

## MESSAGE FROM THE PRESIDENT

Twenty-six years ago, I was preparing to travel to my second Raptor Research Foundation conference, in Montreal, Quebec, which featured the First International Symposium on Bald Eagles and Ospreys. The world was a far different place for Bald Eagles in 1981. Just 3 years earlier, the eagle had been federally listed as Threatened or Endangered in all 48 coterminous U.S. states; recovery planning was getting underway; and the eagle's future was in doubt throughout its non-Alaska range.

What a difference a quarter century makes! On August 8 of this year, the Bald Eagle was removed from the federal list of Threatened and Endangered species. The extraordinary effort put forth by biologists, land managers, and society to recover the eagle has largely succeeded. Populations in most parts of the U.S. have rebounded to levels that some working with Bald Eagles in the early 1980s did not think were possible. While I am personally disappointed with the delisting decision that was reached for the Southwest population, I am also allowing myself to celebrate the successes realized in other parts of the range. From here on out, the challenges will be to intelligently manage the eagle's habitat and our human behavior without the federal Endangered Species Act, and to carefully monitor eagle populations to ensure they do not backslide.

The eagle's recovery is not without personal irony. The eagle congregation at Glacier National Park, Montana to which I attached such a sense of conservation importance in my thinking and in my expenditure of life's daily energy as a graduate student has ended. The kokanee salmon run that was the basis for the congregation is gone, an "unintended consequence" of fisheries management decisions that resulted in collapse of the kokanee's food supply. From peak counts of several hundred eagles along a few miles of creek and river to none, within the same timespan of recovery at the population level. The eagle's recovery and the demise of the Glacier congregation are contrapuntal lessons for me, hope and warning of how quickly things can change, for better or worse.

From my perspective, the Raptor Research Foundation has played a huge and positive role in the Bald Eagle's recovery: papers published in our journal, presentations at our annual conferences, discussions and information exchange among member-colleagues, and ultimately recommendations to U.S. Fish and Wildlife Service regarding its delisting decisions. Our organizational behavior has been exemplary, but the work is not finished. RRF must continue to play a leadership role in the post-delisting world; our communications and conservation efforts should not cease.

It's fitting that RRF will gather for its first post-delisting conference near Hawk Mountain, Pennsylvania. No other place in North America has a richer history of raptor conservation. It's the type of venue that brings added significance to our annual gathering, a source of extra energy for the year ahead. Please join us at Hawk Mountain during the second week of September, in a remarkable place on earth for birds of prey. It's going to be a great meeting.



Best regards -- Lenny



**RAPTOR RESEARCH FOUNDATION, INC**OFFICERS

President: Leonard Young                      Secretary: Joan Morrison  
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North American #3: Laurie Goodrich	At Large #6: Daniel E. Varland

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

Persons interested in birds of prey are invited to join the Raptor Research Foundation (RRF). *Wingspan* is mailed twice each year to all members of RRF. It is available to non-members at a subscription rate of US\$10 per year. Members also receive *The Journal of Raptor Research* (ISSN 0892-1016), which is published quarterly. For membership and subscription information, please contact: Ornithological Societies of North America, 5400 Bosque Boulevard, Suite 680, Waco, TX 76710, USA; 1-254-399-9636 (phone); 1-254-776-3767 (fax); [business@osnabirds.org](mailto:business@osnabirds.org) (email); <http://www.osnabirds.org> (web).

**Get Involved with RRF!!**

If you are interested in becoming more involved with the Raptor Research Foundation, please contact an Officer, Board of Directors member, or Committee chair. There are many opportunities with varying levels of time commitments. Elections for Directors and Officers occur every year; throw your name in the hat. Participate on a committee; the many RRF committees are always looking for additional members! See the RRF website for committee chairs.

**Chair needed for the RRF resolutions committee**

RRF seeks a replacement who, through the resolution process, will help express the will of the RRF and its membership. Interested individuals should contact RRF President Lenny Young or Secretary Joan Morrison.

**Conference Committee Chairperson Needed: 2009-2013 (see page 4)**

**Editor's Note** – Thanks to the contributors for this issue of the *Wingspan*: David Anderson, Patricia Burnham, Jim Duncan, Ricardo Rodriguez Estrella, Fidel José Fernández y Fernández-Arroyo, David Frank, Anita Gamauf, Laurie Goodrich, Carole Griffiths, Don Heintzleman, Lloyd Kiff, Karla Kinstler, Jeff Lincer, Janet Linthicum, Sung Jin Park, Dan Varland, Susan Whaley, Faith Wiley, Lenny Young.

*Wingspan* welcomes contributions from RRF members and others interested in raptor biology and management. Contributions may be submitted by mail (Petra Bohall Wood, *Wingspan*, PO Box 6125, West Virginia University, Morgantown, WV 26506 USA) or email ([rrfwingspan@mail.wvu.edu](mailto:rrfwingspan@mail.wvu.edu)). Email is preferred and for long contributions, please send as an MS Word attachment.

Deadline for the next issue is **14 February 2008**.

**RAPTOR RESEARCH FOUNDATION  
2007 ANNUAL MEETING**

*Kettling on the Kittatinny*

12-16 September 2007

Held in conjunction with  
The Hawk Migration Association of North America

Hosted by  
Hawk Mountain Sanctuary Association

At the Holiday Inn Conference Center  
Fogelsville, Pennsylvania



It is not too late to register and attend The Raptor Research Foundation 2007 annual meeting held from 12 to 16 September at the Holiday Inn Conference Center, Fogelsville, Pennsylvania! A great line-up of talks is planned (see [www.hawkmountain.org](http://www.hawkmountain.org) for link to scientific program).

The meeting is convenient to many eastern RRF members, located just west of Allentown, Pennsylvania, and two hours from New York City and Baltimore. The conference dates, September 12-16<sup>th</sup> are timed to enjoy the peak migration of broad-winged hawks, osprey, and other raptors through eastern Pennsylvania with daily counts of over 1,000 birds possible at several nearby lookouts. The meeting will be held at the Fogelsville Holiday Inn Conference Center (<http://www.hilehighvalley.com>; 1-610-391-1000), just off of Interstate 78, a major east-west highway in eastern Pennsylvania, and strategically located near the base of the Kittatinny Mountain, a world-renown flyway, and only one half-hour from Hawk Mountain Sanctuary. A conference field trip to Hawk Mountain will be held on Friday afternoon.

**Pat and Clay Sutton**, noted authors and naturalists, will deliver the keynote address on Thursday morning entitled “Raptors in Time and Space” and have a book-signing of their new book on Cape May Birds and Birding later in the day. **Dr. Ian Newton** will give a special address on Saturday afternoon to the full meeting about his long-term studies on the Sparrowhawk. The annual banquet is planned for Saturday night.



