap Nature Center, the site of a major grassland restoration project. There are *no facilities* at Bake Oven Knob; bring binoculars, hat, sunglasses, cushion, jacket and wear sturdy walking shoes. A restroom will be available at Lehigh Gap.



▲ Broad-winged Hawk Watching Trip

Wednesday & Sunday September 12 & 16, 8:30 am–5 pm. Cost \$25 includes transportation, box lunch, and guide.

Visit one of the many eastern Pennsylvania and western New Jersey hawkwatch sites to view the Broad-wing flights. Broadwings concentrate in large kettles but their location can vary depending on wind and weather. Possible sites will include Scott's Mountain (NJ), or Rose Tree Park, Militia Hill, or Bake Oven Knob. All sites are within 45 minute drive from hotel. Easy walks are anticipated. Dress for the weather. Bring binoculars, seat cushion, sunglasses, hat, and sunscreen.

○ Lehigh River Canoe Trip

Wednesday, September 12, 8:30 am–4 pm Guide: Tom Kerr, former President of Wildlands Conservancy. Cost: \$50. Includes guide, lunch, water, and transportation.

Explore 13 miles of the scenic and historic Lehigh River. Requires no paddling experience, and is great fun for ages 8 and up. Dress for weather, wear sneakers or comfortable walking shoes. Hat, sunscreen, sunglasses, light jacket recommended.

○ ▲ Trip to Mill Grove-John James Audubon Home & Rose Tree HawkWatch

Wednesday & Sunday September 12 & 16 9 am–4 pm Cost \$25 includes transportation, box lunch, and water.

A personal tour for conference attendees has been arranged for Mill Grove, the home of John James

Audubon. After a tour and box lunch, the group will stroll along estate trails and look for migrant songbirds. A trip to nearby Rose Tree HawkWatch is planned to spot afternoon migrants. *Wear walking shoes, bring binoculars, hat, sunglasses. Sign-ups possible through Friday morning, contact registration desk.*

Cape May Excursion

Sunday, September 16 to Tuesday, September 18.

Leave 9 am Sunday. Return 5 pm Tuesday

Price \$125/person includes transportation and guides.

Room and meals are extra. Contact registration desk for more information. Sign-ups possible through Friday morning.

Join tour leaders and expert birders **Dan Kunkle** and **Fritz Brock** for a three-day excursion to Cape May Peninsula during the peak of autumn migration. Here, millions of birds funnel through as they move south and Cape May Point offers the best views. Tour will visit the Cape May Point Hawkwatch to view the flights of falcons and accipiters.

Directions To Local Hawk Watch Sites

▲ Hawk Mountain Sanctuary (30 minutes)

Take Route 78 west to exit 35, Lenhartsville exit, Go to end of exit ramp turn left on Route 143 (north). Head North on Route 143 to the first crossroads with a gas station at the intersection. At this intersection turn left on Hawk Mountain Road. Drive approximately 6 miles to the top of the mountain, look for the Visitor Center Parking sign, turn left into parking lot. (Trails are open from dawn to dusk; visitor center from 8 am-5 pm; a trail fee is charged for non-members).

▲ Bake Oven Knob Hawk Watch

(25 minutes)

Leave the Holiday Inn Conference Center and turn left onto PA Rt. 100 North. Travel 8.7 miles to PA Rt. 309. Turn right and travel 0.2 miles and turn left on Bake Oven Road. Continue on Bake Oven Road through Germansville and across Mountain Road (about 3.5 miles) to a T-intersection. Turn left and then right after about 150 yards onto a gravel road (still Bake Oven Road). Follow this road to the top of the Kittatinny Ridge and turn right into the parking lot and park there. Find the Appalachian Trail at the southeast corner of the parking lot and follow the trail about 0.4 miles to the highest point on the trail – the South Lookout will be 30 yards to your right and is marked as Bake Oven Knob. If the winds are from the north, proceed about 200 yards past this lookout (downhill grade) until you come to a grassy campsite. There, scramble over the boulder pile just ahead to reach the North Lookout.

▲ Scott's Mountain Hawk Watch, NJ

(30 minutes)

From the Holiday Inn take Adrienne Drive to SR-100. Turn north (left) on SR-100, keep right then take the I-78 ramp East. Continue on I-78 for 1.75 miles to US-22 (exit 51) and continue on US-22 for 22.4 miles. Keep right onto US-22 ramp (toll) into New Jersey and continue on US-22 for 1.4 miles. Keep left onto SR-57 (Washington Avenue West), go straight for 1.4 miles to Uniontown Road (CR-519). Turn left onto Uniontown Road and continue 1.1 miles to Fox Farm Road, turn right onto Fox Farm Road, at the small sign for Merrill Creek Reservoir. Go 2.6 miles, bearing right at the fork, to the entrance to the parking lot, on the right.

▲ Militia Hill Hawk Watch (45 minutes)

From the Holiday Inn take Adrienne Drive to State Route 100. Turn north (left) on SR 100, keep right then take the I-78 ramp East. Continue on I-78 for 1.75 miles to US-22 (exit 51) and continue on US-22 for 2.4 miles to I-476 South (PA Turnpike – toll). Continue south on I-476 (PA Turnpike – toll) for 39 miles to the I-276 East ramp (keep in the right lane) staying on I-276 East for 5 miles to the Fort Washington exit (339) continue through the toll plaza straight onto Pennsylvania Avenue. Continue on Pennsylvania Avenue for .5 miles to Bethlehem Pike, turn left onto Bethlehem Pike and continue for 1.1 miles to SR-73 (Skippack Pike), turn right onto SR-73 and continue on SR-73 for 0.19 miles to Militia Hill Road. Turn left onto Militia Hill Road and continue for 0.08 miles to Fort Washington Road (State Park Road), turn left onto Fort Washington Road and continue up the hill the to the Militia Hill Hawk Watch. The Militia Hill Hawk Watch is staffed daily from 9 am to 5 pm weather permitting.

▲ Rose Tree Park HawkWatch (45 minutes)

From the Holiday Inn take Adrienne Drive to State Route 100. Turn north (left) on SR 100, keep right then take the I-78 ramp East. Continue on I-78 for 1.75 miles to US-22 (exit 51) and continue on US-22 for 2.4 miles to I-476 South (PA Turnpike – toll). Continue south on I-476 (PA Turnpike – toll) for 39 miles to the I-476 South ramp (keep in left lane) – continue through the toll plaza staying on I-476 South for 14.5 miles to US-1 South (exit 5), continue on US-1 South for 0.36 miles to SR-252. Turn north (right) at SR-252 (Providence Road) for 0.21 miles. Rose Tree Park is at the intersection of SR-252 and Rose Tree Road. The park may be entered by continuing through the traffic light on SR-252 at the intersection. The Rose Tree Park HawkWatch (RTPHW) is located near the gazebo in the center of the park.

RRF-HMANA 2007 Joint Meeting

At a Glance

Wednesday, 12 September

- 8:00 AM–5:00 PM **RRF Board Meeting**
Room 201
- 8:00 AM–5:00 PM **HMANA Board Meeting**
Room 257
- 12:00–8:00 PM **Registration desk open**
- 6:00–9:00 PM **Vendor exhibits open**
Lincoln Room
- 6:00–9:00 PM **Ice-breaker Reception**
Outside Lincoln Room

Thursday, 13 September

- 7:15 AM **Registration desk opens**
- 8:15–8:30 AM **Announcements and Opening Remarks**
Washington & Jefferson Rooms
-
- 8:30–9:30 AM **KEYNOTE ADDRESS:
Pat and Clay Sutton
Raptors in Time and Space:
Cape May Connections**
Washington & Jefferson Rooms
-
- 9:30 AM–9:00 PM **Vendor exhibits open**
Lincoln Room
- 9:30–10:20 AM *Coffee Break*
- 10:20–12:20 PM **AMERICAN KESTREL SYMPOSIUM I**
Washington Room
- 10:20–12:20 PM **GENERAL SESSION 1**
Jefferson Room
- 12:20–2:00 PM *Lunch on your own*
- 12:45–1:45 PM **Hawk Migration Monitoring Council Meeting**
Room 201
- 2:00–4:00 PM **AMERICAN KESTREL SYMPOSIUM I**
Washington Room
- 2:00–4:00 PM **GENERAL SESSION II**
Jefferson Room
- 4:00–4:15 PM *Coffee Break*

- 4:15–5:15 PM **RRF Business & Member Meeting**
Jefferson Room
- 4:15–5:15 PM **HMANA Member Meeting**
Washington Room
- 7:00–9:30 PM **Poster Session and Reception, and Book-signings**
Roosevelt & Lincoln Rooms

Friday, 14 September

- 7:30 AM **Registration desk opens**
- 8:00–10:20 AM **AMERICAN KESTREL SYMPOSIUM II**
Washington Room
- 8:00–10:20 AM **GENERAL SESSION III**
Jefferson Room
- 8:00–10:20 AM **HAWK COUNT DATA**
Roosevelt Room
- 9:00 AM–noon **Vendor exhibits open**
Lincoln Room
- 10:20–10:50 AM *Coffee Break*
- 10:50–11:50 AM **GENERAL SESSION IV**
Washington Room
- 10:50–11:50 AM **GENERAL SESSION V**
Jefferson Room
- 10:50–11:50 AM **GENERAL SESSION VI**
Roosevelt Room
- 12:15 PM **HAWK MOUNTAIN SANCTUARY FIELD TRIP¹**
Departs from main Lobby of Hotel promptly; return by 5:45 PM
- 6:15–6:40 PM **Shuttle departs for Muhlenberg Reception - Raptor Art Show Lobby in Hotel¹**
- 6:30–9:30 PM **MUHLENBERG RECEPTION-RAPTOR ART SHOW¹**

¹ pre-registration required

8:00–9:30 PM *Shuttles depart from Muhlenberg
for Hotel (every 20 minutes)*

Saturday, 15 September

7:30 AM **Registration desk opens**

8:30–10:30 AM **STATE OF NORTH
AMERICA'S BIRDS OF
PREY SYMPOSIUM**
Washington Room

8:30–10:30 AM **GENERAL SESSION VII**
Jefferson Room

9:00 AM–2:00 PM **Vendor exhibits open**
Lincoln Room

10:30–10:50 AM *Coffee Break*

10:50 AM–12:30 PM **STATE OF NORTH
AMERICA'S BIRDS OF
PREY SYMPOSIUM**
Washington Room

10:50 AM–12:30 PM **GENERAL SESSION VIII**
Jefferson Room

12:30–2:00 PM *Lunch*

1:30–1:50 PM **Film: LOOKING
SKYWARD:**
A Passion for Hawkwatching
Roosevelt Room

2:00–3:20 PM **STATE OF NORTH
AMERICA'S BIRDS OF
PREY SYMPOSIUM**
Washington Room

2:00–3:20 PM **GENERAL SESSION IX**
Jefferson Room

3:20–4:00 PM *Coffee Break*

4:00–5:00 PM **ROSALIE EDGE LECTURE
IN RAPTOR
CONSERVATION**
Washington & Jefferson Rooms

Dr. Ian Newton
*A Long-term Study of the
Eurasian Sparrowhawk*
(Accipiter nisus)

6:15–7:15 PM *Cocktails, Cash Bar*
Roosevelt & Lincoln Rooms

7:15–9:00 PM **Awards Banquet¹**

¹ pre-registration required



RRF-HMANA 2007 Joint Meeting

Scientific Program Schedule

Thursday, 13 September

KEYNOTE ADDRESS

WASHINGTON and JEFFERSON ROOMS

- 8:15–8:30 AM **Announcements and Introductions**
- 8:30–9:30 AM **Pat and Clay Sutton**
Keynote Address: *Raptors in Time and Space: Cape May Connections*
- 9:30–10:20 AM *Coffee Break*

AMERICAN KESTREL SYMPOSIUM I (CONCURRENT SESSION)

WASHINGTON ROOM

Moderator: David Bird

- 10:20–11:00 AM **David M. Bird** and Lina Bardo
The American Kestrel: A White Mouse for Raptor Research?
- 11:00 AM **Christopher J. Farmer**, Ernesto Ruelas Inzunza, and Jeff P. Smith
Migration Monitoring Points to Widespread American Kestrel (*Falco sparverius*) Declines.
- 11:20 AM **Allen M. Fish**
American Kestrel (*Falco sparverius*) Fall Migration and Winter Trends in California – a Bioregional Approach.
- 11:40 AM **Lawrence B. Fischer Jr.**
A Comparison of Spring and Fall Migration Weights of American Kestrels.
- 12:00 PM **Andrew Homsey**, Bruce Lantz, Anthony Gonzon, Bill Stewart, John Janowski, and Sally O’Byrne
Determining the Status of the American Kestrel (*Falco sparverius*) in Delaware.
- 12:20–2:00 PM *Lunch*

Moderator: Karen Steenhof

- 2:00 PM **Robert DeCandido** and Deborah Allen
Status of the American Kestrel (*Falco sparverius*) in New York City.
- 2:20 PM **John W. Parrish, Jr.**, Pamela L. Maney, and Hope A. Beasley
Significant Southeastern American Kestrel Population Nesting in Tubular Transmission Towers in South-central Georgia.
- 2:40 PM **Kimberly J. Fernie**, Laird Shutt, David M. Bird, and Robert Letcher
Reproductive and Growth Changes in American Kestrels (*Falco sparverius*) Exposed to Environmentally Relevant Levels of DE-71.
- 3:00 PM **Dawn M. Fallacara**, Richard S. Halbrook, and John B. French
Mercury Exposure in the Nest: Early Effects of a Common Contaminant on the Development of the Kestrel Immune System.
- 3:20 PM **Karen Steenhof**
Insights about American Kestrel Demography: Implications for Population Trends.
- 3:40 PM **OPEN**

Thursday, 13 September

4:00–4:15 PM *Coffee Break*

4:15–5:15 PM HMANA General Membership Meeting: *all members encouraged to attend*

**CONCURRENT GENERAL SESSION I
POPULATION STATUS AND TRENDS**

JEFFERSON ROOM

Moderator: Clint Boal

- 10:20 AM **Brent C. Hetzler**
Status of the Peregrine Falcon (*Falco peregrinus*) on the Colorado Plateau, 1991–2007.
- 10:40 AM **Clint Boal**, Carey A. Haralson, and William H. Howe
Status of Golden Eagles in the Texas Panhandle.
- 11:00 AM **Francisco J. Vilella**
Distribution and Abundance of the Broad-winged Hawk (*Buteo platypterus brunnescens*) and Red-tailed Hawk (*Buteo jamaicensis jamaicensis*) in North-Central Puerto Rico.
- 11:20 AM **Lindsay A. Zemba**
Long-term Raptor Road Surveys in the Kempton Valley, Pennsylvania.
- 11:40 AM **Helen A. Snyder**
World's Densest Raptor Population: A Comparison of Cave Creek Canyon on the Coronado National Forest in Arizona and the BLM's Snake River National Conservation Area in Idaho.
- 12:00 **Carole S. Griffiths**, George F. Barrowclough, Jeff G. Groth, and Lisa A. Mertz.
Phylogeny, Diversity, and Classification of the Accipitridae based on DNA Sequences of the RAG-1 exon.

12:20–2:00 PM *Lunch*

12:45–1:45 PM Hawk Migration Monitoring Council Meeting, Will Weber, Coordinator.

**CONCURRENT GENERAL SESSION II
SAMPLING AND TECHNIQUES**

JEFFERSON ROOM

Moderator: Todd Katzner

- 2:00 PM **Todd E. Katzner**, Jamie A. Rudnick, Evgeny A. Bragin, and Andrew Dewoody
What You See Isn't Always What You Get: How Accurate Are Counts of Raptors and How Many Non-Breeders Are Really Out There?
- 2:20 PM **Michael J. Monfils**
Site Occupancy and Detectability of Forest-nesting Owls in Michigan.
- 2:40 PM **Zach Smith**
Winter Roadside Raptor Surveys in the Northern Central Valley of California, 2006–2007.
- 3:00 PM **◆Audrey Washburn**, Allan E. Strand, Kim Norris-Caneda, and Kenneth D. Meyer
Population Structure in U.S. Swallow-tailed Kites (*Elandoides forficatus*).
- 3:20 PM **C. Stuart Houston**
Public Participation Facilitates Turkey Vulture Tagging Program in Saskatchewan.

Thursday, 13 September

3:40 PM **William S. Clark**
Molt and Plumages of the White-tailed Hawk.

4:00–4:15 PM *Coffee Break*

4:15–5:15 PM RRF Business Meeting: *all members encouraged to attend*

POSTER SESSION

ROOSEVELT ROOM

7:00–9:30 PM ♦ **Isabel C. Caballero**, Mary V. Ashley, and John M. Bates
Sibling Relationships Analyzed Using a New Set of Molecular DNA Markers in Reintroduced Peregrine Falcons (*Falco peregrinus*).

♦ **Marco A. M. Granzinolli** and José C. Motta-Junior
Habitat Selection by Five Falconidae Species in the Heterogeneous Landscape of Central São Paulo State, Southeastern Brazil.

Brent C. Hetzler

A Method of Using Digital Recording Equipment and Scope Mounted Video Cameras for Early Confirmation of Peregrine Falcon (*Falco peregrinus*) Eyrie Locations.

Geoff Holroyd and Helen Trefry

Tracking a Floater Female Peregrine Falcon.

♦ **Jayson C. Ibanez** and Dennis J. I. Salvador
Philippine Eagle (*Pithecophaga jefferyi*) Breeding Biology and Ecology: Current Knowledge and Priority Gaps.

Michael Kochert, Karen Steenhof, Susan Toussaint, and Thomas Zarriello
The Raptor Information System: A Web-based Bibliography for Raptor Ecology and Management.

Pamela A. Martin, Laird Shutt, Douglas Campbell, and Kimberley D. Hughes
Contaminant Burdens in Great Lakes Bald Eagles, Ontario, 1991–2006.

Pamela Martin, Ed Sverko, Glenn Barrett, and Greggorious Tomy
Current-Use Flame Retardants in the Eggs and Plasma of American Kestrels (*Falco sparverius*) from Southern Ontario.

Megan S. Melick and Spring 2005–Spring 2007 Hawk Mountain Sanctuary International Interns
A Multi-year Comparison of a Slope-side Versus Ridge-top Watch Site.

Joan L. Morrison, Eric Hallerman, and Daniel Dutton
Finding Microsatellite Markers for the Crested Caracara (*Caracara cheriway*).

Peter Nye, Glenn Hewitt, Irene Mazzochhi, Sarah Mielke, Jim Pawlicki, Angelena Ross, Charles Rosenberg, Michael Sicley and Sheila Tuttle
Preliminary Results of Movements and Home Range of Short-eared Owls (*Asio flammeus*) Wintering in New York State as Determined From Satellite and Conventional Radio Telemetry.