A listing of presentations and the timing is available under conference links at [www.hawkmountain.org](http://www.hawkmountain.org). Two concurrent sessions of talks occur Thursday, Friday a.m., and Saturday. Thursday includes a special symposium on the American Kestrel. Saturday’s program includes a special symposium on the status of North American Raptors with presentation of trends derived from raptor migration counts and other sources. Social gatherings are planned for each evening, including the Thursday night poster session and reception. A special evening reception is planned for Friday night at Muhlenberg College’s Science Center, a newly designed *green* building, and the Acopian Center for Ornithology. A raptor art show will be held in conjunction

with this event with many of the premier regional wildlife artists are exhibiting and selling raptor art. Robert Bateman has contributed a Red-tailed Hawk print.



View from Hawk Mountain (Jeff Schmoyer photo)

Day trips are available on Wednesday and Sunday to several migration watch sites including Hawk Mountain, Bake Oven Knob, and other Broad-winged Hawk traditional hot spots. Early morning warbler walks are planned for before the conference each morning, and a three-day post-conference trip to Cape May for hawk-watching and birding is planned. Other field trips include a canoe trip on the scenic Lehigh River and a trip to the home of John James Audubon, Mill Grove. Non-birding family members may visit the nearby Dorney Amusement Park, Crayola Factory, the Velodrome and other Lehigh Valley attractions. The conference center website provides information on many nearby sites.

Walk-in registration is available and one-day rates for Thursday and Saturday are available through web link. For further details on all conference events check the Conference web page links at [www.hawkmountain.org](http://www.hawkmountain.org).

## **2007 Conference Silent Auction Donations still needed!**

We are asking all RRF members to consider donating an item for the Silent Auction which will be held during the conference to help defray the costs of the conference. Items can be brought to the conference by attendees or mailed to RRF Conference Silent Auction, c/o Laurie Goodrich, 410 Summer Valley Road, Orwigsburg, PA 17961. Please include your name and address for the acknowledgement letter. Please also email the Silent Auction chairs of what you are bringing so they can plan to include it. Notice of items you are bringing and any questions can be directed to the Silent Auction Committee Co-chairs, Arlene Koch, [davilene@verizon.net](mailto:davilene@verizon.net); or Todd Katzner, [tkatzner@asu.edu](mailto:tkatzner@asu.edu). Possible auction items include raptor photographs, artwork, books, t-shirts, gift items or any other bird or raptor related item. (Any authors want to donate a signed volume?). Thank you in advance for your contribution!

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## **RRF Conference Committee Chairperson Needed: 2009-2013**

Dan Varland has served as Conference Committee Chair since 2003 and plans to step down after the 2008 annual meeting in Missoula. RRF is seeking someone to take this position who will serve on the conference committee with Dan through 2008. It is hoped that this individual will serve as chair for five or more years, beginning in 2009 and lasting at least through 2013.

The main responsibilities for the Conference Committee Chair include working with the RRF Board and President to: 1) locate organizations willing and able to host the annual meeting; 2) secure a financial agreement between the host organization(s) and RRF; and 3) work with the local committee to ensure a successful meeting according to RRF annual conference guidelines.

If you are interested in the position or would just like to serve on the committee for a year or two, contact Dan Varland (email: [daniel.varland@rayonier.com](mailto:daniel.varland@rayonier.com); phone: 360-538-4582).

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## UPCOMING MEETINGS

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### 2007

#### **September 19 – 23**

Peregrine Conference – Poland (Piotrowo/Poznan)

We are happy to announce a conference we are organizing about the Peregrine. The Conference is organized by 4 organizations from 4 countries of Europe - Poland, Hungary, Slovakia and Romania. Everyone interested is welcome to participate. More information is at: <http://www.peregrinus.pl/conference2007.php>. Should you have any question, comment or request, please, do not hesitate to contact us at: [conference@peregrinus.pl](mailto:conference@peregrinus.pl) -- Janusz Sielicki

#### **October 31 – 4 November**

WORLD OWL CONFERENCE: OWLS, AMBASSADORS FOR THE PROTECTION OF NATURE IN THEIR CHANGING LANDSCAPES will be held in Groningen, The Netherlands, 31 Oct – 4 Nov 2007, and is hosted by Birdlife International in The Netherlands, the Global Owl Project and the World Owl Trust. A workshop on Owl Survey and Monitoring Techniques will be held on October 31st followed by three days of science, one day birding and evening social events. If this does not sound like enough, embark on a post-conference tour to see more birds or to get a taste of the cultural heritage of The Netherlands. You will have an opportunity to meet hundreds of Dutch Owl enthusiasts during the Dutch National Owl Study Day, hosted by the Dutch Barn Owl and Little Owl Protection Working Groups. Please check out our website for further details and tell others about this event. We hope to see you there! [www.worldowlconference.com](http://www.worldowlconference.com)

#### **October 9-13**

Raptor Research Foundation's 2007 Eurasian Conference – Batumi, Republic of Georgia

#### **canceled**

Due to insufficient registration, we have been forced to cancel the meeting. We are terribly sorry about the inconvenience, but there was just not enough interest to justify continuing with the meeting. Those of you who have paid registration fees will be reimbursed. Thanks for your interest and apologies for the inconvenience.

#### **October 11**

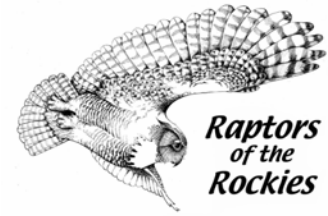
The European Raptor Monitoring Scheme (TERMS) – Batumi

**postponed** May be held in conjunction with the 2009 RRF meeting in Scotland.

**2008****September 22-28**

Raptor Research Foundation 2008 Annual Conference – Missoula

The educational organization Raptors of the Rockies will host the Raptor Research Foundation Conference in 2008 in Missoula, Montana. Dates are from September 22-28, and the venue will be downtown at the Holiday Inn Parkside. The University of Montana will co-host, and we will have related events all week plus numerous field trips in the area. Events include a Birds and Art Show, Film Festival, and dedication to John and Frank Craighead.



Missoula is located in west-central Montana, in a line between Glacier and Yellowstone National Parks. It is the hub of five valleys and the confluence of three major rivers, including the Clark's Fork of the Columbia. In a very scenic setting, Missoula boasts one of the finest biological sciences departments in the country at the University of Montana. Cultural and natural opportunities abound. Nearby are two National Wildlife Refuges, the National Bison

Range, Avian Flight Lab, Avian Science Center, and Montana Waterfowl Foundation.

For more information, contact Kate Davis, Local Committee Chairperson [raptors@montana.com](mailto:raptors@montana.com); [www.raptorsoftherockies.org](http://www.raptorsoftherockies.org); (406) 829-6436

**2009****September 29 – October 4**

Raptor Research Foundation 2009 Annual Conference – Scotland

The RRF 2009 annual conference will be held overseas for the first time, to reflect the global interests of its membership. Hosted by the Scottish Raptor Study Group, this event will be held in an exclusive hotel in the small town of Pitlochry, central Scotland, with a full program of scientific presentations, workshops and seminars. Social events include the hire of a nearby castle



Along the road to Skye - © R. Tingay

for an evening party, and fieldtrips will include the spectacular west coast island of Mull for eagles, otters and lochs. Conference website: <http://www.rfconferencescotland2009.org/>

Registration will open on this website in December 2007. As the conference is limited to 300 delegates, priority will be given to Scottish Raptor Study Group and RRF members, so please ensure your membership is up to date! For further details contact local organizing committee chair RUTH TINGAY (EM: [dimlylit100@hotmail.com](mailto:dimlylit100@hotmail.com)).

*To learn more about what RRF is doing for raptor conservation and for RRF members, check out the minutes from the RRF business meetings. Minutes from the annual business meeting held at the annual conference, as well as minutes from quarterly email agendas, are posted on the RRF website.*

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## News from the RRF Awards and Grants Committee

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### 2007 Grant Recipients

submitted by Jeff Lincer and Carole Griffiths



The **Leslie Brown Memorial Grant** goes to **Paul Kariuki Ndang'ang'a**. Paul is a 35-year-old Kenyan. He currently manages the 'Species' component of the Conservation Programme of the BirdLife International Africa Partnership. This is in addition to coordinating a few BirdLife-led regional biodiversity conservation projects especially in the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania. He has previously (1996-2005) held various research-based positions in the Ornithology Department of the National Museums of Kenya and has extensive experience in Ornithology and conservation biology especially in Kenya. With support from the Leslie Brown Memorial Fund, Paul will coordinate a review of the status of African Raptors.

Many raptor experts in Africa have now found it urgent and necessary to do a detailed review of raptor status in Africa. The forthcoming 12<sup>th</sup> Pan African Ornithological Congress (PAOC 12) to be held in 2008 (in South Africa) has been seen as an opportune platform for doing this review. The support received from this grant will be used to (1) perform a detailed desk review of the status of the respective raptor species in Africa, pulling together as much information (including anecdotal reports) as possible; (2) circulate the review document to a wide range of experts and other stakeholders for input; (3) present the review to a consultative workshop/symposium of raptor experts attending PAOC 12 in 2008; (4) capture the input of the experts to compile an improved draft on the assessment of status of African raptors against the guidelines set by IUCN (2003); and (5) prioritize actions for conservation of African raptors. This work will be pegged to a Symposium on African Raptors that is planned for PAOC 12 for which experts are already in active communication. The outcomes of the review will be disseminated as much as possible for wider use by stakeholders to maximize its effectiveness.

The **Dean Amadon Grant** was awarded to **Ronald Kale Mulwa**, a research scientist in the National Focal Point Important Bird Areas Programme, in the ornithology section of the National Museums of Kenya. He will conduct an intensive survey of raptors in the isolated hilltop forests of Muumoni, Endau and Nuu Hills of Kitui and Mwingi districts in eastern Kenya. Previous avifauna surveys in these little known mountains revealed that they are very rich in both resident and migratory raptors. Four globally threatened raptor species that qualify the sites as Important Birds Area (IBA) have been recently recorded in this area. This study will assess their distribution in the areas to provide information on the boundaries of the proposed IBA, and will identify the determinants of the high raptor abundance, assess current breeding activities in the area and identify prey items for various species. By involving members of the local community as field assistants, awareness will be created and build capacity for raptor identification. Any conflicts between raptors and farmers as well as cases of raptor persecution and other threats to the birds in

the area will be assessed and a community implemented raptor monitoring programme established.

The **Stephen R. Tully Memorial Grant** was awarded to **Corinne Kozlowski**, a graduate student at the University of Missouri, St. Louis, working on androgen allocation in the Eastern screech owl. Her study will determine the effect of elevated yolk androgens on nestling development, and will be the first to investigate whether raptors differentially deposit yolk androgens based on embryo sex. Female birds that produce asynchronously hatching clutches can modify offspring phenotype by varying yolk androgen levels across the laying-order. In most species, elevated androgen levels increase nestling growth and survival. However, in raptors, high androgen levels appear to have the opposite effect. Eastern screech owls are known to increase androgen levels across the laying-order. Ms. Kozlowski is using a captive colony of screech owls for this study.



*Application instructions and deadlines for RRF grants and awards are available on the RRF website.  
Complete applications must be submitted by **15 February 2008***

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## **Biologists release captive-bred orange-breasted falcons for first time in Belize**

Submitted by Susan Whaley

BOISE, Idaho – Rare Orange-Breasted Falcons bred in captivity have been released for the first time to the wild in their traditional territory in Belize to bolster a small and isolated population thought to number fewer than 35 pairs in all of Central America. Early in July, six chicks were placed in a hack box, a platform that provides a safe haven to the young birds as they learn to fly and hunt. Researchers will feed the birds until they are able to successfully pursue and capture prey on their own.

“This has been one of the most difficult species The Peregrine Fund has ever tried to breed in captivity,” said Pete Jenny, president and CEO of The Peregrine Fund, a conservation organization based in Boise, Idaho, that recovers endangered birds of prey. “We’re very pleased that, after 20 years of work, we’re finally in the position of having enough birds to undertake this first release.” The falcons were bred and raised in captivity by Robert Berry, a research associate and founding board member of The Peregrine Fund, at his breeding facility in Wyoming. A 21-year effort to propagate Orange-Breasted Falcons reached important milestones with the first successful hatch of four falcon chicks in 2006 and seven chicks in 2007. The Peregrine Fund remains the only facility to successfully breed this species in captivity.



Photo credit:Robert Berry/The Peregrine Fund

The colorful Orange-Breasted Falcon has grown increasingly rare as its habitat in Central and South America is impacted by human development. The birds have vanished from extensive portions of their previous range in Central America, for reasons that scientists don't fully understand. A research project on the falcon's biology is being led by The Peregrine Fund. "The study of captive-bred falcons in the wild provides biologists with a unique opportunity to understand what limits the species' distribution and abundance without negatively impacting the wild population," Jenny said.