♦ **Kyle E. Pias**, Joan L. Morrison, and Isabel G. W. Gottlieb
Food Habits of Florida's Crested Caracaras (*Caracara cheriway*).

Adam C. Rich

Territory Status of California Spotted Owl (*Strix occidentalis occidentalis*) Following Fuel Reduction Treatments: Management Case Studies from the Stanislaus National Forest.

Thursday, 13 September

Mark E. Robert

Eggshell Thickness Measured Optically from Pole to Pole in the Prairie Falcon (*Falco mexicanus*): Implications for Predicting Eggshell Thickness from a Few Fragments.

Karen Steenhof and Brit Peterson

Site Fidelity, Mate Fidelity, and Breeding Dispersal in American Kestrels.

Friday, 14 September

AMERICAN KESTREL SYMPOSIUM II (CONCURRENT SESSION) WASHINGTON ROOM

Moderator: John A. Smallwood

- 8:00 AM **Jessi L. Brown**, Chris W. Briggs, and Michael W. Collopy
The Reno Kestrel Project: the Early Years of a New American Kestrel Nest Box Project in the Great Basin.
- 8:20 AM **Joanne Mason** and Mike Maurer
What Has Happened to the American Kestrel (*Falco sparverius*) in Southeastern Massachusetts?
- 8:40 AM Joshua J. Rusbuldt, **James R. Klucsarits**, and Sue and Bob Robertson
Reproductive Success of American Kestrels Using Nest Boxes in Eastern Pennsylvania, 1992–2005.
- 9:00 AM **Karen Steenhof** and Brit E. Peterson
American Kestrel Reproduction in Southwestern Idaho: Annual Variation and Long-term Trends.
- 9:20 AM **John A. Smallwood**
Recent Population Trends of the American Kestrel (*Falco sparverius*) in Northwestern New Jersey, and Their Relation to the Species Decline in North America.
- 9:40 AM **John A. Smallwood**
Are American Kestrel (*Falco sparverius*) Populations Declining in North America? Evidence from Nest Box Programs.
- 10:00 AM **David Bird**
American Kestrel Symposium Wrap-up.

10:20–10:50 AM *Coffee Break*

**CONCURRENT GENERAL SESSION IV
HABITAT RELATIONSHIPS**

WASHINGTON ROOM

Moderator: Joan Morrison

- 10:50 AM Jami Barnes, Gregory Lipps, Karen V. Root, and **Joan L. Morrison**
Predicting Habitat Distribution for the Crested Caracara (*Caracara cheriway*) Using a Spatial Modeling Approach.
- 11:10 AM **Mariko Yamasaki**, Christine A. Costello, and Kimberly J. Babbitt
Northern Goshawk (*Accipiter gentilis*) Nesting Habitat in the White Mountains of New Hampshire and Maine.
- 11:30 AM ♦**James F. Dwyer**, James D. Fraser, and Joan L. Morrison
Habitat, Movement, and Communal Roosting of Non-Breeding Crested Caracaras (*Caracara cheriway*) in Florida.
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BOLD denotes Presenter, ♦ denotes Student Award Candidate

Friday, 14 September

**CONCURRENT GENERAL SESSION III
MIGRATION ECOLOGY**

JEFFERSON ROOM

Moderator: Michael Kochert

- 8:00 AM **Neil D. Woffinden**
Wind Direction and Raptor Migration: A Simple Method to Predict Days with Larger Flight Numbers.
- 8:20 AM **David Brandes**, Todd Katzner, Tricia Miller, Michael Lanzone, Keith Bildstein, and Daniel Ombalski
A Terrain-based Dynamic Model for Simulating Raptor Migration through the Appalachians.
- 8:40 AM **Dan Kunkle**, Brad Silfies, Laurie Goodrich, David Barber, Chris Farmer, and Keith Bildstein
Movements of Red-Tailed Hawks Color-Marked during Autumn Migration on the Kittatinny Ridge of Central Appalachians, Pennsylvania.
- 9:00 AM **Peter H. Bloom**, J. Michael Scott, Jeff W. Kidd, Scott Thomas, Joseph Papp, Marge Gibson, and Ed and Judy Henckel
Unusual Summer Initiated, Long Distance, North-bound Migration of Subadult Red-tailed Hawks from Southwestern California.
- 9:20 AM ♦ **Tricia Miller**, David Brandes, Michael Lanzone, Daniel Ombalski, Robert Mulvihill, Robert Brooks, and Todd Katzner
Flight Characteristics of Golden Eagles (*Aquila chrysaetos*) Migrating Through Eastern North America as Determined by GPS Telemetry.
- 9:40 AM **Michael Kochert**, Mark Fuller, Linda Schueck, Marc Bechard, Brian Woodbridge, and Geoff Holroyd
Dissecting Migration of Swainson's Hawks (*Buteo swainsoni*).
- 10:00 AM ♦ **Martina Zucchini**, Marc Bechard, and Keith L. Bildstein
Flight Strategies of Neotropical Migrant Raptors in Panama.

10:20–10:50 AM *Coffee Break*

**CONCURRENT GENERAL SESSION V
NONBREEDING SEASON BIOLOGY**

JEFFERSON ROOM

Moderator: Francisco Vilella

- 10:50 AM **Brett A. Mandernack**, Matthew Solensky, and Mark Martell
Satellite Tracking Bald Eagles (*Haliaeetus leucocephalus*) in the Upper Midwest.
- 11:10 AM **Michael Lanzone**, Tricia Miller, David Brandes, Daniel Ombalski, Robert S. Mulvihill, and Todd Katzner
Golden Eagle (*Aquila chrysaetos*) Wintering Behavior in the Appalachian Mountains of Eastern North America using GPS Data from Satellite Telemetry.
- 11:30 AM **Al Hinde**
Wintering Raptors of the Great Basin Census and Banding Study 1985-2007.

Friday, 14 September

**CONCURRENT WORKSHOP
HAWK COUNT DATA**

ROOSEVELT ROOM

Moderator: Ernesto Ruelas Inzunza

8:00–9:00 AM **Ernesto Ruelas Inzunza**
HawkCount.org: A Tutorial.

9:00–10:00 AM **Ernesto Ruelas Inzunza**
A Data Collection Protocol for Raptor Migration Monitoring.

10:20–10:50 AM *Coffee Break*

**CONCURRENT GENERAL SESSION VI
ECOLOGY**

ROOSEVELT ROOM

Moderator: Allen Fish

10:50 AM **Fred Gehlbach**
How Temperature, Age-class, and Food Affect Texas' Suburban Nesting
Eastern Screech-Owls.

11:10 AM ♦ **Elizabeth C. Long**, Mitchell A. Byrd, and Bryan D. Watts
Impacts of Reintroduced Coastal Peregrine Falcon (*Falco peregrinus*)
Populations on Prey Species Populations.

11:30 AM **Elaine L. Corvidae** and Mathias Englemann
Recovery of Banded Barred Owls (*Strix varia*) in the Carolina Piedmont.

Saturday, 15 September

**STATE OF NORTH AMERICA'S BIRDS OF PREY SYMPOSIUM I
(CONCURRENT SESSION)**

WASHINGTON ROOM

Moderator: Keith L. Bildstein

8:30–9:10 AM **Keith L. Bildstein**
A Brief History of Raptor Conservation in North America.

9:10–9:50 AM **Laurie J. Goodrich and Jeff P. Smith**
Raptor Migration in North America.

9:50 AM **David J.T. Hussell** and Ernesto Ruelas Inzunza
The Raptor Population Index in Principle: Long-term Monitoring of North
America's Raptors.

10:10 AM **Christopher J. Farmer** and David J.T. Hussell
The Raptor Population Index in Practice: Hawk Counts as Population Indexes.

10:30–10:50 AM *Coffee Break*

10:50 AM **Christopher J. Farmer**, Laurie J. Goodrich, Ronald J. Bell, Bruno Drolet,
Else Greenstone, David Grove, David J.T. Hussell, David Mizrahi,
Frank J. Nicoletti, and Jason Sodergren
Trends in Autumn Counts of Migratory Raptors in Northeastern North
America, 1974–2004.

Saturday, 15 September

- 11:10 AM **Jeff P. Smith**, Christopher J. Farmer, Stephen W. Hoffman, Gregory S. Kaltenecker, Kent Z. Woodruff, and Peter F. Sherrington
Trends in Autumn Counts of Migratory Raptors in Western North America, 1983–2005.
- 11:30 AM **Jeff P. Smith**, Christopher J. Farmer, Stephen W. Hoffman, Casey A. Lott, Laurie J. Goodrich, Joel Simon, Cecilia Riley, and Ernesto Ruelas Inzunza
Trends in Autumn Counts of Migratory Raptors around the Gulf of Mexico, 1995–2005.
- 11:50 AM **Ernesto Ruelas Inzunza**
Active Raptor Migration Watchsites: Where Are They Located, How Do They Operate, and What Are They Monitoring?
- 12:30–2:00 PM *Lunch*
- 2:00–2:40 PM **Christopher J. Farmer**, Laurie J. Goodrich, Ernesto Ruelas Inzunza, and Jeff P. Smith
Assessing the Conservation Status of North America's Birds of Prey.
- 2:40–3:20 PM **Keith L. Bildstein**, Jeff P. Smith, and Ernesto Ruelas Inzunza
The Future of Raptor Population Monitoring in North America.
- 3:20–4:00 PM *Coffee Break*
- 4:00–5:00 PM **Dr. Ian Newton**, *Rosalie Edge Lecture in Raptor Conservation:*
A Long-term Study of the Eurasian Sparrowhawk (*Accipiter nisus*).

CONCURRENT GENERAL SESSION VII BREEDING BIOLOGY

JEFFERSON ROOM

Moderator: **Jim Bednarz**

- 8:30 AM **Geoff Holroyd**, Helen Trefry, and Gordon Court
Mate Replacement at Peregrine Falcon Nest Sites - How Common Does this Occur?
- 8:50 AM ♦ **Victor G. Hurley**
A Preliminary Comparison of the Breeding by Peregrine Falcons (*Falco peregrinus macropus*) across Nest Type Versus Landscape: Urban, Rural and Extensive Natural Environments.
- 9:10 AM **Patricia L. Kennedy**, Anne M. Bartuszevige, Ann B. Humphrey, Marcy Houle, and John Williams
Site Occupancy Trends in Sympatric Nesting Buteo Hawks in Northeastern Oregon.
- 9:30 AM ♦ **Christopher W. Briggs**, Michael W. Collopy, and Brian Woodbridge
Assortive Mating in Swainson's Hawks (*Buteo swainsoni*).
- 9:50 AM Kathleen A. Lawrence Townsend and **James C. Bednarz**
Factors Influencing Sibling Aggression in Red-shouldered Hawks.
- 10:10 AM Leo Legra and **Andrew Mack**
Ecology and Conservation of the New Guinea Harpy Eagle (*Harpyopsis novaeguineae*) in Papua New Guinea.
- 10:30–10:50 AM *Coffee Break*

Saturday, 15 September

**CONCURRENT GENERAL SESSION VIII
CONSERVATION**

JEFFERSON ROOM

Moderator: Geoff Holroyd

- 10:50 AM ♦ **Susan L. Roberts** and Jan van Wagtendonk
The Effects of Fire on California Spotted Owls (*Strix occidentalis occidentalis*)
and Their Prey in Yosemite National Park, California.
- 11:10 AM ♦ **Margaret (Peggy) Shrump** and William W. Bowerman
Determining Risk to Raptors from Mercury in Gold Mining Areas of the
Peruvian Amazon.
- 11:30 AM ♦ **Jessi L. Brown** and Michael W. Collopy
Using Existing Nest Box Occupancy Data to Model Potential American
Kestrel Habitat in South-Central Florida.
- 11:50–12:30 PM **Geoff Holroyd**
Conservation Needs of Short-eared Owls.
- 12:30–2:00 PM *Lunch*

**CONCURRENT GENERAL SESSION IX
POTPOURRI SESSION**

JEFFERSON ROOM

Moderator: William Clark

- 2:00 PM **William S. Clark**
Variation in the Tail Pattern of Adult Harlan's Hawks.
- 2:20 PM **William S. Clark**
The Taxonomic Status of Harlan's Hawk.
- 2:40 PM ♦ **Markus Mika** and John Klicka
Population Genetics and Evolutionary History of the Flammulated Owl
(*Otus flammeolus*).
- 3:00 PM **Miguel D. Saggese**, Pablo Halperin, Marcela Uhart, Sharon Deem, Hebe Ferreyra,
Marcelo Romano, María Ferreyra-Armas, Nora Guida, Ana Barboni, and
Eduardo Moras
Hematology, Plasma Biochemistry and Prevalence of Selected Infectious
Agents in Free-Ranging Chimango Caracaras (*Milvago chimango*) from
Central Argentina.
- 3:20–4:00 PM *Coffee Break*
- 4:00–5:00 PM **Dr. Ian Newton**, *Rosalie Edge Lecture in Raptor Conservation:*
A Long-term Study of the Eurasian Sparrowhawk (*Accipiter nisus*).



**Raptor
Research
Foundation**

and



**Hawk Migration
Association of
North America**

2007 Joint Meeting

Kettling on the Kittatinny

12-16 September 2007
Foglesville, Pennsylvania

ABSTRACTS

*Listed in alphabetical order by first author's last name
and in following sections:*

1. **General Session Abstracts**
2. **American Kestrel Symposium Abstracts**
3. **State of North America's Birds of Prey
Symposium Abstracts**
4. **Poster Session Abstracts**

BOLD FACE type *denotes* **Presenter**

◆ *denotes a* **Student Award Candidate**

Predicting Habitat Distribution for the Crested Caracara (*Caracara cheriway*) Using a Spatial Modeling Approach.

JAMI BARNES, GREGORY LIPPS, and KAREN V. ROOT. Dept of Biological Sciences, 217 Life Sciences Building, Bowling Green State University, Bowling Green, OH 43403 USA. **JOAN L. MORRISON**, Department of Biology, Trinity College, 300 Summit St., Hartford, CT 06106 USA.

To develop effective conservation strategies, identifying criteria for suitable habitat is critical, particularly for species in areas with high development pressures. We used land cover and water data layers in a GIS and Mahalanobis distance (D^2) to develop a predictive habitat model for the Crested Caracara in Florida. Listed as both federally and state-threatened, this species occurs in Florida as an isolated population in the south-central peninsula. After evaluating habitat composition of 28 known caracara home ranges estimated using radio telemetry, we recoded layers used in the model to reflect the context of the habitat surrounding each cell within an average caracara home range. We tested models using an independent data set of 80 caracara nests. The final model indicates heterogeneity is critical for habitat suitability for the caracara in Florida, and particularly that caracara home ranges are positively associated with improved pasture, unimproved pasture, and lotic waters. A combination of two Mahalanobis models constructed using home range center points and nest sites, respectively, performed very well in both the percentage of test nests accurately categorized as occurring in suitable habitat (81.25%), and in reducing the portion of the study area judged suitable (27.84%). This model identifies areas of suitable habitat across the entire extent of Florida's caracara population and specific landscape characteristics that comprise habitat for this population. The model also provides a guide for restoration, mitigation, and other conservation efforts and demonstrates a flexible approach applicable to other species and systems.

Unusual Summer Initiated, Long Distance, North Bound Migration of Subadult Red-tailed Hawks from Southwestern California.

PETER H. BLOOM and J. MICHAEL SCOTT, College of Natural Resources, University of Idaho, Moscow, 83843, USA. JEFF W. KIDD, SCOTT THOMAS, JOSEPH PAPP, MARGE GIBSON and ED and JUDY HENCKEL. Western Foundation of Vertebrate Zoology, 439 Calle San Pablo, Camarillo, CA 93012, USA.

As part of a natal dispersal study of Red-tailed Hawks in southwestern California we banded 4,000 nestling Red-tailed hawks (*Buteo jamaicensis calurus*) between 1970 and 2001 and affixed 10 PTT transmitters on fledglings between 2004 and 2006. Red-tailed hawks that departed their natal area and traveled distances greater than 100 km did so in a north to northeasterly direction generally into the Great Basin Desert and surrounding environs. All hawks with PTT transmitters initiated their first north bound migration from southern California in late June or early July about 4 – 6 weeks post-fledging, some traveling as far as northern Idaho and southwest Montana (Yellowstone National Park) in less than a month and returning in August or September of the same year. The one fledgling with a PTT transmitter still alive from the 2004 cohort of southern California fledglings made 3 round trip migrations in 2004, 2005, and 2006 between its natal region in southern California and Idaho or Oregon. In 2007, this hawk acquired a territory 20 km north of its natal territory. We presume that the 2006 south bound migration may have been its last and will now be a resident. Reasons for why this southern California population of Red-tailed Hawks performs this apparently unique migration pattern are discussed.

Status of Golden Eagles in the Texas Panhandle.

CLINT W. BOAL and CAREY A. HARALSON, USGS Texas Cooperative Fish and Wildlife Research Unit, Department of Natural Resources Management, Texas Tech University, Lubbock, TX 79409 USA. **WILLIAM H. HOWE**, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, NM 87103 USA.

We assessed status of the breeding population of Golden Eagles (*Aquila chrysaetos*) in the Texas Panhandle in 2005-2006 by conducting surveys of historic nest areas detected and monitored from 1980-1983. The majority of historic nest area occurred in 3 of 17 counties in the Palo Duro – Caprock Canyon Complex of the Caprock Escarpment. We found few historic nest areas were active in 2005-2006. Based on a sample of sites, our data suggest occupancy

decreased from 92% in 1980-1983 to 32% in 2005-2006. By applying 95% Confidence Intervals across all 42 historic areas, we estimate a 40% to 71% overall decrease has occurred since the 1980-1983 surveys. Causes for this apparent decline are uncertain, but persecution and direct human associated mortality seem unlikely. Rather, we suspect landscape conversion from rangeland to crop cultivation, control of prey species, and vegetation changes from grassland to brushland may have negatively influenced eagles in the region. We recommend that monitoring, conservation, or research efforts on the Panhandle population of Golden Eagles focus on the Palo Duro – Caprock Canyon Complex due to the historic and current concentrations of eagles in the area. Further work is needed to validate population trends and identify causes of change and conservation actions to be taken.

A Terrain-based Dynamic Model for Simulating Raptor Migration through the Appalachians.

DAVID BRANDES, Department of Civil & Environmental Engineering, Lafayette College, Easton, PA 18042 USA. **TODD KATZNER**, The National Aviary, Pittsburgh, PA 15212 USA. **TRICIA MILLER** and **MICHAEL LANZONE**, Carnegie Museum of Natural History, Powdermill Nature Reserve, Rector, PA 15677 USA. **KEITH BILDSTEIN**, Acopian Center for Conservation Learning, Hawk Mountain Sanctuary, Orwigsburg, PA 17961 USA. **DANIEL OMBALSKI**, State College Bird Club, State College, PA 16802 USA.