These beautiful, medium-sized falcons once resided in tropical forests from southeastern Mexico through Central America to Peru, Bolivia, Paraguay and northern Argentina. Orange-Breasted Falcons may be one of the most sparsely distributed falcons in the world. They feed on smaller birds and bats, pursuing them at high speeds and catching them in the air. The falcons generally nest on precipitous cliffs like the peregrine falcon and occasionally in emergent trees. Further information may be found at the following web sites:

<http://www.globalraptors.org/grin/SpeciesResults.asp?specID=8033> or <http://www.birds.cornell.edu/obf>



Photo credit:Marta Curti/The Peregrine Fund

The Orange-Breasted Falcon has a white throat, orange upper breast and legs, and yellow toes and skin exposed around the eye, which stand out in sharp contrast to its black head and back. Their huge feet and long, grasping toes make them the most powerfully armed of all falcons relative to body size. Field work is coordinated and carried out by Angel Muela and Marta Curti, biologists at The Peregrine Fund's field office in Panama.

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## Endangered California Condor chicks hatch in the wild

Submitted by Susan Whaley

Biologists recently confirmed a new condor chick produced in the wild by captive-bred California Condors at Vermilion Cliffs National Monument. They believe another chick is likely in the Grand Canyon. This brings the total number of chicks hatched in the wilds of Arizona to six confirmed, and seven probable, since 1996, the year that endangered California Condors were first reintroduced in northern Arizona as part of a cooperative recovery program by federal, state and private partners. "This confirmed visual allows for a brief sigh of relief," said Chris Parish, the biologist leading the recovery effort for The Peregrine Fund, an international conservation organization. "The next big step, however, will be after the chick fledges and integrates into the

wild flock. One step at a time.” The Peregrine Fund, based in Boise, Idaho, breeds and recovers endangered birds of prey around the world. Two other condor pairs attempted to nest in Arizona this year but were unsuccessful. California Condors are typically six years or older the first time they attempt to breed, and pairs commonly do not succeed until they are eight years of age.

The Vermilion Cliffs chick is the second offspring for a pair of condors at the national monument. The chick was discovered by field biologists who observed nesting behavior in May. By early June biologists suspected a chick had hatched because the parents were venturing out to forage for food and immediately returning to the cave. After watching this behavior continue for three weeks, Peregrine Fund field manager Eddie Feltes rappelled down the face of the cliff and peeked inside the cave to confirm the presence of a healthy young bird. The other chick that likely hatched this summer is the first for a pair nesting in a remote canyon within the Grand Canyon. That chick has not been confirmed with visual inspection but scientists are optimistic, based on the parents’ behavior.

“With each wild chick hatched, the original condor reintroduction concerns of whether the condor could even be successfully recovered have been answered,” said Kathy Sullivan, lead biologist of the Arizona Game and Fish Department’s condor program. “The program is making great strides. However, this chick and the entire flock face many challenges that must be overcome to achieve a self-sustaining population.” The greatest obstacle to a self-sustaining condor population is lead toxicity from spent ammunition. Cooperative efforts are underway to reduce mortality rates from lead contamination in condors. The Arizona Game and Fish Department offers a free non-lead ammunition program, started in 2005, in an attempt to reduce lead exposure for wild condors. Hunters have responded positively to using non-lead ammunition in condor range, although expanded adoption of the effort is needed to further reduce lead exposure and mortality in condors. The chicks are expected to fledge in December when they are about six months old. Four out of five of the previously wild-hatched chicks have survived and assimilated into the flock. “These hatchlings are a significant step in recovering a magnificent bird,” said Benjamin N. Tuggle, regional director for the U.S. Fish and Wildlife Service. “Wild-hatched condors are part of the plan for re-establishing a truly wild population of California Condors.”

Condors were added to the federal endangered species list in 1967. In 1982 there were only 22 California Condors in existence and in 1987 the last birds were removed from the wild for captive breeding to save the species from extinction. Today, more than 300 birds exist, with nearly half of those released to the wild in California, Mexico and at the Vermilion Cliffs in Arizona. The condor is the largest flying land bird in North America. The birds can weigh up to 26 pounds and have a wingspan of up to 9 1/2 feet.

Condors were first reintroduced in Arizona in 1996. There are now 69 condors (59 wild and 10 awaiting release) in the state. Visitors at the Grand Canyon and Vermilion Cliffs may be able to observe the birds, especially during the spring and summer. The condor reintroduction in Arizona is a joint project of many partners, including Arizona Game and Fish Department, U.S. Fish and Wildlife Service, The Peregrine Fund, Bureau of Land Management, National Park Service, Kaibab National Forest and Utah Division of Wildlife Resources. For more information on California Condors, visit The Peregrine Fund website at [www.peregrinefund.org](http://www.peregrinefund.org) or the Arizona Game and Fish Department website at [azgfd.gov/condor](http://azgfd.gov/condor).

**Conclusions of the III Symposium on Vultures**  
**Summer Course of the UNED –Spanish Open University- /Plasencia (Cáceres)**  
**9 - 13 July 2007**

These conclusions have been agreed upon unanimously by the 61 participants (speakers and students), including some of the principal vulture experts from Spain, France and Portugal.

submitted by Dr. Fidel José Fernández y Fernández-Arroyo  
*(Translated by Claire Graham)*

The participants in the Symposium on Vultures would like to thank the **UNED at Ávila in 2001, Barbastro (Huesca) in 2004 and Plasencia (Cáceres) in 2007** for their excellent welcome and the kind assistance received from other institutions, various public and private entities as well as a vast number of people.

Given the seriousness of the problems currently affecting populations of vultures and the need to resolve them before it is too late, the participants to the III Symposium reassert the conclusions of the two prior symposia which are still valid today, especially if we take into account the recent worsening of some of the threats that were foreseen then. In addition, they particularly highlight the following points:

- 1) It is important to preserve the interactions of vultures with the extensive cattle breeding to ensure the survival of both and to prevent excessively rigid legislation from provoking a disaster. Vultures need to be urgently recognised as an essential part of sustainable development, as they:
  - Dispose of dead animals in the most traditional, natural, and economical way possible.
  - Preserve a type of extensive cattle breeding which is very beneficial not only for biodiversity (of which the vultures are an important part) but also for humans (to obtain high quality products).
  - Promote eco-tourism, which is in increasing demand and has to take place in a respectful way and in places where it does not cause significant alterations. Vultures are beautiful, the emblem of a well balanced nature and a hallmark of environmental quality.
  - Avoid the release of many gases that contribute to the greenhouse effect. The collection, transportation and incineration of thousands and thousands of carcasses generate fuel consumption and a considerable release of carbon dioxide that could be easily avoided by allowing the vultures to carry out their function. This would contribute significantly to the removal of biomass and the reduction of pollution. It is a serious mistake not to take this into consideration for the future.
  - Reduce the risk of disease transmission which is greatly increased with the collection and transportation of carcasses from one farm to another.
  
- 2) Implementation in a useful and effective manner, in all the Autonomous Regions, of the Royal Decree 664/2007 dated 25<sup>th</sup> May (official Gazette dated 5<sup>th</sup> June) regarding the **feeding** of necrophagous raptors is an urgent issue; so is the legalization of the dumping of remains from certain animal farms. Joint management and data interchange with local experienced NGOS is advisable.

The creation and management of vulture feeding places (“muladares”) at every farm is recommended, thus decongesting some of the large *muladares*. With regards to the Egyptian Vulture, small *muladares* specifically aimed at this species are required. Additional ways of feeding near the breeding and roosting grounds also need to be taken into account and promoted. With regards to the Lammergeier, the increase of the reproductive success of the pairs whose failure is linked to the lack of resources is recommended through additional feeding of these specific pairs in the area around the nesting grounds. The current management of the large feeding stations should be optimized. At the national level, beyond the strategies of the Autonomous Regions and through the implementation of the legal settings of the European Union, a plan must be developed to allow the recovery (or stability, depending on the case) of the balance allowing the conservation of the current population of scavenger birds in Spain. In Portugal, the situation should be clarified so that the remains of hunting species can be left in the field, without the need to set up *muladares*, in accordance with European Directives.

- 3) The illegal use of **poisoned baits** has alarmingly become generalised over the last few years and is having a big impact on the populations of scavenger birds, doing away with many of the conservation achievements obtained over the last decades. Eradication of the use of poison is one of the most important measures for the conservation of all the species of vultures and in general of all the scavenger birds. The active fight against poison must include the creation of patrols with specially trained dogs (as is already done in some regions), as well as raising the awareness of the hunting associations. Coordination between the different Autonomous Regions is required so as to improve the effectiveness of the strategies to eradicate the illegal use of poisoned baits. International cooperation with France and Portugal as well as the exchange of experience and procedures must also improve. The main obstacle for the eradication of poison is due to the complicity between the various entities involved, including even sometimes the Environmental Administration itself.
- 4) The installation of **wind generators** near vulture territories, roosts and feeding grounds must be forbidden; they should be forbidden not only in the nesting areas but also in the feeding or **resting** areas, passage routes and connecting areas between vulture colonies. Maps indicating total exclusion zones for wind farms as well as preferential exclusion zones should be produced, taking into account the Important Areas for vultures and other birds (including protected species) as well as the Special Interest Habitats.
- 5) The installation of **power lines** and other infrastructures that alter the habitat are a cause of unnatural mortality of various species of vultures (as well as many other birds). The new structures must be placed in such a way as to prevent electrocution and collision. With regards to the existing power lines, measures should be taken to correct as much as possible the negative impact on the vultures and other birds.
- 6) The global conservation of **habitats** and the environment is essential to various species of vultures (including the rarest ones) and other birds.

We condemn, specifically, unnecessary works conducted in natural protected areas and which are in conflict with the protection of habitats and species. It is unacceptable and

hypocritical that the Administration's departments, responsible for conservation, accept or even promote the impoverishment and occupation of these habitats. The conservation of habitats (and also of species) should be a priority in the PORN and PRUG plans that have to be developed and respected in protected areas; it should also be a priority in the other legal instruments linked to the management of scavenger bird populations and their habitats. In properties where the black vulture lives, forest and agricultural management should be made compatible with the conservation of this species.

- 7) Human **interference** is in many cases a real problem that must not be underestimated, especially in the breeding areas and during the breeding seasons. Except for very early and late cases, and taking into account local variations, the sensitive period for the breeding of vultures in the Iberian Peninsula is as follows:

For the Lammergeir: from 10<sup>th</sup> December to 15<sup>th</sup> August

For the Black Vulture: from 15<sup>th</sup> January to 30<sup>th</sup> September

For the Egyptian Vulture: from 1<sup>st</sup> March to 15<sup>th</sup> September

For the Griffon Vulture: from 15<sup>th</sup> December to 31<sup>st</sup> August

Where the black vulture breeds in cork oaks, the extraction of the cork should be done when the chicks in the nearby nests are 35 to 75 days old; if no monitoring has been conducted, then it should take place between the 1<sup>st</sup> of June and the 1<sup>st</sup> of July, always under the supervision of the rangers or qualified personnel.

In addition, educational, information and awareness campaigns are needed for children and adults.

- 8) **Reintroduction** projects involve a considerable effort that needs to be maintained in the very long term. They must be conducted in accordance with the directives of the IUCN, as has been done in some older projects that have been successful in Europe. More specifically, they should be conducted only once the causes of extinction of the species have disappeared, without harming the wild populations, and having previously obtained the maximum possible consensus between the involved parties.
- 9) With regards to **other issues** that affect vultures in Europe and in the World, we refer to the conclusions of the previous Symposia.
- 10) It is only fair to **praise** the great effort carried out in favour of the vultures and the wildlife by many individuals and entities. The current situation of the scavenger birds and their environment would be much worse without this noble and generous work, discreet but constant, and frequently thanks to real personal sacrifices that have not always been recognised as deserved.

This III Symposium is especially dedicated to some of the great naturalists whose work has been decisive and who died after the previous symposium: **David Gómez Samitier**, founding member of the Fondo Amigos del Buitre, his wife **Lourdes Mairal**, and their daughters **Jara and Iris**; also to the Swiss ornithologist **Daniel Magnenat**.

The III Symposium is also dedicated to the great wardens of WWF/Adena at the Montejo Raptor Refuge (Montejo's Reserve for Birds of Prey), **Hoticiano Hernando** (current

Honorary Warden) and **Jesús Hernando** Iglesias; to all the **wardens** that have managed to convert their vocation in a profession, even with very few means and recognition; and to all the **naturalists** who generously dedicate their lives to defend the wildlife and our valuable natural heritage overcoming much ignorance and many difficulties.

With regards to the scavengers, we wish to support especially the work conducted for decades by associations such as the already mentioned **Fondo Amigos del Buitre** in Aragón.

In addition, all the participants (speakers and students) to the III Symposium on Vultures agree, also by unanimity, to congratulate the **Fondo para el Refugio de las Hoces del Riaza**, for its continued work in favour of these habitats and for all the battles fought to defend them, specifically supporting its opposition to the planned “senda larga” (long trail), opposition backed by the **Ombudsman** (“Defensor del Pueblo”) in his report 16-5-2006 (05-MKB-AJF; file N°: Q0502445; registration n° 06031482). They also wish to thank the support found with regards to this matter in many nature conservation associations and hope that this support may be extended to all associations in the future, to form once again a common front against a serious conservation threat. We can’t forget the beautiful heritage that **Félix Rodríguez de la Fuente** left us. On the other hand, the conservation of a protected area must have priority over its use for tourist activities, something especially important in a case like this one.