The northeastern USA has the highest density of raptor migration monitoring sites in the world; however, gaps remain in the understanding of both broad-scale patterns of raptor migration through the region and the specifics of what makes particular sites more or less attractive to migrants. A previous attempt to address this issue resulted in development of a theoretical model for simulating terrain-based raptor migration using a fluid flow analogy (Brandes and Ombalski, 2004). That model used a deterministic energy minimization approach based on estimated updraft velocity at each pixel of the model domain. Although useful in quantifying how wind and terrain impact migration locally, the original model is limited in scope, and does not reflect the dynamic and varied nature of raptor migration over large regions. Here we present a modified approach that includes time-varying weather conditions and probability-weighted directional choice based on both local (adjacent pixel) updraft strength and non-local conditions (i.e., nearby terrain features). The revised model produces realistic simulated migration tracks and over many realizations can be used to predict migration pathways with an associated probability. Several case studies are presented to illustrate the model and show that under conditions where terrain updrafts are the dominant source of lift, three factors determine the primary migration routes: wind direction and strength, local terrain orientation, and regional terrain structure/connectivity. Work is ongoing to calibrate the model with satellite telemetry data from Golden Eagles (*Aquila chrysaetos*), and simulate migration over relevant space and time scales. The end goal is the development of a quantitative model that will identify areas within the Appalachian region of particular ecological significance to migrating eagles and other raptors, and would also be applicable in other settings with highly variable terrain.

Assortive Mating in Swainson's Hawks (*Buteo swainsoni*).

◆ **CHRISTOPHER W. BRIGGS** and **MICHAEL W. COLLOPY**, Ecology, Evolution and Conservation Biology, University of Nevada, Reno, NV USA. **BRIAN WOODBRIDGE**, U.S. Fish and Wildlife Service, Yreka, CA USA.

Persistent plumage polymorphisms occur in many avian species, and are especially prevalent in raptors (i.e., Falconiformes and Strigiformes). Many hypotheses have been put forward to attempt to explain why these groups are prone to persistent polymorphism, including; apostatic selection, heterozygous advantage, and assortive mating. We examined the assortive mating hypothesis in a population of Swainson's Hawks in the Butte Valley of California, where intermediate plumage morphs were common, and dark and light individuals were relatively rare (i.e., there was a persistent polymorphism within the population). We have metal banded nestlings and individually color banded adults with numeric color band since 1979, allowing us to know parental phenotype and the mate selection of recruited individuals. We used a contingency table to determine if recruits were differentially choosing mates of a given phenotype. There were 67 recruits where at least one parent had a known phenotype. We found that males seemed to have no preference for either maternal or paternal phenotype (i.e., random mating; $P = 0.36$). However, females strongly selected for their paternal phenotype ($P = 0.02$). These results indicate that there is strong assortive mating among females, which is not surprising given female preference in other avian species. Further, strong assortive mating is likely to provide enough selection pressure to maintain a plumage polymorphism in the population, at least at the temporal scale of a 30-yr study.

Using Existing Nest Box Occupancy Data to Model Potential American Kestrel Habitat in South-central Florida.

◆**JESSI L. BROWN**, Program in Ecology, Evolution, and Conservation Biology, University of Nevada-Reno, 1000 Valley Rd., Reno, NV 89512 USA. **MICHAEL W. COLLOPY**, Academy for the Environment, University of Nevada-Reno, 108 Mackay Science, Reno, NV 89557-0192 USA.

We conducted a pilot project to predict the spatial distribution of Southeastern American Kestrel (*Falco sparverius paulus*) breeding habitat in south-central Florida, in order to direct the placement of nest boxes for a future study of kestrel life-history traits and population dynamics. We modeled potential kestrel habitat by using the locations of occupied kestrel nest boxes to find associations with spatial datasets in a geographic information system (GIS). We used the weights-of-evidence methodology in the ArcGIS extension ArcSDM 3.1 software for analyzing interactions between training points (nest boxes near Gainesville, FL) and spatial data based on the application of Bayes' Rule of Probability. Spatial datasets examined included land cover (i.e. vegetation type), distance to developed lands, distance to Florida's designated strategic habitat conservation areas (SHCA's), elevation, and soils; all were publicly available on the Internet. The resulting models were evaluated by assessing the efficiency of classification (e.g. success-rate curve or SRC) of the original training points. The best model describing Gainesville kestrel nesting habitat was then extended to the south-central study area by using the "expert" weights-of-evidence mode. Thus, the weights previously calculated for the best Gainesville model were applied to spatial datasets describing south-central Florida to derive breeding habitat models for south-central Florida. These final models were evaluated by assessing the efficiency of prediction (prediction-rate curve or PRC) considering kestrel breeding pair locations discovered during surveys conducted during summer 2007. This final step of evaluating the predictive power of the models was essential for ensuring that the habitat models could confidently guide future decisions concerning survey effort and nest box placement.

Molt and Plumages of the White-tailed Hawk.

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The White-tailed Hawk (*Buteo albicaudatus*) is an unusual Buteo in that it has three immature plumages: Juvenile, Basic II, and Basic III. Most buteos have only one immature plumage: Juvenile; several have two; and no others have three. Molt of the flight feathers of 267 hawks captured in Texas for banding were used as an aid for ageing. I will show and describe all four plumages, which are valid throughout the species' range. Juveniles are overall dark, quite different from adults. Basic II birds are similar to juveniles, with white breasts and dark belly bands, appearing somewhat similar to some Red-tailed Hawks (*Buteo jamaicensis*). Basic III birds are nearly adult in appearance. Sexual differences in plumages will be suggested for each age class. My colleagues are determining sex using DNA taken from feather samples and will use the measurement data to determine criteria for sexing White-tailed Hawks for each age class.

The Taxonomic Status of Harlan's Hawk.

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Harlan's Hawk (*Buteo jamaicensis harlani*) was described by Audubon in his Birds of America (1840-1844) from a specimen he collected in Louisiana. He called it the Black Warrior and deposited the type specimen in the British Museum. It was called Harlan's Hawk (*Buteo Harlani*) until 1886, when the AOU check-list committee made it a subspecies of Red-tailed Hawk. The AOU in 1944 again classified it as a separate species based on published differences between it and Red-tailed Hawk. The AOU flip-flopped and reunited it with Red-tailed Hawk in 1972, based on three rather nebulous papers. Mindell (1983, 1985) supported this taxonomy. All their conclusions were apparently based solely on the presence of rufous in the plumage of many Harlan's Hawks; no other reasons were given. I present plumage characters that serve to separate harlani from all other subspecies of jamaicensis, especially those that breed adjacent to the range of harlani: calurus and alascensis. I found that rufous was present in the plumage, including the tail, of many pure harlani that otherwise showed no calurus characters; I believe that this is the result of shared ancestry, not hybridization. I also found no breeding adult Red-tailed Hawks in British Columbia and southeastern Alaska that had significant harlani traits, thus I could find no evidence of gene flow between Harlan's and the adjacent Red-tailed Hawks. I show other plumage and behavioral differences between them that are at the species level. My

colleagues are investigating the differences in DNA between these taxa and will report their results when completed. Harlan's Hawk is different in plumage from all other similar subspecies of Red-tailed Hawk, with no evidence of interbreeding. It should be considered a species, Harlan's Hawk, (*Buteo harlani*).

Variation in the Tail Pattern of Adult Harlan's Hawks.

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Harlan's Hawk (*Buteo jamaicensis harlani*) differs from other Red-tailed Hawks in adult plumage by the pattern and color of their tails (as well as other plumage characters). I will first show the uniformity in the rufous tails of adults of other subspecies of Red-tailed Hawk; only the so-called Krider's Hawk (A color morph of Eastern Red-tailed Hawk) has a distinctive adult tail. Then I'll show the extremes of variation in coloration and dark markings of the tails of adult Harlan's. The extent of this variation hasn't been reported previously, most likely because there is limited space in field guides and handbooks and most museums have only a few specimens of adults of this taxon. Color of adult Harlan's tails vary greatly from white to pale gray to medium gray to dark gray, often with some to lots of rufous, including completely rufous, or some mix of the above. These often show characteristic dark mottling and grizzling or irregular to regular, narrow to wide banding or both, and usually a vague dusky to crisp variable-width dark subterminal band. No two tails seem to appear the same. Their distinctive tails always differ from those of adult *B. jamaicensis* of other subspecies. Harlan's Hawk is unique in showing this amount of variation in tail pattern. No other raptor shows this great a difference in tail pattern and coloration, nor does any show this great a difference between one subspecies and the others.

Recovery of Banded Barred Owls (*Strix varia*) in the Carolina Piedmont.

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Between 1977 and 2006, Carolina Raptor Center banded 911 Barred Owls in the Piedmont region of North and South Carolina. Encounters with 98 individuals (dead and alive) were subsequently recorded, either by presentation directly to the center or by reports to the Bird Banding Laboratory. Birds banded as juveniles were recovered sooner (259.9 ± 70.61 d) than birds banded as adults (737.4 ± 159.55 d; $P = 0.0075$), and were recovered farther from the initial location (4.80 ± 0.81 km vs. 2.30 ± 0.63 km; $P = 0.018$). When birds released in rural counties were contrasted with birds from urban counties, it was found that rural birds were recovered farther from the initial location (6.27 ± 1.62 km) than urban birds (2.55 ± 0.34 km; $P = 0.0014$).

Habitat, Movement, and Communal Roosting of Non-Breeding Crested Caracaras (*Caracara cheriway*) in Florida.

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A threatened population of breeding Crested Caracaras (hereafter Caracara) in Florida may be in decline due to widespread loss of nesting habitat. Landscape changes also may impact non-breeding Caracaras, and compound risks to population persistence. We used aerial telemetry to track communal roosting, movement, and habitat use of 35 non-breeding Caracaras. In the fall, non-breeders congregated in at least 3 distinct communal roosts containing >100 individuals each. No communal roosts were previously known in Florida. Long distance dispersal activity occurred mostly in winter, spring, and summer, and routinely included weekly movements of >30 km. The area used by all radio tagged non-breeders encompassed approximately 12,000 km² (minimum convex polygon). Dispersing non-breeders used multiple communal roosts, and flock membership was plastic. We collected habitat data at > 300 aerial relocation points, and > 300 random points in South Florida. Non-breeding Caracaras were significantly closer to flowing water than random sites, and canals were significantly more likely to be the closest type of flowing water to non-breeders. Non-breeders also were significantly closer to roads than random sites, and there were significantly fewer human structures near non-breeder locations. Non-breeders were more likely to be found in vegetation <1 m high than random sites. These features are characteristic of traditionally managed ranch and agricultural landscapes in

South Florida, and we found that non-breeders used drained pastures, orange groves, and harvested fields more than expected based on the availability of those land cover types within the species' range. Non-breeders avoided open water, wetlands, swamps, and urban areas. These use patterns differ from adult Caracaras' use of wetlands and avoidance of agricultural areas, and may indicate resource partitioning between breeders and non-breeders. This research will contribute to development of more effective conservation plans for Caracaras that include all age classes and roosting areas.

How Temperature, Age-class, and Food Affect Texas' Suburban Nesting Eastern Screech-Owls.

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Temperatures are rising, mean maximums faster than mean minimums, and mean first egg dates are earlier by 1 day every 3 yrs over four decades. Laying date is tied to mean maximum temperature in February and percent successful nests is higher, when laying is earlier. Fledglings per egg increases faster in yearlings than older females in response to increasing warmth relative to rising April-May temperature. Earlier laying and higher reproductive efficiency are also related to increasing numbers of permanent resident birds in the habitat and concurrently in the diet, both positively related to suburban sprawl. Half the ecosystem's variation is explained by pre-laying and nesting temperatures, avian prey base, and percent successful nests. Successful nests now average one more fledgling per egg every two years, while clutch size remains the same at 3-6 eggs. Climatic warming is the ultimate factor.

Phylogeny, Diversity, and Classification of the Accipitridae based on DNA Sequences of the RAG-1 exon.

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The avian family Accipitridae has historically been divided into subfamilies or tribes based on features such as general resemblance, feeding ecology, and behavior. Recently, three phylogenetic analyses of a majority of the genera have appeared, one based on osteology, one on DNA sequences from a single mitochondrial gene, and the third on mitochondrial plus nuclear DNA sequences. The resulting phylogenies were in substantial disagreement concerning the composition and basal branching patterns of the clades and hence require further analysis and confirmation. We used DNA sequences from the large nuclear RAG-1 exon to investigate the phylogenetic relationships of these birds. Our results largely corroborated the prior study that included nuclear genes. We found strong support for a monophyletic clade comprising the Secretarybird (*Sagittarius serpentarius*), the Osprey (*Pandion haliaetus*), and the traditional accipitrids. However, every one of the traditionally recognized subfamilies of accipitrids was found to be polyphyletic, as were the genera Buteo and Accipiter. For the latter genus, the Marsh Harrier (*Circus aeruginosus*) clustered within Accipiter species in a strongly supported clade. The most basal nodes in the phylogeny separate small clades of insectivorous and scavenger species, such as kites and Old World vultures, from the rest of the family. The speciose genera of bird and mammal predators are all relatively derived (terminal) in the phylogeny. Many of the basal clades are cosmopolitan in their distributions, consistent with the great mobility of these raptors.

Status of the Peregrine Falcon (*Falco peregrinus*) on the Colorado Plateau, 1991–2007.

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The National Park Service has conducted Peregrine Falcon monitoring surveys on the Colorado Plateau since 1990. The areas of specific interest in which I participated were Glen Canyon National Recreational Area (1991, 1992, 1993), Dinosaur National Monument (1998) and Zion National Park (2000–2006). We recorded continuous or discontinuous usage of the site (occupancy) at each site surveyed. This report provides data for a total of 228 occupied sites. For more than half of those occupied sites, we recorded additional data including spatial distribution (distance

from the nearest site), breeding success (number and age of young and/or number of young which reached 80% of fledgling age \pm two days), behavior and nesting phenology. We documented breeding attempts at 169 (71%) of the occupied sites. However, the total number of the breeding nests that were successful (e.g., nests with nestlings at 80% of fledgling age) was 120 (71% of Breeding sites). Mean breeding success in successful nests was 2.2 ± 0.1 young birds (mean \pm standard deviation). Across all nests with known outcome (includes failed sites), breeding success averaged 1.9 ± 0.3 young birds. The average distance between the successful nests was five km. Overall, with stable populations in all three parks; recovery of the Peregrine Falcon is well underway in these areas, with populations probably approaching historical size and ecological carrying capacity.

Wintering Raptors of the Great Basin Census and Banding Study 1985–2007.

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Since 1985, Al Hinde has conducted a roadside census and banding study of wintering raptors in the Great Basin. Initially, this project was limited to northeastern Nevada and was intended to augment knowledge of regional raptor ecology derived from HawkWatch International's (HWI) long-term migration study in the Goshute Mountains of northeastern Nevada (on-going annually since 1983). By 1989, further exploration throughout Utah and Nevada had revealed eight major concentration areas for wintering raptors, with each roughly 50-square-mile area consistently containing 100–200+ individuals of several species. At least 10 species, primarily buteos, winter in these areas. These areas consist entirely of cattle ranching and agriculture, mainly alfalfa farming, which produces abundant rodent supplies for winter raptors. Indeed, where these conditions are absent, no large raptor concentrations have been found. One such area, Lovelock, Nevada, contained a previously undocumented communal roost of 200+ buteos. These include: Rough-legged Hawks (*Buteo lagopus*), Red-tailed Hawks (*Buteo jamaicensis*), and Ferruginous Hawks (*Buteo regalis*), and several Great Horned Owls (*Bubo virginianus*). Continuing each January, with field assistance from HWI raptor biologists, other ornithologists, and local and state wildlife officials, Hinde focused on these eight areas, including the Lovelock roost. All sites have continued to sustain similar large numbers of wintering raptors each year, with the Lovelock roost routinely containing dozens of mixed-species buteos. This long-term study suggests that these areas are among the most significant winter ranges for raptors in western North America, and the censuses provide a means of monitoring population changes in relation to habitat, land-use, and climatic changes in the study regions. The capture and banding of 300+ raptors (12 species) over the course of study—including 90 Rough-legged Hawks, the focal species—also has yielded morphometric, genetic, and photographic data that have been used in several other studies and publications.

Conservation Needs of Short-eared Owls.

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Short-eared Owl (*Asio flammeus*) numbers across North America are in decline according to Breeding Bird Survey. Between 1966 and 2004, the 9% annual decline in Canada was significant, but the 3% decline in the US was not significant. A workshop in November 2006 in Winnipeg reviewed some information on the status of our knowledge of the Short-eared Owl in Canada and its conservation needs. Short-eared Owls are ephemeral in some localities, but in others are predictable in summer and winter. For example, each winter Short-eared Owls can be observed on Wolfe Island, Ontario in the St. Lawrence River. In the winter 2005 and 2006, over 100 Short-eared Owls wintered at Beaverhill Lake, Alberta, due to recent drought resulting in a dry lake bed covered in Foxtail Barley, which in turn caused an explosion of meadow voles. Three satellite transmitters have been placed on Short-eared Owls to date and there are plans to attach more. These 9.5 g solar transmitters should allow multi-year tracking of this species. These data and the seven objectives that were proposed in Winnipeg will be discussed. A symposium should be held on the status of Short-eared Owls at the next RRF meeting.



Mate Replacement at Peregrine Falcon Nest Sites - How Common Does this Occur?

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In the spring of 2007, three Alberta Peregrine Falcons (*Falco peregrinus*) with satellite transmitters returned to their urban nest sites and were involved in fights to the death with falcons that had returned earlier or shortly after and claimed their nests. Two fights resulted in the death of adults; the third was saved through the intervention of humans twice. In one case the 'winning' male raised the young of the defeated male. In another case the winning female did not lay eggs and in the third case the new female successfully laid four eggs. The circumstance of all three replacements would not have been known without satellite telemetry. This paper will review other nest replacements and consider the frequency of adult replacements by force. In addition, we will consider the conservation implications in a population that appears to have abandoned nest attempts on prairie rivers in favour of prairie cities.

Public Participation Facilitates Turkey Vulture Tagging Program in Saskatchewan.

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Between 1893 and 1996, Turkey Vultures (*Cathartes aura*) are known to have nested 23 times in 15 caves in badlands and lake and river banks throughout southern Saskatchewan. When fires still ravaged the prairies, vultures sometimes nested in thin shrubbery on the ground. As aspen forests were cleared for farming and fires controlled, some pairs used impenetrable brush-piles as nest sites. The first use of a deserted farm house was reported in 1982, with 14 additional instances through 2002, including the first three known nestings in the Saskatoon Bird Area in the latter year. A program of applying patagial tags to nestlings was initiated in 2003, generating publicity through a yearly illustrated article in the Western Producer and thrice-yearly features on Trevor Herriot's monthly Bird-Line on CBC radio across Saskatchewan. Results have far exceeded our expectations. One farmer-naturalist, Don Forbes, visited 20 deserted houses and found four active nests in 2005; in 2006 he found eight active nests in 42 houses. The number of active nests increased from 13 to 22 to 38 to 53 during the four years of the study; nestlings tagged increased from 14 to 30 to 43 to 84. We expect to visit over 70 nests in August 2007. Please look for a patagial tag on every Turkey Vulture you see.