We must also acknowledge the extremely valuable and varied work of **other associations and organizations**, in Spain as well as in other countries, to defend the scavenger birds and their environment. Finally, the participants to the III Symposium on Vultures reassert their congratulations to the **UNED** (Spanish Open University) and wish to encourage future Symposia.

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## Importance of the Kittatinny-Shawangunk Ridge and Corridor to Raptors

submitted by Donald S. Heintzelman

An opinion piece by Don Heintzelman was published on August 22, 2007 in *The Morning Call*, Allentown, PA USA under the headline “Raptor flyway deserves broad protections.” In it, he draws attention to the need for conservation of the famous Kittatinny Ridge (Blue Mountain) that forms the northern border of Berks, Lehigh, and Northampton Counties, Pennsylvania, USA which is the location for Bake Oven Knob Hawk Watch and Hawk Mountain raptor migration sites. The slopes of the Kittatinny Ridge are experiencing increasing development pressures. Dan Kunkle, executive director of the Lehigh Gap Nature Center, also commented on this topic in the Summer 2007 issue of *Wildlife Activist*, the newsletter of that organization. Don’s opinion piece with conservation suggestions is available on *The Morning Call* website.

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## Memorials to RRF Members

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**Bill Burnham  
1947 - 2006**



Photo credit: Kurt K. Burnham

Bill Burnham, President and CEO of The Peregrine Fund from 1986 through 2006, has died from brain cancer. Bill grew up in Colorado, spending as much time as possible in the outdoors. His initial interest in raptors developed through falconry when, at the young age of 15, he obtained an eyass Golden Eagle, which he raised and later flew as his first falconry bird. Shortly after this he received his first Peregrine Falcon, a species which subsequently led him from the sandy shores of Padre Island to the barren tundra of Greenland. After completing his M.Sc. in Zoology at Brigham Young University describing his work with Peregrines in Greenland, Bill joined The Peregrine Fund/Cornell University and managed its Western Program. In 1977 Bill was elected to The Peregrine Fund Board of Directors, and in 1982 he was named a Founding Member. During the spring and summer of 1984, Bill spearheaded the creation of The Peregrine Fund's World Center for Birds of Prey in Boise, Idaho. At the same time he received his Ph.D. in Wildlife Biology from Colorado State University. In 1986 Bill was named President of The Peregrine Fund, a position he held until his cancer precluded his active participation. Under Bill's direction and guidance, The Peregrine Fund's scope and breadth flourished, and its staff, to date, has worked on more than 95 species of raptors in 55 different countries. During his tenure over 2,000 Peregrine Falcons, 1,250 Aplomado Falcons, 93 California Condors, and 47 Harpy Eagles were produced in captivity and released into the wild. Highlights included the de-listing of the Peregrine Falcon from the Endangered Species List in 1999 and the first wild-produced California Condor fledging in the Grand Canyon in November 2003. Despite his ever expanding administrative duties, Bill always remained active in fieldwork. When not working, he maintained his lifelong passion for nature and the outdoors. Bill's experience with birds of prey extended over 44 years, and led him around the world, from the mountains, plains, and forests of North America (since 1963) to arctic Greenland (since 1972), and then on to the tropical forests of Latin America, Asia and Africa, and to the Pacific Islands (since 1980). He authored more than 90 scientific papers and articles, and one book, *A Fascination with Falcons*. Together, these various publications reflect his diverse interests in raptors, general science, and conservation, from captive breeding and egg physiology to raptor ecology and species restoration. In addition, Bill edited The Peregrine Fund's publications and web site, and co-edited the book *Return of the Peregrine*

which chronicled the restoration of the Peregrine Falcon in North America and its de-listing from the Endangered Species List in 1999. He was appointed by Secretary of the Interior Lujan to the National Public Lands Advisory Council, served as a trustee on the Boise State University Foundation, as a conflict mediator and then member of the Bureau of Land Management's Oversight Committee for the Snake River Birds of Prey Area, on the council for the multi-agency and university Raptor Research and Technical Assistance Center, on the Board of the North American Raptor Breeders' Association, on the Advisory Board of the Walt Disney Company's Animal Kingdom, as an advisor to the Philippine Government on science and conservation for the Philippine Eagle, and as a Board member of the Philippine Eagle Foundation, Inc. He was a "fellow" member of The Arctic Institute of North America and of The Explorers Club. He received the Explorers Club's Champion of Conservation Award in 2004 and was awarded the Zoological Society of San Diego's prestigious Conservation Medal in 2006. As time allowed, Bill was a practicing falconer, still flying a Peregrine Falcon. Each fall Bill looked forward to chukar hunting with his son in Idaho and spending several weeks flying his falcons, big game hunting, running dogs, and bird hunting with his friends in Sheridan, Wyoming. Bill held a special love for the Arctic and worked in Greenland from 1972 through this past summer. He was especially proud to have spent the last 16 summers working on Peregrine Falcons and Gyrfalcons in Greenland with his son, Kurt.

**Brian Walton**  
**1951 - 2007**



Photo credit: SCPBRG file.

The Santa Cruz Predatory Bird Research Group regrets to announce the passing of our colleague and friend, Brian Walton. Brian died unexpectedly on 15 June 2007 at his home as a result of hemorrhagic stroke, and will be sorely missed. Brian was active in California birds of prey management beginning in 1971, when he studied prairie falcons as a field biologist for the California Department of Fish and Game. Brian Walton became coordinator of the Santa Cruz Predatory Bird Research Group in 1977. He worked closely with biologists, managers, and directors of state and federal conservation agencies to craft strategies for the recovery of threatened and endangered raptors. It is fitting that Brian lived to see the day when peregrine falcons and other previously imperiled raptors in California had become relatively common sights.

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## ANNOUNCEMENTS and BRIEF NEWS ITEMS

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### Observations

First record of Himalayan vulture in Korea - A Himalayan vulture *Gyps himalayensis* was observed for the first time in South Korea. Three amateur bird watchers observed one juvenile Himalayan vulture while watching cinereous vultures *Aegypius monachus* at a Korean pine forest in Sancheong Gyeongnamdo province, southern part of Korean peninsula on the morning of 11 February 2007. These vultures usually occur in and around the Himalayan Mountains. This juvenile rested with cinereous vultures on a mountainside and was often chased by black-billed magpies *Pica pica* and crows *Corvus corone*. A juvenile vulture was observed once again in Pocheon Gyeonggi province, central part of Korean peninsula, on 17 March with cinereous vultures. These Himalayan vultures (or a Himalayan vulture) might be lost and are following migrant cinereous vultures. You may find news and photos in Korean at the following links. - submitted by Sung Jin PARK, a graduate student of Seoul National University, South Korea.