A Preliminary Comparison of the Breeding by Peregrine Falcons (*Falco peregrinus macropus*) across Nest Type Versus Landscape: Urban, Rural and Extensive Natural Environments.

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Peregrine Falcons have a near global nesting distribution and can be found in almost any habitat except dense forests and treeless deserts. However, nest construction by Peregrine Falcons is limited to digging a scrape in an existing substrate and laying their eggs in the depression created. In most circumstances, Peregrines Falcons are considered cliff nesters, using ledges or caves for nesting. In the current study, 260 Peregrine Falcon nest sites have been recorded across Victoria in temperate Australia. Most sites within this study (including natural and man made cliffs), bridges, buildings and silos are grouped under the same category of 'cliff site' (62.8%). Of the remaining sites, 37.2% are non-cliff (or atypical) nest sites, namely those in disused stick nests of other birds (18.3%) or tree hollows in large Eucalypts (18.9%). Sites were further classified according to the major land use within a 5 km radius of each. Of these, 28% remain in extensive natural landscapes, 61% in rural and agricultural lands, and the remaining 11% are found in areas with greater than 33% urbanization within the designated radius. Across these land use categories, 434 breeding attempts were monitored. We recorded clutch size, brood size and the number of breeding peregrines produced from each site. Clutch size was largest in urban environments (2.84 eggs) and smallest in territories found in extensive natural landscapes (2.48 eggs). Brood sizes mirrored the size hierarchy of clutch sizes with those in urban territories (average = 1.91 nestlings), extensive natural areas smallest, 1.76 nestlings, and rural territories in between with 1.88 nestlings. However, of all the nestlings fledged, 13.2% from natural areas became breeding adults compared to 8.4%

from rural areas and only 7.0% from urban areas. These last results provide the most meaningful indication of the contribution territories within each land system make to the population.

What You See Isn't Always What You Get: How Accurate Are Counts of Raptors and How Many Non-Breeders Are Really Out There?

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Estimating population size of breeding season raptors is typically accomplished by counting occupied breeding territories. However, it is widely acknowledged that for many species this approach misses the large number of non-breeders, usually pre-adults and non-territorial adult "floaters." Yet these birds are thought to make up a large proportion of the overall population size and studies that ignore them do so at the risk of compromising understanding of demographics. The limited data we have on this poorly studied component of raptor populations is primarily derived from direct observation of communal roosts, or wing tagging or telemetry studies of individuals. We compared traditional visual counts to microsatellite genetic analyses of noninvasively collected feathers to estimate the size of a non-breeding Imperial Eagle (*Aquila heliaca*) population using communal roosts in Kazakhstan. The maximum number of individuals observed in each of 11 years of visual counts between 1978 and 2004 ranged from 7 to 37. In 2004 a maximum of 21 individuals were observed at one time. Noninvasive genetic analyses from >1500 feathers collected in 2004 told another story, detecting >10 times more birds than were observed. Specifically, we identified 287 non-breeding Imperial Eagles and mark-recapture analysis estimated the total population to number 308 ± 8 . The vast majority of raptor studies rely on territory occupancy and visual counts to estimate population size of focal species. Our research suggests that these approaches may vastly underestimate the true size of populations. We also show a viable alternative to visual observations - noninvasive collection and genetic analyses of feathers - that can be used to evaluate population size, natal philopatry, and local movements of birds that are difficult to study using traditional means.

Site Occupancy Trends in Sympatric Nesting Buteo Hawks in Northeastern Oregon.

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In 1979–80, one of the highest North American nesting densities of three species of Buteo hawks (Ferruginous Hawk, Swainson's Hawk, and Red-tailed Hawk) was recorded on the Zumwalt Prairie in northeast Oregon. We have returned to the prairie approximately 25 years later to document trends in site occupancy to see if this last, large remnant of the Northwest bunchgrass prairie still supports large nesting populations of sympatric prairie raptors. This area is entirely privately owned and the primary land use is cattle ranching. Using the historic data, we stratified the ca. 50,000-acre study area into Not Suitable Nesting Habitat, Low Suitability, and High Suitability. We then randomly assigned 100, 800 m² (functional size of a defended area) plots to the study area with 2/3 of the plots in the High Suitability strata and 1/3 of the plots in the Low Suitability strata. We developed several a priori site occupancy criteria and during the 2004 nesting seasons all plots were searched once to determine site occupancy by each species of hawk. Plots that were not identified as occupied during the first visit were revisited later in the season. During 2005 we added a third site visit to plots not occupied during the second visit. During 2006 we conducted 3 complete searches of each plot. We also determined occupancy status of each plot during 1979–80 from the historic data. This approach allowed us to calculate annual detection probabilities for each species in 1979–80, and 2004–06 as well as annual probabilities of colonization and extinction. The results suggest the trends in site occupancy for all three species are stable.

Dissecting Migration of Swainson's Hawks (*Buteo swainsoni*).

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We radio tracked 46 adult Swainson's Hawks during 1995-1998 from seven U.S. states and two Canadian provinces. Preliminary results indicate that birds departed the nesting grounds between 12 August and 13 October on a southerly course. During fall migration 75% of the hawks made one to seven stopovers, lasting between 1.2 and 27.0 d (mean = 5.1). Of these hawks, 42% stopped for ≥ 9 d at their first stopover, which occurred north of the U.S. - Mexico border, mainly in the Great Plains. Swainson's Hawks arrived at their central Argentina austral summer range between 7 November and 30 December. Southward migrations lasted from 42 - 98 d. Travel distances we report reflect a minimum distance because it is unlikely that birds flew a straight line between location estimates. Cumulative tracking distances for fall migration ranged from 8,849 - 13,209 km. A bird from southeast Arizona had the shortest distance, and a hawk from northern California had the longest. Hawks left Argentina on a northerly bearing between 13 February and 26 March. Of the migrating birds, 30% made one to two stopovers lasting 4.0 to 8.4 d (mean = 6.1), with most occurring north of the U.S.- Mexico border. North migration lasted 51 to 82 d, and cumulative tracking distances ranged from 9,047-11,585 km. A hawk from southwest Minnesota had the shortest distance, and a bird from northeast Oregon had the longest. We recorded cumulative distances of south plus north migrations for 23 birds. The shortest round-trip distance was 19,613 km by a hawk nesting in central Colorado, and the longest was 23,605 km by a bird from northeast Oregon.

Movements of Red-Tailed Hawks Color-Marked during Autumn Migration on the Kittatinny Ridge of Central Appalachians, Pennsylvania.

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The Red-tailed Hawk (*Buteo jamaicensis*) is one of the three most common species sighted at inland migration watch sites in the northeastern United States and is seen regularly along the Kittatinny Ridge, a major migration corridor for south bound raptors in autumn. The Red-tailed Hawk uses both thermal soaring and ridge updrafts to save energy as it traverses the central Appalachian region. Since the Red-tailed Hawk is a common nesting bird and partial migrant, counters at some watch sites presume early autumn (e.g. September) sightings to be of resident or non-migrant birds, however some proportion of these birds may be migrating. We studied the movement of Red-tailed Hawks during autumn migration along the Kittatinny Ridge, in the central Appalachians of Pennsylvania, by color-marking birds during autumn migration 2000 through 2003. Birds were trapped and four secondaries marked pink from late August through mid-October, and green or yellow from mid-October through 1 December. None of the color-marked birds remained in the vicinity of the banding station or any hawkwatch during the study. We therefore conclude that Red-tailed Hawks sighted during autumn along the central Appalachians appear to be predominantly migrants excepting a few early dispersing birds. The migrants appear to move primarily southwest and over-winter as far south as Tennessee. Early season birds tend to move in a more southerly, off ridge direction than late season birds. No difference was found in flight direction between adults and juveniles within color groups. We conclude that early season Red-tailed Hawks are often migrants. As such, count protocols should include methods of counting red-tails in early as well as late autumn. We also suggest that early season migrants may be more likely to use thermal flight and fly south off the ridge, whereas late season birds appear to more consistently follow the ridge flight line to the southwest.

Golden Eagle (*Aquila chrysaetos*) Wintering Behavior in the Appalachian Mountains of Eastern North America using GPS Data from Satellite Telemetry.

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Golden Eagles that breed in northern eastern regions of Canada migrate south each year to their wintering grounds in the central and southern Appalachians. As part of a larger ongoing study of the effects of underlying topography and prevailing weather (e.g., wind speed and direction) on the routes and flight behaviors of eastern Golden Eagle during migration, we present preliminary results on the wintering behavior of two sub-adult Golden Eagles, one a fourth-year male (#39) and the other a third-year male (#40), captured and telemetered in fall 2006. During the winter of 2006-07 hourly GPS data was collected on both birds and analyzed to determine home-range size, habitat usage, roost site selection and use of local topography for moving to and from roosting and feeding areas and localized movements between wintering areas. During the period from 4 December 2006 to 8 March 2007 #39's core wintering area was 2,335.4 km², and #40's core wintering area was 1,163.5 km². While #39's winter range was fairly confined, #40 had several large scale movements during this period encompassing 39,163.4 km². On a daily basis the birds traveled an average of 26.3 km (#39) and 64.1 km (#40). Currently we are analyzing habitat use and roost site selection, however, preliminary data suggests that both of these birds had some roost site fidelity. The significant differences between the behavior of these two birds, if indicative of broader trends within the larger population, suggest that eagles may have a variety of wintering strategies. Among other products, this data will be used to assess possible adverse impacts on wintering eastern Golden Eagles from proposed wind power development in the region and to help guide such development.

Ecology and Conservation of the New Guinea Harpy Eagle (*Harpyopsis novaeguineae*) in Papua New Guinea.

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We studied behavior and habitat use of the New Guinea Harpy Eagle (*Harpyopsis novaeguineae*) around six nest trees. Perch trees of juvenile New Guinea Harpy Eagles averaged 28 m high (N = 59, range = 15–45) with mean DBH of 67 cm (range = 23–144). New Guinea Harpy Eagles used nest trees of greater DBH (mean = 83.10), height (mean = 35.50) and had greater ease of access to the nest (mean = 0.67) compared to random trees (mean = 46.97, mean = 26.77 and mean = 0.33). Nest sites on average were further away (103 m) from water than random trees (70 m). We found a mean of 95% closed forest within a 2-km radius around nest trees and these were located at a mean distance of 265 m from forest tracks. Fledgling eagles are dependent on parents for food provisioning for at least two years. Prey items of the eagles comprised of mammals (48%), birds (20%), and reptiles (32%). This species needs large trees away from human disturbance with intact populations of marsupials for successful nesting. Logging in Papua New Guinea and competition with humans for prey constitute the greatest threats to the species.

Impacts of Reintroduced Coastal Peregrine Falcon (*Falco peregrinus*) Populations on Prey Species Populations.

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Virginia's Eastern Shore supports one of the most critical habitats for breeding and migrating shorebirds and waterbirds in the world. In part because of the presence of this large avian community, the area was heavily used to reintroduce Peregrine Falcons after their extirpation from much of their North American breeding range following widespread DDT poisoning. Most of the eastern U.S. population currently breeds in habitat that is very different from that used by the historical population, and prey species in these areas were not under threat from breeding peregrines

prior to the 1980s. Many of the prey species used by this peregrine population are of conservation concern, and the impact of introduced peregrines on these populations remains undocumented. Here we use demographic data combined with morphometric measurements to estimate the energy requirements of each peregrine in the breeding population since reintroduction in 1982 through 2005. Energy requirements peaked in 2005 at 13.51 kg (daily peak 1st June) and 1550.02 kg (year total). In conjunction with diet information obtained through prey studies and prey species census information, we estimated the potential direct impact as well as the likely direct impact of peregrines on their prey populations, with special consideration for species of conservation concern. We found that at periods of peak consumption, there is over 200 times the shorebird biomass available than is likely taken, and 126 times more biomass available than what is potentially taken. While we found that most prey species are not likely to be severely threatened by peregrine predation, some species of breeding and migrating shorebirds and waterbirds may be seriously affected, and we discuss those here.

Satellite Tracking Bald Eagles (*Haliaeetus leucocephalus*) in the Upper Midwest.

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Our objectives were to answer age-old questions regarding where Bald Eagles that winter along the Upper Mississippi River Valley spend their summers, what their migration routes are between summer and winter ranges, and the fidelity shown to those ranges and routes. We also noted mobility in summer and winter ranges, as well as migration duration and distance. During late fall and winter months from March 1999 through February 2006, 14 satellite transmitters were placed on wild-caught Bald Eagles (12 adults, two immatures) on a winter range or migration stopover point in southwest Wisconsin. They were tracked until transmitter failure. Data revealed winter ranges as far south as the Mississippi and Illinois Rivers northwest of St. Louis, Missouri. Summer ranges extend out from the Upper Mississippi River Valley migration corridor as far north as Arviat, Nunavut, on the west shore of Hudson Bay. Migration route fidelity was apparent, with two notable exceptions. Fidelity to summer and winter ranges was also apparent, but variable, some remaining on their ranges the entire season, others traveling extensively, often to the same areas in subsequent years. Median start and end dates for spring migration were 5 March and 3 April, respectively. It took 4-151 d (median = 31) to reach their final summer ranges. Median start and end dates for fall migration were 27 October and 12 December, respectively, fall migration lasting 15-77 d (median = 47). Straight-line distances between the cores of an eagle's winter and summer range ranged from 592-2287 km.

Population Genetics and Evolutionary History of the Flammulated Owl (*Otus flammeolus*).

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Distributions of Nearctic vertebrate taxa and their population structures have been shaped by glacial cycles during the late Pleistocene. Investigation of population genetics in owls is difficult due to low densities and secretive behavior in these birds. Throughout the western mountains of North America, the insectivorous Flammulated Owl is a Neotropical migrant with a high degree of site tenacity among breeding adults. Sedentary populations are found in montane forests of central and southern Mexico. Between 2002 and 2006, we gathered 141 genetic samples from breeding populations of both migrants and non-migrants throughout the United States, Canada, and Mexico. Population genetic analyses of the mitochondrial markers ATPase 6&8 using standard and coalescent approaches reveal 29 unique haplotypes and a lack of geographic structure. We found strong evidence for a recent population expansion into the United States and Canada following the last glacial maximum. From a genetic perspective, non-migratory birds appear to be the same as their migratory counterparts. High rates of gene flow between regions are observed. Unexpectedly, sedentary birds from southwestern Mexico exhibit low genetic variation. This may be due to a recent expansion from a refugium into this area. Current habitat destruction in the species' southern ranges may keep such diversity indices low in the future.

Flight Characteristics of Golden Eagles (*Aquila chrysaetos*) Migrating Through Eastern North America as Determined by GPS Telemetry.

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Golden Eagles that breed in northeastern Canada migrate south each year to their wintering grounds in the central and southern Appalachians. As part of a larger ongoing study of the effects of underlying topography and weather (e.g., wind speed and direction) on the routes and flight behaviors of eastern Golden Eagle during migration, here we present preliminary results on the spring migration of one after fourth year (#39) and two after third year (#40 and #41) male Golden Eagles captured and telemetered in late 2006 and early 2007. We collected hourly GPS data to examine timing, distance, flight speed and altitude. Migration commenced as early as 09 March 2007 and as late as 06 May 2007. As of the end of May, two birds had completed migration in 22 (#39) and 41 (#40) days, having traveled a total of 2890.8 km and 4539.3 km, respectively. For all three birds, the maximum distance traveled in one day was 408.1 (#39), 340.1 (#40), and 305.9 km (#41), with an average distance traveled per day of 144.5, 126.1, and 154.8 km. Average speeds during active migration were 44.8, 48.0, and 49.8 km/hr, with maximum speeds of 106, 102, and 102 km/hr. Average altitudes above sea level were 736.6, 706.4 and 919.8 m with maximum altitudes of 1603, 1631, and 1790 m. In addition to these analyses, we are currently conducting additional analyses regarding ridge use and altitude above ground level. These preliminary data suggest that certain flight characteristics such as flight speeds are consistent among individuals but that other flight characteristics such as daily and total distances traveled during migration are highly variable.

Site Occupancy and Detectability of Forest-nesting Owls in Michigan.

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We surveyed breeding woodland owls in Michigan to determine species distribution and investigate factors that may influence site occupancy and detectability of Eastern Screech-Owl (*Megascops asio*), Great Horned Owl (*Bubo virginianus*), and Barred Owl (*Strix varia*). We conducted point counts from 2004-2006 along 40 randomly selected North American Breeding Bird Survey routes between mid January and early May using broadcast calls. Site occupancy (proportion of sites occupied) and probability of detection was estimated using likelihood-based models. We documented 577 Eastern Screech-Owl, 276 Great Horned Owl, and 523 Barred Owl detections during 3,251 point counts. Site occupancy estimates were similar for Eastern Screech-Owl and Great Horned Owl, while Barred Owl estimates were lower. The proportion of sites occupied by Eastern Screech-Owl increased with higher amounts of herbaceous upland and agriculture and decreasing proportions of forest surrounding survey points. Great Horned Owl site occupancy was higher with increasing levels of herbaceous upland, agriculture, and deciduous forest and lower amounts of coniferous and mixed forest. Barred Owl site occupancy increased with higher proportions of forest and decreasing amounts of agriculture and herbaceous upland. Eastern Screech-Owl detection probability was negatively related to wind speed in 2004 and 2005 and negatively related to both time of night and wind speed in 2006. Detection probabilities for Great Horned Owl were the lowest of the three species examined. Great Horned Owl detection probability was negatively related to wind speed every year; however, support in 2005 was weak. Barred Owl detection probability was negatively related to wind speed in 2004 and 2005 and noise level in 2006. Probability of Barred Owl detection increased with each successive survey in a given season. Substantial survey effort is required to have high confidence that owls are absent from a site when not detected.

A Long-term Study of the Eurasian Sparrowhawk (*Accipiter nisus*).

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This talk will present the highlights from a 27-year study of the Eurasian Sparrowhawk. It will be based mainly on findings from south Scotland, but will also draw parallels with findings from other areas. It will discuss the factors that influence breeding densities, including the role of food-supply, nesting places and territorial behaviour. The talk will also discuss the factors that influence the lifetime reproductive performance of individual birds, together with age-related trends in survival and reproductive output. Territories vary in quality, and have a major influence on the breeding of their occupants. Most sparrowhawks use the same nesting territories in successive years, but some move to different territories. The factors that influence changes in territory or mate will be discussed, including the effects of territory quality. Additional information will be presented on other aspects, such as sex ratios, growth and dispersal of young, and general ecology.