<http://www.kukinews.com/news/article/view.asp?page=1&gCode=soc&arcid=0920455514&cp=nv> (Sancheong Gyeongnam)

[http://news.naver.com/news/read.php?mode=LSD&office\\_id=001&article\\_id=0001576778&section\\_id=103&menu\\_id=103](http://news.naver.com/news/read.php?mode=LSD&office_id=001&article_id=0001576778&section_id=103&menu_id=103) (Pocheon Gyeonggi)

### Announcements

GREAT HORNED OWL SOUND RECORDINGS from across the entire range of the species are needed for a vocal study to determine regional variation in territorial hooting and document the complete vocal repertoire. Especially needed are recordings of territorial hooting from Central America, South America, Mexico, Montana, Idaho, Wyoming, and New Mexico. Recordings of less common vocalizations of the species from anywhere in their range would also be particularly helpful. Even low quality recordings can be of use. Contact Karla Kinstler at 19268 Perkins Valley Dr, Houston, MN USA, 507-896-3436, or [kenkarla@acegroup.cc](mailto:kenkarla@acegroup.cc) if you have recordings you would be willing to contribute to this study.

### WORLD OWL HALL OF FAME SEEKS NOMINATIONS

The World Owl Hall of Fame is seeking nominations of both owls and humans who have made tremendous strides toward making this world a better place for owls. Nominees may be living or deceased and may reside anywhere in the world. Self-nominations are accepted. Nominations must be received **by 11 Jan 2008**. Winners will be announced at the International Festival of Owls in Houston, Minnesota, USA on Friday, 29 Feb 2008. For more information, contact the Houston Nature Center (PH: 507-896-4668, EM: [nature@acegroup.cc](mailto:nature@acegroup.cc)), or go to the "Activities" section of the International Festival of Owls website (URL: <http://www.festivalofowls.com>) and click on "World Owl Hall of Fame".

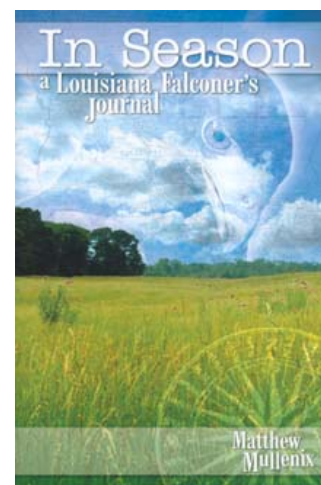
## For Sale

**RRF Publications, Pins, and Decals** – Back issues of *The Journal of Raptor Research* (TJRR) Vol. 1-30, all Raptor Research Reports, and RRF pins and decals may be purchased directly from RRF (Jim Fitzpatrick, Carpenter St., Croix Valley Nature Center, 12805 St. Croix Trail S, Hastings, MN 55033, USA; email: [jim@carpenternaturecenter.org](mailto:jim@carpenternaturecenter.org)). Some older issues are not available. See <http://biology.boisestate.edu/raptor/JRR.htm> for details and prices. Orders for 4 or more issues receive a 30% discount. Vol. 31+ of TJRR may be purchased from Ornithological Societies of North America (5400 Bosque Blvd, Suite 680, Waco, TX 76710, USA; phone: 1-254-399-9636; email: [business@osnabirds.org](mailto:business@osnabirds.org); web: <http://www.osnabirds.org>).

## Raptor Books and Publications

*IN SEASON: A Louisiana Falconer's Journal* by Matthew Mullenix. Western Sporting Publications. Softbound, 6 x 9 in. 208 pages.

Matthew Mullenix of Louisiana State University offers every ornithologist and naturalist a treat with this publication. From the standpoint of a raptor enthusiast and falconer, he addresses the issue of human expansion into wilderness areas, offering a unique and straightforward approach without editorializing. The reader sees the world through the eyes of a Harris' Hawk in the landscape of the southern Louisiana bayou. A passion for the outdoors along with contemplation of the role of humans in our ever-changing environment provided the inspiration for this work. Available by calling 1-888-FLY-HAWK or emailing [sales@westernsporting.com](mailto:sales@westernsporting.com) or visiting [www.westernsporting.com](http://www.westernsporting.com).



**SPATIAL ANALYSIS IN RAPTOR ECOLOGY AND CONSERVATION. 2004.** Ricardo Rodríguez-Estrella & Luis A. Bojórquez Tapia (Eds.) (CIBNOR-CONABIO). ISBN: 968-5712-14-9

This book contains a series of GIS modeling state-of-the-art applications in raptor ecology and conservation. Ricardo Rodríguez-Estrella and Luis A. Bojórquez-Tapia compiled selected papers from presentations at the Raptor Research Foundation meeting held in La Paz, Baja California Sur, Mexico in 1999, as well as articles from recognized authors in raptor ecology. The book provides a valuable synthesis of the most relevant methodological issues in spatial modeling, and is thus useful for upper-level and graduate students, wildlife biologists, managers, and practitioners in the fields of biodiversity, conservation, and environmental planning. **100 COPIES AVAILABLE FOR COST OF SHIPPING; ADDITIONAL COPIES AT SPECIAL PRICE OF \$25 + shipping** to libraries, research stations, researchers or students interested in spatial analysis, conservation and raptor ecology. Students must include signature of your advisor or other proof of student status. For more information, contact Ricardo Rodríguez Estrella [estrella04@cibnor.mx](mailto:estrella04@cibnor.mx), Laura B. Rivera Rodríguez [lrivera04@cibnor.mx](mailto:lrivera04@cibnor.mx)

**CURRENT RAPTOR STUDIES IN MÉXICO 2006. Rodríguez-Estrella, R, Ed.**  
(CIBNOR-CONABIO). ISBN: 970-9000-37-3

This book provides a synopsis of existing information on raptors in México. Studies on the ecology, biology, taxonomy and systematics of raptors (Falconiformes and Strigiformes) are presented throughout the different chapters of the book. This work also presents an analysis of habitats and type of ecosystems where raptor studies are currently performed. Special attention was paid to display the strengths and weaknesses in knowledge of endemic, protected under Mexican law, rare, and sensitive species, and remarking specific challenges. The lack of studies in the most relevant ecosystems for raptors in México is also made evident and discussed. This compiling current work is the first one on Mexican raptors, which attempts to promote, stimulate and encourage more studies on this remarkable group of top predator birds as indicators of habitat quality and functional biological systems. **300 COPIES AVAILABLE for cost of shipping** to libraries, research stations, researchers, or students interested in current raptor studies. Students must include signature of your advisor or other proof of student status. For more information, contact Ricardo Rodríguez Estrella [estrella04@cibnor.mx](mailto:estrella04@cibnor.mx), Laura B. Rivera Rodríguez [lriviera04@cibnor.mx](mailto:lriviera04@cibnor.mx)

**Proceedings of the 4th conference on birds of prey & owls in Austria**

GAMAUF A. & H.-M. BERG (Eds.) - Greifvögel & Eulen in Österreich. Verlag Naturhistor. Museum Wien 2006. 200 pp., 31 color pictures, 89 graphs, tables etc. 14 articles, 12 in German with abstracts in English and 2 in English.