The Effects of Fire on California Spotted Owls (*Strix occidentalis occidentalis*) and Their Prey in Yosemite National Park, California.

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As forest managers use fire to maintain healthy forests and manageable fuel loads, it is imperative to consider how fire and fire suppression affect forest wildlife. The California Spotted Owl, an old growth associated species, is sensitive to habitat changes with reduced nesting success in compromised habitat. We studied the occurrence and nesting success of spotted owls in 16 randomly chosen burned and unburned old growth mixed-conifer forests ($N_{\text{total}} = 32$) throughout Yosemite National Park, California. We conducted systematic, nocturnal surveys for Spotted Owls throughout these areas, with a total of 120 km² surveyed in the spring of 2004 and 2005. We live-trapped mammalian prey in 20 of the owl survey areas. Prey abundance and diversity were similar between burned and unburned forests, but northern flying squirrels (Spotted Owl's primary prey) were captured significantly more in unburned forests. Eighteen percent of all Spotted Owl responses were in burned forests, with 14% of the owls nesting in burned forests producing 19% of the total juveniles in the study group. We delineated a 203 ha core activity area around each nest and calculated the mean area of four fire severity classes (unchanged, low, moderate and high) within the core area. For owls inhabiting burned areas, the 203 ha core area encompassed a heterogeneous matrix of variable burn severities. The 11 owl pairs nesting in burned areas had, on average, 38% of their core area burned, with 20% of the area defined as low severity and 17% moderate. We suggest that fire management plans should maximize the areas burned at low severity while maintaining a landscape with a heterogeneous matrix of burn severities to provide valuable foraging and nesting habitat for the California Spotted Owl.

A Data Collection Protocol for Raptor Migration Monitoring.

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In this session, I present a revised standard protocol for raptor migration counts. It is divided in two parts; a first section covering the rationale behind why, how, and when data that are collected in the field, and a second part with a simple set of instructions to collect and archive data, which includes two tables with field record conventions, and two separate data forms to document daily and seasonal data. Among the most important changes made to the previous HMANA protocol is the use of numeric values rather than categories in recording flight conditions, a set of codes for collecting information on sex, age, and color morph of migrants, and the need to clearly document the specifics of how data was recorded each season on each site. The revisions I made to current standards are aimed at (1) Increasing the quality of data collected and facilitate data recording and data analysis, and (2) To stimulate the development of written protocols for raptor migration monitoring sites. I close my presentation with an invitation to adopt the new standards simultaneously with the old standards in order to compare the possible added value of adopting the new protocol.

HawkCount.org: A Tutorial.

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Hawkcount.org is an Internet-accessed database system that provides count and observation data entry, storage, and reporting services for hawk watch sites. This system was initially implemented in 1999-2000 as a single-site hawk watch data reporting system for the Holiday Beach Migration Observatory, near Amherstburg, Ontario, Canada. This session intends to provide a simplified explanation of this system's capabilities as well as a tutorial for data entry procedures for migration monitoring sites. A summary of data entry procedures, current hawk watch site participation, and plans for future system development will also be presented.

Hematology, Plasma Biochemistry and Prevalence of Selected Infectious Agents in Free-Ranging Chimango Caracaras (*Milvago chimango*) from Central Argentina.

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The Chimango Caracara is the most common scavenger inhabiting the pampas' agroecosystems of central Argentina. Although its breeding and feeding ecology have been previously investigated, health studies have not been reported for this species. As a result of their opportunistic, generalistic, and scavenging feeding habits, Chimango Caracaras are probably being exposed to multiple pathogenic agents. In the agricultural areas of the pampas, they regularly visit diverse human settlements and are known to feed on carrion of many domestic animals. However, no attempts have been made to investigate their exposure to common avian pathogens. During November and December of 2000 and April of 2001 seventeen free-ranging Chimango Caracaras were captured along roads in close proximity to farms and urban areas in Santa Fe province in central Argentina. Body weight, standard hematological, and plasma biochemistry parameters were determined. Presence of *Clamydophila psittaci* in feces and the seroprevalence for selected poultry pathogens such as *Salmonella* spp., *Mycoplasma synoviae*, *M. gallisepticum* and Paramyxovirus type-1 (Newcastle diseases) was investigated. Seropositivity was found for *M. gallisepticum* (13.3%) and *M. synoviae* (26.6%). There was no evidence of exposure to the other infectious agents. Results from this research suggest that exposure to poultry pathogens is not common in Chimango Caracaras in the study area. Prevalence of these two species of *Mycoplasma* common to poultry and other peri-domestic birds is low. The role of these pathogens as a cause of disease or mortality in adults and nestlings requires further investigation.

Determining Risk to Raptors from Mercury in Gold Mining Areas of the Peruvian Amazon.

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The Amazon Basin is undergoing extreme changes due to natural resources extraction. While most of the world's concern has been focused on deforestation and loss of wildlife habitat, mining activities can also impact raptors. Mining of gold in the region uses primitive methods that include the open combustion of mercury and direct runoff of mercury to surface water. Many raptor species inhabit the basin, but little is known about their ecology. To determine what risk mercury from gold mining activities poses to raptors in the basin, we have begun a study to measure concentrations of mercury in feathers and blood of free-flying individuals. We will compare exposure of birds captured in areas where gold mining has occurred and also in control sites without a history of gold mining. Using live traps, we have captured 45 individuals of 11 species through May 2007. We have captured 21 Road-side (*Buteo magnirostris*), 9 Slate-colored (*Leucopternis schistacea*), 2 White-browed (*L. kuhli*), and 1 Bi-colored (*Accipiter bicolor*) hawks; 8 Barred (*Micrastur ruficollis*), 6 Lined (*M. gilvicolis*), 1 Buckley's (*M. buckleyi*), and 1 Slaty-backed (*M. mirandolei*) forest-falcons; 1 Double-toothed Kite (*Harpagus bidentatus*); and, 1 Ornate Hawk-Eagle (*Spizeatus ornatus*). Con-

centrations of blood and feather mercury from these individuals will be compared to known toxic reference values for other raptors. We will determine potential risk to individuals from these activities. Since these raptor species have multiple terrestrial, aquatic, and semi-aquatic food webs, both the risk and the potential pathway of mercury will be determined. Results of this study will be provided to the Peruvian governmental agencies responsible for environmental quality.

Winter Roadside Raptor Surveys in the Northern Central Valley of California, 2006–2007.

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During the winter of 2006-2007, monthly roadside raptor surveys were conducted at several sites throughout California's Central Valley to determine raptor diversity and abundance. Average birds/survey km (bpk) and birds/survey hour (bph) across all sites was 1.6 bpk and 25.7 bph, respectively. Red-tailed Hawks (*Buteo jamaicensis*) were the most common raptor (46.5%) followed by American kestrels (*Falco sparverius*) (22.2%) and Northern Harriers (*Circus cyaneus*) (9.7%). January surveys produced the highest bpk (1.7) and bph (29.8). These measures were lowest in November (1.4, 21.2) and February (1.5, 22.5). These results are compared with those from concurrent survey efforts in other regions. This pilot-study was undertaken in an attempt to instigate winter raptor monitoring in this important region. Coordinated monitoring of raptor populations during winter in North America has been sporadic, but it can compliment other forms of raptor population monitoring (i.e. migration counts). Increasing the number of survey routes and incorporation of the data into HMANA's WRS (Winter Raptor Survey) project are goals of this project in the near future.

World's Densest Raptor Population: A Comparison of Cave Creek Canyon on the Coronado National Forest in Arizona and the BLM's Snake River National Conservation Area in Idaho.

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Idaho's Morley Nelson Snake River Birds of Prey National Conservation Area, managed by the BLM, reportedly has the world's densest nesting population of raptors. I compared the density and species diversity of nesting raptors reported for the Snake River NCA with the density and diversity found in a 50 square km. montane canyon study area of in the Chiricahua mountains, most of which is on US Forest Service land (Coronado National Forest). The Snake River NCA has an average nesting density of 1.09 pairs per square km, whereas the Cave Creek study area has over 4 pairs per square km. Five species of small owls account for over half the nesting raptors. The Snake River NCA is used by 24 species of which 16 nest and eight are wintering/migratory, whereas Cave Creek Canyon has 29 species of which 24 nest and five are migratory or wintering-only. An additional five species nest within 40 km. of the study area for a total of 34 that utilize this corner of southeast Arizona. Cave Creek Canyon is currently a world-class birding destination as well as an increasingly popular recreation area, and future U S Forest Service management policies should take the area's remarkable raptor concentrations into account.

Factors Influencing Sibling Aggression in Red-shouldered Hawks.

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Sibling aggression in raptors, although often reported, has not been well studied in terms of its ecological and evolutionary significance. In siblicidal birds, the amount of food delivered to the young, hatching sequence, and gender have been proposed as key factors influencing sibling aggression. We monitored 20 Red-shouldered Hawk (*Buteo lineatus*) nests in 2004 and 2005 using surveillance cameras. Of these nests, 10 were supplemented with food and 10 were control nests. Aggressive behavior was significantly higher in un-supplemented (2.26 acts/chick/hr) nests than supplemented nests (0.74 acts/chick/hr; $P = 0.04$). First-hatched nestlings in un-supplemented nests were more aggressive (1.76 acts/chick/hr) than first-hatched (0.29 acts/chick/hr), second-hatched (0.41 acts/chick/hr), or last-hatched nestlings (0.12 acts/chick/hr) in supplemented nests. Within un-supplemented nests, first-hatched nestlings consumed significantly more food (2.88 g/chick/hr) than second-hatched nestlings (2.24 g/chick/hr; $P = 0.02$).

Gender had no effect on aggression level or the amount of food consumed by nestlings ($P = 0.57$, $P = 0.94$, respectively). Severe aggression was observed at two un-supplemented nests in 2004 and 2005. In the 2004 nest, one act of siblicide was captured on video when a first-hatched chick (female) evicted the second-hatched chick (male) from the nest. In 2005, severe aggression was captured on video in a two-chick nest when the youngest nestling (female) showed visible injuries from attacks by its older male sibling. The interaction between hatch order and food supply was significant and may influence sibling aggression in Red-shouldered Hawks more than any single factor.

Distribution and Abundance of the Broad-winged Hawk (*Buteo platypterus brunnescens*) and Red-tailed Hawk (*Buteo jamaicensis jamaicensis*) in North-Central Puerto Rico.

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Knowledge of raptor biology in the West Indies is limited. The Broad-winged Hawk is an endemic and endangered subspecies of montane forests of Puerto Rico. Red-tailed Hawks breed in all life zones of Puerto Rico. We conducted point-count surveys in the moist karst forest and montane forests of the Cordillera Central during July 2001-July 2004. We used distance sampling to estimate density of Red-tailed Hawks. We estimated Broad-winged Hawk abundance by dividing the number detected by the adjusted effective area. We used nonparametric analysis of variance and mixed models analysis of variance to determine if the number of hawks observed differed between regions and surveys. We observed 347 Red-tails and 126 Broad-wings during morning surveys conducted in Río Abajo Forest and surrounding areas from 2001 to 2004. We observed 145 redtails in the Cordillera Central region during breeding season surveys, however, no broadwings were observed in this area. Mean number of red-tails and broad-wings observed per survey and per station differed in the Río Abajo Forest region ($P < 0.0001$). An overall density of 0.01651 redtail/ha ($SE = 0.0044$) and abundance of 112 redtails was estimated for north-central Puerto Rico. We estimated an average density in the Río Abajo Forest of 0.01060 broadwing/ha ($SE = 0.3$) and a total of 56 Broad-winged Hawk individuals for this region. Red-tailed Hawk densities in our study are the highest reported for the species. Broad-winged Hawks were restricted to the moist karst forest region and were not detected in the Cordillera Central. The unique landscape attributes of the moist karst forest region (rugged topography and dense forest cover) likely influenced raptor detectability.

Population Structure in U.S. Swallow-tailed Kites (*Elanoides forficatus*).

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Genetic data suggest that, globally, Swallow-tailed Kites (STKIs) form three highly distinct breeding populations. Natal philopatry could explain this subdivision. Radio-tracking data in Florida suggest that STKIs are philopatric to natal and breeding sites. However, it is difficult to detect rare or short dispersal events between breeding groups without extremely rigorous radio-tracking or genetic data. We used STKI tissue samples from throughout the southeastern U.S., the range of the northern-most breeding population, to generate sequence and randomly amplified polymorphism data from mitochondrial and nuclear DNA. Phylogenetic- and frequency-based analyses found no phylogeographic structure within this breeding population. Potential explanations for lack of structure within populations include reduced natal or breeding philopatry. Philopatry then, does not appear to be a good explanation for global STKI structure. Without radio-telemetry information to help scale our interpretation of these results, the genetic data could be used to suggest that long-distance dispersal is prevalent throughout the U.S. To reconcile radio-tracking and genetic data, we hypothesize a gradual shifting and overlapping of breeding neighborhoods (loosely colonial aggregations of pairs) with associated transfers of individuals among these neighborhoods over time.

Wind Direction and Raptor Migration: A Simple Method to Predict Days with Larger Flight Numbers.

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Each fall thousands of North American breeding raptors migrate south to their wintering grounds. This spectacle is observed by numerous people from all walks of life. Some devote many hours each year carefully recording migrant numbers and species, important conservation information, while others simply spend brief periods in restful observation. Being able to predict when larger flights might occur would allow the casual hawk watcher to maximize his or her observation time. Additionally, since this predictability is most likely tied to events that have a real impact on hawk flight, the activity should also provide insights into the mechanics of hawk migration. The simple system described here was developed in an attempt to predict good flight days and learn more about the conditions that regulate movements. Working under the premise that birds are unlikely to fly against prevailing winds, it was assumed that larger flights could be expected when tail winds were available. With this in mind, a simple predictive system was developed using wind patterns obtained from the internet site aviationweather.gov. This site predicts future wind direction for up to four days. Wind direction and migrant numbers were compared for several hawk watches. A useful correlation between larger flights and tail winds was observed. For instance, during October 2005, 73% of the birds passing the Hitchcock Nature Center near Omaha, Nebraska, did so on days when tail winds prevailed. During the same interval at Lake Erie Metropark, 95% of the observed birds also traveled on north winds. Simply determining days when tail winds prevail at a particular site could allow one to predict better flight days, thus making better use of available observational time. The system will be further explained during the presentation.

Northern Goshawk (*Accipiter gentilis*) Nesting Habitat in the White Mountains of New Hampshire and Maine.

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Little published information exists for Northern Goshawk nesting habitat in the northeastern United States. Concern over the goshawk exists because of its association with large tracts of later-seral stage forests; and the implication that land conversion activities and harvest practices may reduce the availability of nest sites. The main objectives of this study are: 1) develop baseline data on goshawk distribution and abundance in the White Mountains of New Hampshire and Maine; 2) describe nesting habitat characteristics; and 3) compare goshawk nest sites with available habitat. Fifty-four nest trees representing 31 territories were located between 1993 and 2006 using broadcast surveys, goshawk 'wanted' posters, directed searches and sightings. Vegetative structure and topographic characteristics of nest sites were compared to 108 random forest sites. Almost half of the located nest territories have only been used once. Basal areas of white pine, sawtimber- and large sawtimber-sized trees, and live trees were significantly greater at nest sites compared to random sites ($P < 0.01$). Nest sites had more open understories ($P = 0.019$), were located on gentler slopes ($P = 0.000$), at lower elevations ($P = 0.000$), and were closer to a forest opening (road, trail, cut stand) ($P = 0.039$) than random sites. Forty-eight percent of nests were constructed in white pine trees. Mean nest tree dbh was 42.6 cm and mean nest height was 14 m. Nests were situated at the base of the canopy in large primary crotches of hardwoods, or against trunks on horizontal limbs of white pine. Overall, goshawk nest sites occurred in forest-dominated landscapes, were often a component of managed stands, and situated on lands with a prior history of agricultural activity or cutting.

Long-term Raptor Road Surveys in the Kempton Valley, Pennsylvania.

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Road surveys often have been used to obtain density indexes for studying regional abundances, seasonal changes in populations, population trends, and habitat use. A 48-km road survey has been driven weekly in the Kempton Valley, PA since 1993 by six different Hawk Mountain biologists to monitor regional raptor populations in the valley. The route is driven starting shortly after noon local time at 24-32 km/hr, stopping the car to identify an individual's age and sex if possible, to observe its behavior, and to record findings. Adverse weather conditions (rain, fog, snow) are avoided, and two observers are used whenever possible. The most common habitat types available along the route are cultivated and fallow fields, pastures, residential areas, and forest and woodland. Detectability may vary depending on the habitat sampled, species, and observer. The most common species seen during the past 14 years have been Turkey Vultures (*Carthartes aura*) (mean = 49% \pm 0.04% of all surveys), American Kestrels (*Falco sparverius*) (mean = 18% \pm 0.03%), Red-tailed Hawks (*Buteo jamaicensis*) (mean = 14% \pm 0.01%), and Black Vultures (*Coragyps atratus*) (mean = 10% \pm 0.03%). Black Vultures show a steady increase during the last 14 years ($F = 5.6$; $df = 12$; $P = 0.035$), whereas American Kestrels have decreased significantly ($F = 73.8$; $df = 12$; $P = 0.0001$). Red-tailed Hawk numbers have decreased and Turkey Vultures have increased non-significantly. Road surveys are a valuable method for monitoring local populations of raptors, especially those that occur in roadside habitats.

Flight Strategies of Neotropical Migrant Raptors in Panama.

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We studied the flight strategies of Turkey Vultures (*Cathartes aura*), Swainson's Hawks (*Buteo swainsoni*), and Broad-winged Hawks (*Buteo platypterus*) in Panama during October-November of 2005 and 2006. Observations were made from two count sites along the Panama Canal (Ancon Hill and the Canopy Tower) following Hawk Mountain's Sanctuary field protocols for studies of vulture flight behavior. We determined the amount of flapping and gliding done by migrants during 30-sec intervals, noting their age and molt status. Flapping-rate observations of migrants were confined to the period from 0930 to 1530 H to reduce time-of-day effects. During 2005 a total of 631 observations were obtained vs. 1217 observations obtained in 2006. Paired-observation analyses were made to determine the effects of species, age differences, and molt status on the flapping rates of the three migrant species. The results of the 2005 and 2006 seasons are somewhat different; however, our preliminary results show significant differences among the flapping rates of the three species, as well as between immature and adult hawks during both seasons.



The American Kestrel: A White Mouse for Raptor Research?