ISBN: 3-902 421-15-0. Price: Euro 28,60 (excl. postage).

Order: Museum of Natural History Vienna (Verlag), Burgring 7, A-1010 Vienna, Austria.

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Homepage: <http://www.nhm-wien.ac.at/d/verlag/monographien.html>

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PETER, H.: *Population dynamic and invasions of the Short-eared Owl (Asio flammeus) in Burgenland, Austria, between 1959 and 2001.*

ENGLEDER, TH.: *Re-introduction of the Ural Owl (Strix uralensis) in Bohemian Forest, Upper Austria (2001/2002): status, monitoring, telemetry – a case study.*

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## RECENT THESES ON RAPTORS

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The U.S. Geological Survey's Richard R. Olendorff Memorial Library greatly appreciates receiving a copy of each thesis abstracted in *Wingspan*. This allows the Library to make theses available to scientists and managers worldwide through its Raptor Information System (RIS, see *Wingspan* 7(1):16). Please send theses to: Olendorff Memorial Library, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Snake River Field Station, 970 Lusk Street, Boise, ID 83706, USA.

**Henneman, C. 2006. Habitat associations of red-shouldered hawks in central Minnesota landscapes. M.S. Thesis, University of Minnesota, St. Paul, Minnesota, USA. 56pp.**

The red-shouldered hawk (*Buteo lineatus*) is a species of special conservation concern in much of the Great Lakes region, although little information exists about its habitat associations at the landscape scale. I conducted repeated call-broadcast surveys and nest searches in central Minnesota in 2004 and 2005 to assess habitat characteristics associated with red-shouldered hawk nest sites and occupancy. For call broadcast surveys, I estimated the probability of detection and occupancy, and assessed habitat associations at 2 spatial scales (100 and 314-ha circular plots), which were based on reported minimum and maximum red-shouldered hawk home-range size. To evaluate red-shouldered hawk habitat associations at nests, I used standard logistic regression methods to compare nests sites to random sites at 3 spatial scales (25-ha, 100-ha, and 314-ha circular plots). I estimated habitat amount, average patch size, patch density, edge density, and habitat diversity at all 3 spatial scales. I chose 4 study areas that represent a gradient of habitat conditions, from large, contiguous tracts of mature forest to small, isolated stands that have been fragmented and reduced in size, mostly due to timber harvest. In 2004, I conducted call broadcast surveys at 128 locations in 2 study areas, and in 2005, I surveyed 247 locations in 4 study areas. Estimates of probability of detection ranged from 0.1747 to 0.7500 and occupancy ranged from 0.5948 to 1.00 across years and study areas. I found a total of 68 red-shouldered hawk nests at 3 study areas in 2004 and 2005. For both nest sites and call-broadcast survey locations, I developed models relating habitat characteristics at multiple spatial scales to red-shouldered hawk nest site use and occupancy, and assessed support for these models using an Information-Theoretic framework. Overall, the amount of non-forest (grass, clear-cut area, forest <5 years old) and the amount of mature deciduous forest (>40 years old) had the strongest association with red-shouldered hawk occupancy and nest sites, but their importance varied across years, study areas, and survey techniques. The amount of non-forest was negatively correlated and amount of mature deciduous forest was positively correlated with red-shouldered hawk occupancy and nest-sites. Red-shouldered hawk nests in central Minnesota were associated with the amount of mature deciduous forest in combination with low levels of non-forest. With call broadcast surveys, red-shouldered hawk occupancy was either associated with amount of mature deciduous forest or limited amount of non-forest, rather than the combination of both, as observed for nest sites. Other metrics describing patterns of mature deciduous forest, such as the number of patches, mean patch size, and landscape diversity were retained in some best-supported models and may be important in red-shouldered hawk-habitat associations. Based on circular plots surrounding nests, the lower limit of mature forest (including mature deciduous and mature coniferous) at red-

shouldered hawk nests was approximately 30% and did not vary across spatial scale. Most nests and call broadcast sites with red-shouldered hawk responses were associated with  $\geq 40\%$  and averaged approximately 50% mature deciduous forest. My findings suggest that red-shouldered hawks are associated with a high proportion of mature forest and a small proportion of open, non-forested areas across a range of spatial scales.

**Wiley, F.E. 2007. Extraction method development and in vivo and in vitro toxicity studies of the etiologic agent of avian vacuolar myelinopathy. PhD dissertation, Clemson University, Clemson, SC, USA. 172 pp.**

Avian vacuolar myelinopathy (AVM) is a neurological disease affecting birds in the southeastern United States. The cause of the disease has not yet been determined but is believed to be a naturally produced toxin and is associated with aquatic vegetation. Current research on AVM is limited to *in vivo* studies utilizing whole tissue or vegetative samples. The objectives of this research were to develop extraction methods for isolating the putative AVM toxin from vegetative samples and to develop an *in vitro* bioassay for detection and study of the toxin. Samples of vegetation were collected from reservoirs known to be affected by AVM and confirmed to contain the toxin by mallard bioassay. The collected vegetation was then extracted with a series of solvents and the crude extracts were re-introduced to a mallard model to confirm the presence or absence of the AVM agent. All birds administered a methanol extract developed characteristic AVM lesions, indicating that methanol is a suitable solvent for AVM toxin extraction. Additional crude extracts were produced from vegetation collected at AVM-affected reservoirs as well as reservoirs with no known history of AVM and evaluated for their *in vitro* toxicity using established cell lines. Extracts produced from vegetation collected at AVM sites induced a significant cell cycle arrest in C6 glioma cells, while AVM-negative extracts induced only mild effects on this endpoint. To further evaluate this *in vitro* assay for its ability to detect the AVM toxin, as well as continue the development of toxin extraction methods, fractions were produced from a crude methanol extract and evaluated for toxicity by the cell cycle assay as well as an *in vivo* chicken bioassay. The fractionation methods were successful in isolating the *in vitro* toxicity, but the presence of the AVM toxin could not be confirmed in these fractions due to inconclusive *in vivo* results. Further testing will be necessary to determine if the observed cell cycle arrest is due to the etiologic agent of AVM as well as to advance the process of AVM toxin isolation and characterization, but this research has providing promising tools for future AVM investigations.

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