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The American Kestrel (*Falco sparverius*) is the smallest and most numerous North American falcon, and the only kestrel species to occur in the western hemisphere. Nesting in cavities in open habitats, it can be found from Alaska to South America. It is sexually dichromatic and can be sexed at 12 days of age, ranges in size from 80 to 165 g (females are generally 10 to 30% larger than males), and is sexually mature at one year of age. They breed readily in captivity if provided with a suitable nest box and are the only raptor species to date that can be produced in sufficient numbers in captivity for toxicological studies. Due to its small size and relatively non-aggressive temperament, the kestrel can be housed in same-sex flight pens of up to 30 birds with minimal aggression between birds during nonbreeding seasons, and winter losses are usually less than 10%. Up to 90% of captive pairs paired in any given year will produce eggs, and as many as five clutches can be produced if eggs are removed. The Avian Science and Conservation Centre of McGill University have maintained a captive colony of American Kestrels for almost 35 years from which more than 100 collaborative scientific papers and 24 theses have been generated. Fields of study include behavioral ecology, sensory ecology, endocrinology, hematology, reproductive physiology, gastrointestinal physiology, nutrition, genetics, parasitology, pathology, and toxicology. A doctoral study examining the potential impact of long-term captive breeding on the American Kestrels is currently underway.

The Reno Kestrel Project: the Early Years of a New American Kestrel Nest Box Project in the Great Basin.

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American Kestrel (*Falco sparverius*) populations may be declining in several regions of the United States and Canada. Because data are lacking from western regions, we initiated a kestrel population monitoring program in northern Nevada. We additionally view this project as community outreach, since it is a cooperative venture between the Raptor Ecology Laboratory of the University of Nevada, Reno, and volunteers recruited from the undergraduate student body, the local Audubon Society chapter, and other community groups, thus directly involving the general public in science-based conservation. We constructed a network of nest boxes, with 42 and 43 boxes available for kestrel use in 2006 and 2007, respectively. Occupancy rates were low, but increasing, with 14% and 26% boxes used by kestrels. In addition to banding of adults and juveniles during the breeding season, 6 adult kestrels were captured near nest boxes with bal-chatri traps during winter 2006. In 2007, four temperature data-loggers were deployed in nest boxes in hopes of closely monitoring incubation behavior. Future plans include increasing nest box numbers, refining nest box placement to improve occupancy rates, and capturing more adults via remote-controlled nest box traps and increased trapping effort during winter. Annual adult and juvenile survival rates, juvenile recruitment rates, and breeding productivity will be estimated for individuals using mark-recapture analyses and nest box monitoring. These population vital rates will allow us to examine the local population's trajectory and viability. We expect our research will be a valuable contribution to continent-wide kestrel population evaluations.

Status of the American Kestrel (*Falco sparverius*) in New York City.

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From autumn 2006 through summer 2007 we visited 16 known American Kestrel territories in three of New York City's five boroughs: Manhattan (12), Brooklyn (1), and the Bronx (3). We found kestrel pairs occupying at least 12 territories and located eight nests. Five territories have been occupied since at least 2000. Most, if not all, pairs of American Kestrels do not migrate and remain on territory year-round. Copulations were observed beginning in January, and one female was sitting on eggs by mid-March. In New York City, kestrels can fledge as many as five young,

beginning in mid-May. More commonly three young fledge per nest, with some young fledging in mid-July. In 2006 in Manhattan, one pair reared a second brood that fledged in August. The typical kestrel nest in New York City is within a partially rusted metal cornice of a 19th century apartment building, located 20-25 meters above a one-way street. All nests were situated within 70 meters of a vacant lot, community garden, or public park. Heavy pedestrian and vehicular activity below the nest does not negatively affect nesting kestrels. From April-June, food consists primarily of small birds, particularly House Sparrows (*Passer domesticus*), migratory birds such as wood warblers, nestling Rock Pigeons (*Columba livia*), and European Starlings (*Sturnus vulgaris*), and less commonly, small rodents. Beginning in late spring, insects such as dragonflies, bees and moths are captured in flight. The primary threat to New York City kestrels include (a) building renovation; (b) building construction on vacant lots particularly in the South Bronx; and (c) thunderstorms during the fledging period. Overall, we believe the population of New York City kestrels is stable with an estimated 15 pairs nesting annually in Manhattan, and an estimated 25 additional pairs breeding in the other four boroughs.

Mercury Exposure in the Nest: Early Effects of a Common Contaminant on the Development of the Kestrel Immune System.

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Nestlings from sixty pairs of captive American Kestrels (*Falco sparverius*) were elicited to examine methylmercury's (MeHg) effect on immune system competence during early stages of development in the American Kestrel. Environmentally relevant concentrations of methylmercury were administered in the diet from day 1 through day 17 post-hatch. During this period, cellular components of the avian immune system are proliferating, nestlings are beginning to produce their own antibodies, and B cell and T cell colonies are rapidly maturing and differentiating in the bursa and thymus. At 0.6 and 3.9 ppm, dietary MeHg suppressed T cell proliferation ($F = 5.98$, $df = 2$, $p = 0.0034$) at 10 days of age. Sheep red blood cell (SRBC) assay, measuring antibody-mediated immune function, showed an elevation in antibody production during the primary immune response for nestlings exposed to either 0.6 or 3.9 ppm MeHg at 17 days of age ($F = 2.13$, $df = 2$, $p = 0.0489$). At 24 days of age, nestlings exposed to 0.6 ppm MeHg elicited higher antibody titers compared to controls ($F = 23.43$, $df = 1$, $p = 0.0005$) but nestlings exposed to 3.9 ppm MeHg did not elicit a secondary immune response indicating a lapse in immunological memory. White blood cell profiles and histological effects to spleen, thymus, and bursa will also be presented.

Migration Monitoring Points to Widespread American Kestrel (*Falco sparverius*) Declines.

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The Raptor Population Index project analyzed migration counts of American Kestrels at 21 autumn hawkwatches throughout North America. Prior to trend analysis, the counts were converted to indexes that were adjusted for effort and patterns of passage. In eastern North America, autumn counts recorded a pattern of significant declines along the Atlantic coast and eastern Appalachian Mountains, stable counts in the eastern Great Lakes, and significant increase in the western Great Lakes from 1974 to 2004. In the most recent decade, significant declines occurred at most hawkwatches in eastern North America, with non-significant declines recorded in the western Great Lakes, northeastern Quebec, and southeastern U.S. (Florida). In western North America, counts from the mid-1980s to the present showed mixed trends in the region, although the number of hawkwatches available was low. In the last decade, counts decreased at six western hawkwatches. These results suggest population declines in an area extending from the northern Rockies to the Pacific Northwest. Kestrel counts remained stable during the last decade in the southern Rocky Mountains. Migration counts along the Gulf of Mexico were variable over the last decade, with no strong indication of population changes in this region. The overall pattern of migration counts suggests that kestrel populations have undergone a long-term decline in the Northeast and are beginning to decline in the Midwest and West.

Reproductive and Growth Changes in American Kestrels (*Falco sparverius*) Exposed to Environmentally Relevant Levels of DE-71.

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Polybrominated diphenyl ethers (PBDEs) are manufactured as additive flame retardants in the production of polyurethane foams, textiles and plastics. PBDEs are persistent, lipophilic compounds. PBDEs and in particular their environmentally-relevant hydroxylated metabolites have demonstrated endocrine-disrupting properties, affecting the thyroid system and altering behaviour. Concentrations of PBDE congeners have been reported in numerous wildlife species with some of the highest concentrations to date found in the eggs of Swedish Peregrine Falcons (*Falco peregrinus*). Previous research in our lab found exposure to several BDE congeners to affect growth and thyroxine (T₄) levels in juvenile American Kestrels. We studied the effects of exposure to a commercial pentabromodiphenyl ether mixture, DE-71, on the reproductive performance, growth, and development of captive American Kestrels. Thirty pairs of kestrels were exposed to two environmentally relevant doses: a low dose of 0.3 ppm or a high dose of 1.5 ppm DE-71 added to their diet 30 days prior to pairing and continuing until eggs began to hatch. Control pairs had safflower oil added to their diet. Results obtained to date indicate that, of those pairs which produced eggs, those receiving 1.5 ppm DE-71 experienced a significant delay of 12 days, while those receiving 0.3 ppm DE-71 experienced an 8 day delay from pairing to the laying of their first egg in the clutch. In addition, both groups of birds showed reductions in fertility, hatching, and fledging success in comparison with the control pairs. Eggs laid by the dosed birds were significantly smaller and there were also indications of reduced egg shell thickness. Developmental changes were also observed in a sex-specific manner with the chicks of the dosed birds. Low-dose female chicks were smaller, and had delayed, slower growth rates compared to control females. Low-dose males and high-dose nestlings of both sexes were generally larger in terms of body mass and bone growth. These changes in growth may have the potential to affect survival in wild birds exposed to comparably levels of DE-71.

A Comparison of Spring and Fall Migration Weights of American Kestrels.

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In 1986, a spring migration banding project for American Kestrels (*Falco sparverius*) was begun at Flirt Hill in Easton, CT. In 1994, the project began fall migration banding of kestrels. Flirt Hill is located in Fairfield County approximately 9 miles from the coast on the west side of the Aspetuck River Valley which has a NNW to SSE orientation. Flirt Hill is well north of the traditional coastal migration corridor. Flirt Hill is the only location in Connecticut where large numbers of migrating kestrels can be seen in the spring. In spring and fall, most birds enter the area coming from the south moving NNW up the river valley, suggesting that this area is a migration stopover for kestrels (as well as many other raptor species banded). The elevation is 520 feet and Long Island and Long Island Sound are easily visible on clear days. Hawks traveling in the coastal migration corridor can see this high grassland hill standing above the surrounding woodlands. All kestrels caught are aged, sexed, weighed, and wing-chorded. To date, 112 fall males and 77 females and 214 spring males and 384 females have been caught, banded and released for a total sample size of 787. The data collected show that the average weight for spring migrant males and females is consistently higher than fall migrant males and females. More importantly, average weights for all birds over a 20-year period show a decline.

American Kestrel (*Falco sparverius*) Fall Migration and Winter Trends in California – a Bioregional Approach.

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Autumn bird migration counts were kept in the Marin Headlands near the Golden Gate, California, since 1972. Migration rates for 5-yr blocks show a 30-year pattern starting at near 1.2 kestrels/hr in the mid 1970s, dipping to 0.7 kph in the late 1980s, then increasing gradually to 1.2 kph in the 2001-2005 block. Using California's 10 bioregions -- the Sacramento Valley and San Joaquin valleys; the Sierra Nevada, Modoc, and Bay-Delta regions; the North, Central and South coasts; and the Mojave and Colorado deserts -- I selected a sample of 24 Christmas Bird Count (CBC) circles to evaluate winter kestrel trends. Roughly eight of 24 counts showed stable or slightly increasing trends for the past 20 years; the remainder showed clear declines. The combined desert regions showed the highest rate of winter kestrel activity for the state, roughly 1.5 kestrels/party-hour, and also one of the most stable CBC trends for the past two decades. This pattern was buoyed by wintering kestrel numbers at the Salton Sea. Nearly as high were both Central Valley regions, each averaging 1.3 kestrels/party-hour. The three coastal regions and the Sacramento Valley each showed long kestrel declines beginning in some cases in the early 1960s. By contrast, kestrel activity in the San Francisco Bay-Delta region has remained stable back to the mid 1960s, hovering around 0.70 kestrels/party-hour. Winter kestrel activity was lowest statewide in the Sierra foothills, with a slight decline beginning back in the mid 1980s. Though the numbers were low, kestrel activity in the California's northeastern Modoc region, specifically near Fall River Mills, showed a slight increase over the past 15 years. Reasons for regional kestrel declines in California are unclear, although kestrel increases in Oregon and Washington CBCs suggest that migratory shortstopping may be playing a role.

Determining the Status of the American Kestrel (*Falco sparverius*) in Delaware.

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Breeding pairs of American Kestrels appear to be seriously declining in the State of Delaware. Delaware is distinguished by its small size and variety of land types within both the Piedmont and Coastal Plain physiographic provinces. The Delmarva Ornithological Society (DOS), a volunteer 501c3 birding club, is studying the current status of kestrels with the objective to develop strategies for kestrel population restoration. During the summer of 2006, we conducted an informal survey by soliciting birders throughout Delaware to report sightings. We displayed a map at the Delaware State Fair on which rural residents noted kestrel sightings. We obtained 21 sightings through this effort. Subsequently, the DOS website deployed an interactive submittal form through which observers entered sightings, specifying the location through a Google Maps™ interface. We collected sighting reports of wintering (17 December 2006–15 March 2007) American Kestrels from across Delaware. Winter sightings totaled 101 individuals. During the summer of 2007, we initiated a formal survey, conducted 1 May through 31 July, using a simple standard protocol. The state was divided into survey grid cells, each covering 1/6 of a USGS 1:24,000 Topographic Quadrangle. A total of 199 grid cells were surveyed by 54 volunteers at a repeat interval of 2 wks. Surveyors recorded gender, age, and breeding information (where applicable) for observed kestrels. Survey sightings were overlaid on habitat and land-use data, using GIS, to examine possible associations of breeding kestrels with particular habitats or structures. Summer 2007 results will be discussed, and will form the baseline from which strategies for restoration within Delaware's borders will be developed.

What Has Happened to the American Kestrel (*Falco sparverius*) in Southeastern Massachusetts?

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An ongoing nestbox project of 17 years has documented a significant decline in American Kestrels in Southeastern Massachusetts in the last 7 years. The cause of this decline has not been determined. The majority of nest boxes were erected around cranberry bogs where pesticides have become more environmentally friendly through the years. Known origins of failed boxes include disappearance of an adult, predation, competition, and disturbance. Occupancy rates have plummeted since adult birds are not returning in the same numbers in the spring to nest. The adults that do return raise their nestlings adequately during the breeding season. Possible contributing factors to this decline to be discussed include predators, West Nile Virus, and weather.

Significant Southeastern American Kestrel Population Nesting in Tubular Transmission Towers in South-central Georgia.

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We report a significant and previously unrecognized Southeastern American Kestrel (*Falco sparverius paulus*) population nesting in the tubular, cross-arms of electrical transmission towers in south-central Georgia, between Dougherty and Pierce Counties (ca. 160 km). The towers (30 m high) have a pair of hollow (ca. 16-25 cm dia.), horizontal pipes which have been previously used by other nesting passerines, and thus, provide nest sites for a pair of kestrels. During monthly surveys from March through August in the spring and summer of 2003, 2004, 2005, and 2006, adult kestrels were observed at 274, 296, 284, and 284 different electrical towers, respectively, of the 368 towers along the transect that possess tubular cross-arms. No more than a single pair has been observed at any one of the transmission towers, which are about 0.2 km apart. This south-central Georgia kestrel population is the state's largest breeding population of *F.s. paulus*. The inevitable removal of the badly rusting transmission towers has prompted the design of several types of alternative nest structures made from UV-resistant PVC tubes, to be placed on the towers after removal of the tubular, cross-armed nest sites. Preliminary data show that kestrels successfully nested in four different types of PVC tubes, as well as wooden nest boxes placed on transmission towers that currently lack tubular cross-arms. Hopefully, a "no kestrel left behind" policy instituted by Georgia Power Company officials will ensure that alternative nest sites will be provided for kestrels along this transect when the tubular, cross-armed towers have to be removed in future years. This research has been funded in part by the Georgia Power Co., Avian Power Line Interaction Committee, Georgia Department of Natural Resources, and GSU Research Committee.

Reproductive Success of American Kestrels Using Nest Boxes in Eastern Pennsylvania, 1992-2005.

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Since 1987, scientists and volunteers of Hawk Mountain Sanctuary have monitored the reproductive success of American Kestrels (*Falco sparverius*) nesting in boxes near the mountain. Data have been gathered from 1987 onward recording the use and success of nest boxes, as well as assessing the status of the local kestrel population. While kestrel numbers and success rates were somewhat stable between 1992 and 1999, box use has declined since 2000. For example, in 1995, nest box use was over 50% ($N = 199$ boxes) and fledgling success was over 75%. A decade later, in 2005, nest box use was down to only 23% ($N = 144$ boxes), though success rates remained above 80%. Despite lower nest box use and nestling output, fledgling success in occupied boxes has remained relatively stable throughout the study period (1992-2005).

Recent Population Trends of the American Kestrel (*Falco sparverius*) in Northwestern New Jersey, and Their Relation to the Species Decline in North America.

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Between 1995 and 1997, I erected 129 nest boxes in pastures and meadows in northwestern New Jersey. The number of American Kestrel pairs that bred in the nest boxes increased from 2 in 1995 to 59 in 2002, a 62% mean increase per year, consistent with the hypothesis that kestrels were nest site limited in the study area. Between 2002 and 2005, the population of nest box breeding kestrels declined to 26 pairs, a mean loss of 24% per year. Similar declines have been observed in nest box populations across North America. Factors suggested to be important to this widespread decline include the spread of West Nile Virus (WNV); increases in populations of Cooper's Hawks (*Accipiter cooperii*), which are known to prey on kestrels, particularly recently fledged young; and loss of suitable habitat. In my study area, the onset of the decline coincided with the introduction of WNV, but the decline continued during the years that the kestrel population was expected to recover with WNV-resistant genotypes. To test whether changes in kestrel population densities are generally associated with the opposite trends in Cooper's Hawks, I examined the 40 USGS Breeding Bird Survey physiographic regions for which population trend data for both species are available. From 1966 to 2005, kestrels decreased in 25 regions while Cooper's Hawks increased in 32 regions. However, there was a significant positive, not negative, correlation between the two population trends ($r = 0.379$, $P = 0.016$). There also was a positive, although nonsignificant, correlation from 1980-2005 ($r = 0.248$, $P = 0.12$). Christmas Bird Count data also showed positive, but nonsignificant, correlations. Finally, based on a qualitative assessment, habitat change within my study area does not account for the population decline, although habitat change elsewhere may affect this population. The reason American Kestrel populations are declining remains elusive at this time.

Are American Kestrel (*Falco sparverius*) Populations Declining in North America? Evidence from Nest Box Programs.

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We examined trends in the numbers of American Kestrels that breed in nest boxes in the United States and Canada. Our data represent annual nest box occupancy rates (number of nest boxes in which at least one kestrel egg was laid divided by the number of nest boxes available that season) for nine study sites in Florida, Georgia, Virginia/Maryland, New Jersey, Massachusetts, Pennsylvania, Saskatchewan, and the Yukon Territory. The span of records from each study site ranged from 13–23 yr, and the pooled data include observations from 1984–2007. As expected, occupancy rates increased during the first few years after nest boxes were introduced; kestrel populations tend to be nest site limited. However, after the initial increase, there was a substantial decrease in occupancy rates in all nine locations. The nest box programs which were established earliest have been experiencing declines the longest. Except for the most recently established program, begun in 1995 and declining since 2002, all study sites began experiencing their declines before the introduction of West Nile Virus (WNV) in North America in 1999. Therefore, these results suggest that while WNV may be a contributing factor in some cases, it is not the only or the primary cause of the widespread decline in kestrel populations in North America.

Insights about American Kestrel Demography: Implications for Population Trends.

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Longitudinal, as opposed to cross-sectional, studies of reproduction provide important insights about biological fitness and population dynamics. In this paper, we present preliminary results from a long-term study of marked American Kestrels (*Falco sparverius*) in southwestern Idaho. Only a small fraction of the kestrels we banded as nestlings returned to nest in the study area due to a combination of emigration and mortality. Males were more likely to return than females, and individuals that hatched earlier in the year were more likely to survive and return the next breeding season than later hatching birds. Local lifetime production was higher for males that we banded as nestlings than for males we banded as adults. Approximately 25% of nesting kestrels never produced young, and only 22% produced half of all fledglings. Age-related differences in reproduction were related mainly to differences among individuals and were probably related to higher mortality rates of less productive birds that had dispersed into the study area. Young that returned to nest in the study area were produced by relatively few lineages. The percent of fledglings recruited to the nesting population increased with parental experience. Mates of experienced males laid eggs earlier in the nesting season, which increased the likelihood that their young would survive after fledging. Low survival rates, natal dispersal patterns, and age-related differences in reproduction suggest that newly established populations might have lower reproductive rates than populations using boxes that have been available for many years.

American Kestrel Reproduction in Southwestern Idaho: Annual Variation and Long-term Trends.

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We monitored American Kestrels (*Falco sparverius*) nesting in boxes from 1986-2006 in southwestern Idaho. The number of boxes available to kestrels each year varied from 34 to 126. Approximately 20% of boxes were on the backs of highway signs along Interstate 84, 20% were on trees in rural residential properties near Kuna, Idaho, and 60% were wooden poles in agricultural and exurban areas south of Boise and Meridian, Idaho. During the study period, human populations, housing developments, and vehicular traffic increased near the boxes. Preliminary analyses suggest that occupancy and reproduction increased over the 20-year period. Occupancy rates averaged 48% and nesting success (the percent of nesting attempts that raised young to 22 days of age) averaged 64%. Clutch size averaged 4.8 and showed no significant trend over time. Brood size at fledging tended to increase with time and averaged 4.0. Mean number of young fledged by kestrel pairs each year ranged from 1.3 to 3.5 and averaged 2.6. We evaluate how occupancy, nesting success, and productivity varied with weather conditions and nesting substrates.



A Brief History of Raptor Conservation in North America.

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The conservation of North American raptors has changed considerably since European settlement. Historically, raptors were treated with indifference or outright hostility by most people of European descent, including ornithologists and conservationists. Shooting-era declines of many populations of birds of prey in the early 20th Century energized segments of the scientific and conservation communities and led to special protection efforts on behalf of Bald Eagles (*Haliaeetus leucocephalus*) via the U.S. Bald Eagle Protection Act of 1940, and, eventually, to protection efforts for all species of raptors once they had been included within the jurisdiction of the Migratory Bird Treaty Act with Mexico in 1972. Catastrophic declines in regional populations of many birds of prey, including high-profile species such as Bald Eagles and Peregrine Falcons (*Falco peregrinus*) during the DDT-era of mid-20th Century North America, refocused protection efforts on the new threat of environmental contaminants. Today, the most significant human threats to raptors appear to be (1) a growing number of environmental contaminants, many of whose potential effects remain unknown and unexplored, (2) land-use change, including the loss of natural landscapes and the erection of harmful structures, and (3) potential conflicts between humans and birds of prey as raptor populations rebounding from reduced persecution and pesticide-era lows reassert themselves as functionally significant predators in both natural and human landscapes. I first review the largely historic threats of direct persecution and pesticide contamination, and then discuss new and old environmental contaminants, the current and likely potential threats of land-use change, and the growing potential for raptor-human conflict as populations of both increase. The bulk of the paper focuses on direct persecution for two reasons: (1) the history of human persecution of raptors in North America is largely unknown among today's conservationists, and (2) this history played a major role in the creation of raptor-migration watchsites and the sport of hawkwatching.

The Future of Raptor Population Monitoring in North America.

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Although consigned to a relatively bleak ecological fate as recently as the late 1970s, populations of North America's diurnal birds of prey, particularly in the East, recently have rebounded to population levels not seen since the late 1800s. Factors responsible for this rebound include reduced human persecution, reduced misuse of organochlorine pesticides, and reforestation in parts of the continent. Although what has happened recently suggests that projecting future populations levels is difficult at best, we believe that increased conservation success, and subsequent population increases on the part of many species of birds of prey, will come on the heels of decreasing threats of contaminants (in particular lead shot), and electrocution. Furthermore we believe that increased populations of raptors will lead toward calls for their control, something that we oppose, particularly on a broadcast basis. Learning from previous mistakes, a growing understanding of the ecological needs of migratory birds of prey, the development of an effective monitoring program using counts from migration watchsites, together with other monitoring efforts, and an appreciation for the resilience of the birds themselves, all are important aspects of successful raptor conservation.

Assessing the Conservation Status of North America's Birds of Prey.

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Populations of many of North America's birds of prey are not well monitored by existing, large-scale monitoring schemes, such as Breeding Bird Surveys (BBS) and Christmas Bird Counts (CBCs). Sources of difficulty in monitoring by conventional means include low breeding densities, cryptic nesting, lack of survey coverage in the breeding range, and autumn migration of entire populations from North America. Numerous raptor species, however, migrate seasonally past hawkwatches that can serve as a monitoring network. To assess the conservation status of North America's raptors, we began by examining historical and recent estimates of trends in counts of raptors at these hawkwatches. The Raptor Population Index (RPI) calculates trends for individual hawkwatches, and the geographic pattern of trends across the RPI network reveals areas of commonality as well as apparent breakpoints in the areas sampled by the sites. We compared these trend estimates to trends in BBSs, CBCs, and other available population indexes for areas believed to be either the origin (BBS) or destination (CBC) of migrants passing hawkwatches in each of three broad geographic regions. We present examples of the process and results for species found to be declining (American Kestrel, *Falco sparverius*), increasing (Bald Eagle, *Haliaeetus leucocephalus*), and stable (Red-shouldered Hawk, *Buteo lineatus*) over the study period, along with several additional species.

Trends in Autumn Counts of Migratory Raptors in Northeastern North America, 1974–2004.

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Hourly counts of migrating raptors have been collected for at least 10 years at >20 hawkwatches in eastern North America. Using counts from seven hawkwatches with 30 or more years of counts, we calculated annual population indexes for 16 species of diurnal migrant raptors. The seven hawkwatches were at similar latitude along an east-to-west transect from Atlantic Coast Connecticut to the western shore-line of Lake Superior. We also calculated population indexes for a shorter-term count at l'Observatoire d'oiseaux de Tadoussac, which receives migrants primarily from northeastern Quebec and Newfoundland. We estimated geometric rates of change in the population indexes for the 16 species. Counts increased or remained stable for seven species and decreased for one species throughout the region from 1974 to 2004. Eight other species showed variable long-term trends across the region. Precision of long-term trend estimates from migration monitoring was generally good ($N = 107$), with 45 estimates rated with high ($\pm 1.8\%$), 51 moderate ($\pm 1.8-3.5\%$), and 11 low ($\pm > 3.5\%$ per year) precision. Trends often were not linear, and several species that increased significantly during the 1980s (Merlin, Osprey, Peregrine Falcon) ceased to do so in the 1990s. A few species showed geographic patterns in trend, suggesting that either different source populations were monitored in the eastern and western portions of the study area, or migration geography changed over the course of the study period.

The Raptor Population Index in Practice: Hawk Counts as Population Indexes.

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The Raptor Population Index (RPI) uses adjusted migration counts to help monitor populations of migratory raptors in North America. Data collection for this effort is largely a "citizen-science" undertaking, with a network of expert amateurs contributing much of the migration count data. There also are several professionally-staffed migration count sites contributing data to the network, most notably the 14 sites organized by HawkWatch International in western and Gulf coast North America. The data are organized in a secure electronic database maintained by the Hawk Migration Association of North America, and are transferred electronically to Hawk Mountain Sanctuary for statistical analyses that generate the RPI indexes and estimates of population trend. The RPI migration indexes compensate for variation in effort, seasonal and daily patterns of passage, and, in some cases, weather covariates affecting passage. Trends in the resulting indexes are then estimated from a trajectory fitted by polynomial regression. It is not yet possible to combine data from multiple sites to derive a valid composite population trend estimate for the entire continental population of any species, but examination of consistencies and inconsistencies in estimates across the continent allows an assessment of regional patterns in population trends. Combining these regional analyses with independent sources of information concerning population size and trend facilitates the assessment of species' conservation status. Directions for future analysis include the comparison of recent to long-term trends, and the comparison of recent index values (5-yr averages) to historic levels.

Raptor Migration in North America.

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Many migrating raptors follow distinct routes during their autumn and spring journeys. Topography and water barriers largely define these routes, which vary among species and are influenced by ecological and meteorological factors (Kerlinger 1989, Bildstein 2006). The paths that migrants follow and the geographic patterns they demonstrate vary among species and populations. Some species tend to move almost entirely across a broad front, others often concentrate along leading lines and diversion lines. Here, we describe the general patterns and variability for both outbound movements in autumn and return movements in spring. We also provide a synopsis of species migration behavior and ecology, and identify regions and watchsites where each species concentrates. Our overview provides a background for understanding migration-count trends presented in this symposium and the future roles that migration counts may play in monitoring populations of North America's raptors.

The Raptor Population Index in Principle: Long-term Monitoring of North America's Raptors.

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We present a short history of hawkwatching and the use of migration counts to monitor raptor populations in North America. We argue the need to continue monitoring hawks in migration as a component of a comprehensive monitoring and conservation program for North American landbirds. We also discuss some of the concepts, principles, and assumptions required for the proper application of current analysis methods and the interpretation of population-trend data. Since the first analyses of migration counts at the end of the 1960s, most researchers have used annual indexes of effort-adjusted counts to calculate long-term population trends using different types of regression models. However, there has been significant progress in methods that (a) recognize and account for the skewed distribution of daily counts, (b) reduce and control for the effects of extrinsic factors, such as weather and date, on the population signal in migration counts, and (c) reduce the bias caused by intrinsic factors, such as differences among observers and variation in observation periods, through the adoption of standard data collection procedures. Most raptor-trend analyses published to this date refer to counts taken at a single site. Papers presenting results from multiple sites are

scarce and recent. The proper application of current analysis methods includes meeting model assumptions, which are explained conceptually here. We also discuss the feasibility of combining trend data from multiple sites and the need to understand the ecology of raptor migration to interpret population trend data. We conclude with a discussion of the potential roles of the Raptor Population Index (RPI) partnership and the contributions of the Hawk Migration Association of North America's information system, HawkCount.org, to facilitating the collection and use of migration count data to monitor raptor populations across the continent.

Active Raptor Migration Watchsites: Where Are They Located, How Do They Operate, and What Are They Monitoring?

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More than 400 sites across Canada, the United States, and Mexico, have been used to monitor hawk migration. At a global scale, Zalles and Bildstein (2000) compiled a comprehensive directory of raptor migration sites and made a careful analysis of their operation and biological attributes. Here, I present the profiles of the 22 active watchsites used for population trend analysis in *The State of North America's Birds of Prey*, 2007 and describe where they are, the features of their datasets and how those features suit Raptor Population Index (RPI) analysis, how they are operated, and which species are monitored and where. I make a qualitative analysis of the relevance of their population estimates according to species and site. I also introduce a possible successor to a printed directory: HawkCount.org's site database, an information resource that is free of space limitations and that has the potential to keep a rich and dynamic archive of up-to-date data and metadata on raptor migration sites.

Trends in Autumn Counts of Migratory Raptors around the Gulf of Mexico, 1995–2005.

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We estimated trends in annual count indexes of up to 17 species of diurnal raptors seen at four autumn migration watchsites around the Gulf of Mexico: Curry Hammock State Park in the Florida Keys (1999–2005), Smith Point and Corpus Christi, Texas (1997–2005), and Veracruz, Mexico (comprised of a two-site survey line; 1995–2005). The Veracruz counts monitor the world's largest concentration of migratory raptors (4–6 million/yr). The Corpus Christi count monitors the largest concentration of migrants in the United States and Canada (more than 1 million in 2004). The Florida Keys monitors the largest migratory concentration of Peregrine Falcons (*Falco peregrinus*) known from Mexico north (average >1800 birds/yr). Four species constituted >90% of the Texas and Veracruz totals: Broad-winged Hawk (*Buteo platypterus*; 35–40%), Turkey Vulture (*Cathartes aura*; 35–40%), Swainson's Hawk (*B. swainsoni*; 15–20%), and Mississippi Kite (*Ictinia mississippiensis*; 2–5%). Northern Harriers (*Circus cyaneus*) and Sharp-shinned Hawks (*Accipiter striatus*) were the only species for which negative rates of change were detected at all sites, with both showing significant declines ($P < 0.10$) in Florida, and harriers also declining in Veracruz. No significant increases were detected for American Kestrels (*Falco sparverius*) and Merlins (*F. columbarius*), but both declined in Florida. Mixed trends were detected for Red-shouldered Hawks (*B. lineatus*) in Texas. No declines but increases at one or more sites were detected for seven other species. No trends were detected for Black Vultures (*Coragyps atratus*) in Texas, for Red-tailed Hawks (*B. jamaicensis*) in Texas and Veracruz, or for Cooper's Hawks (*A. cooperii*) at any site. The precision of trend estimates was consistently low due to short monitoring periods (i.e., ≤ 11 yr) and, in many cases, relatively high inter-annual variability. Nevertheless, for 53% of the analyzed site–species combinations, 95% confidence intervals were $\pm 10\%$ /yr or less, which at least approached a designated moderate-precision threshold of $\leq 3.5\%$ /yr.

Trends in Autumn Counts of Migratory Raptors in Western North America, 1983–2005.

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We estimated trends in annual count indexes for 16 species of diurnal raptors observed during autumn at 10 migration watchsites in western North America. Species representation varied by site. Sites included Chelan Ridge, WA (1998–2005) and Bonney Butte, OR (1995–2005) in the Pacific Northwest; Lucky Peak, ID (1995–2005), Goshute Mountains, NV (1983–2005), and two sites in the Grand Canyon, AZ (Yaki Point: 1997–2005; Lipan Pt: 1991–2005) in the Intermountain region; and Mt. Lorette, Alberta (1993–2005), Bridger Mountains, MT (1992–2005), Wellsville Mountains, UT (1987–2005), and Manzano Mountains, NM (1985–2005) in the Rocky Mountains. Turkey Vulture (*Cathartes aura*) was the only species for which at least a slight positive rate of change in the annual indexes occurred at all analyzed sites over the relevant periods of record (significant [$P \leq 0.10$] increases at 3 of 6 sites). Northern Goshawk (*Accipiter gentilis*) was the only species for which at least a slight negative rate of change occurred at all analyzed sites (significant declines at 2 of 6 sites). Other species for which only significant increases or non-significant rates of change occurred included Swainson's Hawk (*Buteo swainsoni*), Merlin (*Falco columbarius*), and Peregrine Falcon (*F. peregrinus*). Other species for which only significant decreases or non-significant rates of change occurred included Northern Harrier (*Circus cyaneus*; declines at 2 of 8 sites) and Golden Eagle (*Aquila chrysaetos*; declines at 5 of 9 sites). A mix of significant decreases and increases occurred for Osprey (*Pandion haliaetus*), Broad-winged Hawk (*B. platypterus*), Sharp-shinned Hawk (*A. striatus*), Cooper's Hawk (*A. cooperii*), Red-tailed Hawk (*B. jamaicensis*), American Kestrel (*F. sparverius*), and Prairie Falcon (*F. mexicanus*). Only Rough-legged Hawks (*B. lagopus*; 2 sites) and Bald Eagles (*Haliaeetus leucocephalus*; 3 sites) showed no significant trends. For many species, count trends appeared to correlate well with variation in regional precipitation levels and drought severity, especially within the Great Basin and Intermountain region since the late 1980s.



Sibling Relationships Analyzed Using a New Set of Molecular DNA Markers in Reintroduced Peregrine Falcons (*Falco peregrinus*).

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We are assessing dispersal and mating systems of Peregrine Falcons in urban ecosystems using molecular tools. The reintroduction and reestablishment of Peregrine Falcons in the Midwestern US represents one of the most compelling examples of a recovered native species. Eleven microsatellite DNA markers were isolated from genomic DNA and genetic relationships were investigated using the markers. A first analysis of 35 unrelated Peregrine Falcons revealed high levels of polymorphism with number of alleles varying from four to seventeen. The total probability that two unrelated individuals would carry the same genotype was calculated to be $2.62 \cdot 10^{-14}$, a better value than reported in previous studies. The combined exclusion probability for parentage testing was 0.99 and 0.93 for one or both parents unknown, respectively. The markers were used to examine the parentage of peregrine broods from the same nest site from different breeding seasons, and consequently the nest site fidelity of the breeding peregrines. High nest site fidelity was demonstrated through pairwise estimates of relatedness (r_{xy}) among 90 chicks at seven Chicago area nest sites from the years 2000–2006. These results reveal that these markers can be applied to study population dynamics in this recovering species and their use can be extended for future monitoring and conservation purposes as well.

Habitat Selection by Five Falconidae Species in the Heterogeneous Landscape of Central São Paulo State, Southeastern Brazil.

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Here we present information about habitat use/selection by five Falconidae species (*Falco sparverius*, *Falco femoralis*, *Herpetotheres cachinnans*, *Milvago chimachima* and *Caracara plancus*) in the heterogeneous landscape of central São Paulo state. The study site (151,602 ha) is in the “cerrado” domain, but heavily modified by agricultural expansion. It is represented today by a mosaic of natural areas and plantations (mostly sugar-cane, orange, pastures, and eucalyptus). From September 2005 to February 2007 we surveyed birds monthly, from seven roadsides routes of 14 km each, three days per month, totaling 5,292 km. To evaluate the habitat use/selection we calculated the Bonferroni confidence intervals. We made 1,522 records, Crested Caracara ($N = 805$), American Kestrel ($N = 418$), Yellow-head Caracara ($N = 136$), Aplomado Falcon ($N = 134$) and Laughing Falcon ($N = 29$). From the available nine habitats, the Crested Caracara utilized eight, while the American Kestrel and the Aplomado Falcon were recorded in seven each. The Yellow-head Caracara was present in six habitats, whereas Laughing Falcon only in four. Monoculture plantations (sugar-cane, eucalyptus, orange, pine and others cultivars) were not used more than expected by none raptor. The only “non-natural” habitat used more than expected was pasture, by all species except the Laughing Falcon. On the other hand, the open cerrado (savannah grassland) was “selected” by four of the five species and used in proportion to abundance by one species. Except for the Laughing Falcon, the other species studied are relatively common in southeastern Brazil. This is the first quantitative study of habitat selection by raptors in Brazil, and our data demonstrate that intensive increment of agriculture areas (mostly sugar-cane) can affect negatively even the more common raptor species. Finally, at least to study site, even common and generalist raptors seem to prefer natural habitats in relation to disturbed ones, contrary to some generalizations in the literature.

A Method of Using Digital Recording Equipment and Scope Mounted Video Cameras for Early Confirmation of Peregrine Falcon (*Falco peregrinus*) Eyrie Locations.

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I found that observers can confirm Peregrine Falcon eyrie locations sooner by using digital video recording equipment and viewing accelerated recorded images. A day's observations of one possible eyrie location can then be viewed in about one hour without missing any exchanges by the adult peregrines. I found that if I ran the digital recorder simultaneously while making observations, if the birds were indeed using the eyrie the camera was recording, many times the camera was catching exchanges which had been missed by the observers. Additionally, I found that using this technology increased efficiency by allowing us to direct the camera on a possible site and leave for the day to perform other work in another location. After viewing the accelerated recorded video, we could confirm whether or not the birds were using that ledge. This saved us about a day's worth of observation time with the added bonus of being able to go back and view any activity. All images are time and date stamped. The use of digital recording equipment and video cameras has helped us in hastening the confirmation of eyrie locations in regards to climbing closures at Zion National Park. This has meant that climbing routes which do not have nesting falcons can be opened sooner and used by the public.

Tracking a Floater Female Peregrine Falcon.

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A female Peregrine Falcon (*Falco peregrinus*) was 'beaten' up at her nest and spent the summer as a non breeder. The previous year she was trapped at the successful nest site at the University of Alberta and outfitted with a 30gm GPS solar satellite transmitter (Microwave Telemetry, Inc). When she returned to the site in April 2007 it was occupied by a new female and the male from the previous year. We witnessed the ensuing fight and banishment of the transmittered female. She subsequently spent the summer traveling to towns, cities and rivers in central and southern Alberta presumably searching for a nest site and mate. During some days she traveled over 400km. Other days she remained nearly stationary. This poster will provide a summary of her summer's travels which are just underway as the abstract is submitted.

Philippine Eagle (*Pithecophaga jefferyi*) Breeding Biology and Ecology: Current Knowledge and Priority Gaps.

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The Philippine Eagle is a critically endangered species endemic to four big islands of the Republic of the Philippines. Forest loss, shooting, and trapping of birds appear to be the major causes of population decline. It's a monogamous species that is long-lived, slow reproducing, rearing only a single egg once every two years, and is dependent on the fast disappearing tropical forests of Luzon, Leyte, Samar and Mindanao Islands. Nearest-neighbour distances of nineteen pairs indicate that there could be between 175–233 breeding pairs in Mindanao Island. Monitoring of breeding success from 1978–1998 also indicate that Philippine Eagles in Mindanao are breeding well, suggesting that breeding failures might not be the cause of recent declines on that island. In contrast, no nest has ever been documented in Luzon, Leyte and Samar Islands. In the short term, an estimate of breeding density each for Luzon, Leyte and Samar Islands is a priority and so is baseline diet and breeding biology. Measuring home ranges and habitat use through telemetry with the aid of Geographic Information System is also important for species and habitat management in this period where logging and mining within remaining forests are being renewed.

The Raptor Information System: A Web-based Bibliography for Raptor Ecology and Management.

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The Raptor Information System (RIS) <http://ris.wr.usgs.gov/> consists of more than 35,000 citations of scientific papers, government reports, and academic dissertations dealing with raptor life history, biology, ecology, and conservation. It is a searchable bibliographic database on the World Wide Web served by the U.S. Geological Survey (USGS), Snake River Field Station (SRFS). RIS is noted for housing essentially unobtainable copies of articles and reports that are mainly in the grey literature. Hard copies of all papers catalogued by RIS are available at the Richard R. Olendorff Memorial Library, at the SRFS offices on the Boise State University campus. Users can download the full text of some references by clicking a hotlink. Online query tools at each site allow users to focus their search by author name(s), year(s) of publication, title of the work, and keywords. As budgets grow tighter, USGS is evaluating the relative importance of RIS in relation to other research and information management priorities. USGS is seeking feedback from the research community about the importance and utility of the RIS as well as how this information system can best meet their needs.

Contaminant Burdens in Great Lakes Bald Eagles, Ontario, 1991–2006.

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Bald Eagles (*Haliaeetus leucocephalus*) were in danger of disappearing from the Great Lakes region by the 1970s due to habitat destruction in the lower lakes basin coupled with the reproductive effects of persistent organic pollutants. While numbers have increased markedly in the upper lakes, recovery has been much slower in Lakes Erie and Ontario. Levels in organic contaminants and mercury in nestlings of Canadian Lake Erie eagles are low, productivity is sufficient to maintain an increasing population, and the population is expanding slowly. Nevertheless, the recovery of several dead adult and immature eagles within the Canadian lower Great Lakes basin, in conjunction with anecdotal evidence of the replacement of adult breeding birds with subadult breeders in the north shore Lake Erie population, has drawn concern. Nine of 46 (20%) eagles from southern and central Ontario necropsied between 1991 and 2006 contained tissue levels of lead or mercury consistent with those associated with lethal poisoning. Two of these birds had lethal levels of both metals in liver and/or kidney. Lead concentrations ranged from 0.02 to 290 ppm in liver (dry weight) and 0.02 to 296 ppm in kidney (dry weight). Mercury concentrations ranged from 0.74 to 98.3 ppm (dry weight) in liver and 0.2 to 314 ppm in kidney (dry weight). An additional three birds contained lead in soft tissues at levels indicative of sublethal poisoning. Three birds contained selenium at levels known to affect health and reproduction. Concentrations of p,p'-DDE and total PCBs in livers of twelve bald eagles did not generally exceed values typically associated with adverse reproductive effects; concentrations of total brominated diphenyl ethers (BDEs) in livers of these birds ranged from 39.61 to 851 ng/g (wet weight). Increased efforts are needed to document the exposure of these birds to lead and mercury, determine the impacts of metal toxicity on the health of these birds and lastly to develop measures to reduce exposure.

Current-Use Flame Retardants in the Eggs and Plasma of American Kestrels (*Falco sparverius*) from Southern Ontario.

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Polybrominated diphenyl ethers (PBDEs) are manufactured as additive flame retardants in the production of polyurethane foams, textiles and plastics. PBDEs are persistent, lipophilic compounds that bioaccumulate through to the highest levels of the food chain. Recent reports have demonstrated that avian populations are subject to PBDE bioaccumulation but that temporal trends differ among species. PBDE concentrations have increased exponentially in wild birds in the North American Great Lakes from 1981 to 2000. Many studies of PBDE concentrations have

focused on fish-eating species of the aquatic food web, however eggs of wild peregrine falcons (*Falco peregrinus*) in Sweden contain among the highest concentrations of Σ PBDEs measured in wildlife (39,000 ng/g lw). American kestrels (*Falco sparverius*) are common though declining throughout the heavily populated and industrial landscape of southern Ontario. Egg samples were collected from identified nest boxes from the Niagara region through to central southwestern Ontario. Subsequently, hatchling serum samples were collected from the same nest boxes. Samples were analyzed for 8 current-use flame retardants: polybrominated diphenyl ethers (PBDE), pentabromoethylbenzene, hexachlorobutadiene, 1,2-bis(2,4,6-tribromophenoxy)ethane (BTBPE), tetrabromo-p-xylene, pentabromotoluene, decabromodiphenyl ethane (DBDPE) and dechlorane plus (DP). The PBDEs were the highest in total concentration in both egg and plasma, 0.6 ng/g–15.2 ng/g and 0.08 ng/ml–1.1 ng/ml, respectively. BDE's 47, 99, 100, 153, 154, 138, and 183 were detected in the eggs, however we did not detect BDE's 138 and 183 in the plasma. Similarly, no BTBPE was detected in the plasma but measured in the eggs at 0.02 ng/g–1.9 ng/g. Both the syn and anti stereoisomers of the chlorinated flame retardant, DP, were detected in eggs ranging from 0.01 ng/g–0.25 ng/g. The highest egg concentration was measured in the Niagara region, nearest the manufacturer of DP. The spatial pattern for the plasma samples were similar, however only anti-DP was detected. Our findings suggest that female kestrels ingest these chemical from their local terrestrial food web which are then transferred to the eggs.

A Multi-year Comparison of a Slope-side Versus Ridge-top Watch Site.

MEGAN S. MELICK, and SPRING 2005-SPRING 2007 HAWK MOUNTAIN SANCTUARY INTERNATIONAL INTERNS, Hawk Mountain Sanctuary Association, Kempton, PA 19529 USA.

A comparison of two separate migration observation points at Hawk Mountain Sanctuary (HMS) has been taking place during autumn and spring migration since the spring of 2005. Counters simultaneously count migrating raptors at the North lookout (NLO) (a ridge-top site) and Riverview Overlook (RVO) (a slope-side site). A higher percentage of birds are counted at the NLO, versus the RVO (i.e., 67% of all birds in autumn and 54% of all birds in the spring). The higher proportion of birds seen at NLO is attributed to its greater view-shed (a 240° view), versus the RVO (a 170° view). In autumn 14–16% of the birds seen at NLO also were seen at RVO, versus 13–19% in spring; on the other hand, in autumn 30–32% of birds seen at RVO also were seen at NLO, versus 15–24% in spring. The smaller inter-annual difference in the autumn versus spring overlap most likely reflects the significantly higher count totals in autumn. Species overlapping most frequently in autumn were Sharp Shinned Hawks (*Accipiter striatus*), Red-tailed Hawks (*Buteo jamaicensis*) and Broad-winged Hawks. Species overlapping most frequently in the spring were Broad-winged Hawks (*Buteo platypterus*) and Ospreys (*Pandion haliaetus*). The high overlap of the first three species in autumn most likely is due to the fact that they are among the most commonly observed birds at HMS and may have mistakenly been considered “overlap birds” when, in fact they were not. That Broad-winged Hawks overlapped frequently in both seasons may reflect their flocking behavior which made the distant birds more visible in both seasons. That Ospreys overlapped frequently in spring may reflect their use of the river at the base of Hawk Mountain for fishing.

Finding Microsatellite Markers for the Crested Caracara (*Caracara cheriway*).

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I attempted to identify dinucleotide microsatellite loci suitable for evaluating genetic diversity in Florida's population of Crested Caracaras using 20 primer pairs previously found to assess diversity successfully in several species of Falconidae. PCR reactions were performed using DNA extracted from blood samples taken from 32 individual caracaras from across the range of the Florida population, 3 individual caracaras from Texas, and 4 Peregrine Falcons (*Falco peregrinus*). Successful amplification was obtained with all 20 primer pairs for the peregrines, but only with 16 primer pairs for the caracaras. Products from the amplification were separated in 6% denaturing polyacrylamide gels and examined visually. For the caracaras, polymorphism was apparent for only 2 loci; all other loci were homozygous in all individuals from both populations. Although the loci examined showed polymorphism in other members of Falconidae, the absence of allelic diversity at these particular loci in the Crested Caracara raises questions about the possibility that these northerly populations were subject to founder or genetic bottleneck events. To conduct a population level study of genetic diversity of caracaras in any population, suitable polymorphic markers must be found.

Preliminary Results of Movements and Home Range of Short-eared Owls (*Asio flammeus*) Wintering in New York State as Determined From Satellite and Conventional Radio Telemetry.

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Concern has been growing regarding the status of Short-eared Owls (*Asio flammeus*) (SEOW), both for breeding and wintering populations, in Canada and the United States (US), resulting in its listing as endangered, threatened, special concern, or vulnerable in many US states and Canadian provinces. Loss of open grassland habitats appears to be a primary factor cited in declines of this species in many areas. Suitable wintering habitats are particularly important and vulnerable, and in New York (NY) and elsewhere, are under considerable pressure from development. While a very occasional breeder in NY, mostly our state serves as a wintering area for more northern breeding owls. We selected three SEOW wintering areas across NY of approximately 32 known sites to capture wintering owls for the purpose of winter home range delineation. We employed both conventional and satellite telemetry in an effort to track SEOW while resident. While the use of back-pack mounted solar-powered satellite telemetry units was highly experimental, this afforded us the opportunity to obtain information on owl departure dates, migratory movements and duration, and subsequent summering locations. Little is known of the migratory movements of this species, and, to our knowledge, this represents the first effort to track SEOW using satellite telemetry.

Food Habits of Florida's Crested Caracaras (*Caracara cheriway*).

◆**KYLE E. PIAS**, JOAN L. MORRISON, and ISABEL G. W. GOTTLIEB, Environmental Science Program, Trinity College, 300 Summit St., Hartford, CT 06106 USA.

We compared the invertebrate component of the diet of breeding and nonbreeding Crested Caracaras in Florida using pellet analysis. Pellets collected from beneath nests in 52 different breeding areas during the peak breeding season, January–April, were compared with pellets from nonbreeding caracaras collected at a communal roost, over the same time period. Pellets of breeding and nonbreeding caracaras were of similar mass, but pellets from nonbreeding caracaras were larger in volume, possibly due to a difference in matrix composition. Caracaras consumed invertebrate prey from a total of 32 families from nine orders. Six families contained prey types associated with carrion. Prey from the family Silphidae made up the largest portion of breeding caracaras' diet, and prey from the family Scarabaeidae constituted the largest portion of the diet of nonbreeding caracaras. Breeding caracaras consumed invertebrates from fewer families and genera than nonbreeding caracaras during Jan-Apr. Although invertebrate diet diversity (FNBst) at the family level was similar for breeding and nonbreeding caracaras, at the genus level, diet of the breeding caracaras was less diverse than diet of the non-breeding caracaras, and overall, nonbreeding caracaras ate more different prey types. Pellets of non-breeding caracaras contained almost twice as many invertebrates per pellet than pellets from breeding birds. Results suggest hypotheses about the potential importance of invertebrates as a food resource for nonbreeding caracaras and their use of marginal habitats as foraging grounds. Comparisons among populations of the genus *Caracara* across its geographic range revealed higher overall diet diversity but fewer invertebrate families consumed by caracaras from southernmost populations.

Territory Status of California Spotted Owl (*Strix occidentalis occidentalis*) Following Fuel Reduction Treatments: Management Case Studies from the Stanislaus National Forest.

ADAM C. RICH, US Forest Service, #1 Pinecrest Lake Road, Pinecrest, CA 95364 USA.

National Forests in the Sierra Nevada are currently implementing fuel-reduction treatments on a vast landscape scale. Treatment areas sometimes fall within 121 ha California Spotted Owl territories known as protected activity centers (PACs). While not part of formal research studies, these situations can still provide much needed information as management case studies. I monitored California Spotted Owl territory status at three sites following fuel reduction treatments conducted within PACs. At the first site, a thinning-from-below mechanical harvest was conducted

within an owl nest stand and PAC. Continued owl occupancy and successful owl reproduction was documented 2, 4, and 6 yrs post-treatment. At the second site, an underburn was conducted across 75% of a PAC. Continued owl occupancy and successful reproduction was documented at 1 yr and 2 yrs post-treatment. At the third site, mechanical harvest followed by underburning was conducted in an owl PAC outside of a 10 ha nest buffer area. Continued owl occupancy and reproduction was documented immediately following treatment. These case study outcomes suggest that standard fuel reduction treatments may often be compatible with continued owl occupancy and successful reproduction. Fuel reduction treatments reduce the risk of stand-replacing wildfire that may render Spotted Owl habitat unsuitable for decades. I recommend that formal research studies be conducted to further examine the short term and long term influences standard fuel reduction treatments have on California Spotted Owl and habitat.

Eggshell Thickness Measured Optically from Pole to Pole in the Prairie Falcon (*Falco mexicanus*): Implications for Predicting Eggshell Thickness from a Few Fragments.

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Eggshell thickness measured at the waist is one indicator of reproductive health recorded under the Peregrine Falcon (*F. peregrinus*) recovery plan and continues to be recorded as a requirement of the post-recovery monitoring effort. In monitored eyries where addled eggs are not present, measurements of eggshell fragments collected from the scrape may be substituted. In an attempt to improve the prediction of eggshell thickness from a very few fragments (or even one), I optically measured thickness around the longitudinal axis of unincubated Prairie Falcon eggs (a similarly-sized congener with nearly identical egg dimensions) with ($N = 4$) and without ($N = 6$) membranes. For the thirteen measured positions from pole to pole, shell with intact membrane shows a larger range of thicknesses compared to shell without membrane. (Average (SD) with membrane: waist = 0.35 mm (0.013); apex = 0.29 mm (0.014); base [$N = 2$] = 0.32 mm (0.01). Without membrane: waist = 0.29 mm (0.014); apex = 0.27 mm (0.010); base [$N = 4$] = 0.28 mm (0.015)). For the intact membrane condition, a simple geometric reconstruction of the egg surface shows that a third of the shell matches waist thickness while an eighth of the shell is thicker by almost 3%. Approximately a third and a seventh of the shell are thinner than the waist by almost 3% and 6%, respectively. The remaining fraction (~3%) of the shell ranges from about 9 to 17% thinner. For the case without membrane, the reconstruction shows almost three quarters of the shell matching the waist thickness. The remaining quarter of eggshell is about 4% thinner than the waist measure with less than a fraction of a percent of the shell being ~7% thinner than the waist. I will discuss considerations for improving the odds of identifying eggshell thickness at the waist from small amounts of shell material.

Site Fidelity, Mate Fidelity, and Breeding Dispersal in American Kestrels.

KAREN STEENHOF and **BRIT E. PETERSON**, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Snake River Field Station, Boise, ID USA.

Most raptors return to nest in the same areas year after year, and many pair with the same mate in multiple years. Sometimes, however, the advantages of staying on the same territory or with the same mate may be outweighed by the advantages of moving to a better territory or a better mate. From 1986 to 2006 we monitored marked American Kestrels (*Falco sparverius*) nesting in boxes in southwest Idaho. Preliminary analyses indicate that turnover was high. In cases where nest box occupants were identified in consecutive years, 77% of boxes had new males ($n = 299$) and 87% had new females ($n = 462$). High turnover rates were due to a combination of mortality, emigration, and box-switching. Approximately 50% of males and 60% of females that nested within the study area in consecutive years switched boxes. Breeding dispersal distances for birds that switched boxes averaged 1.8 km for males (maximum 22 km) and 2.8 for females (maximum 32 km). Approximately 70% of birds that nested in consecutive years had a different mate in the second year. Mate switches occurred approximately 30% of the time when the previous mate was known to be alive and nesting in the area. We evaluate factors that influence breeding dispersal and mate-switching, and assess the reproductive consequences of switching mates and territories.



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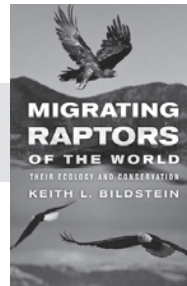
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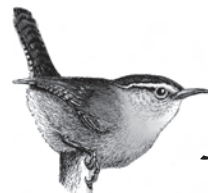
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