Wildlife Services

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National Wildlife Research Center

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Avian and Invasive Species Population Management

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Major Cooperators

- Florida Power and Light Company
- Innolytics, LLC
- National Park Service
- U.S. Navy
- U.S. Geological Survey
- U.S. Fish and Wildlife Service

Groups Affected By These Problems

- Airports
- Airlines
- Air travelers
- Homeowners
- Business owners
- City managers
- Military installations
- Electric utility companies
- Broadcast and communication tower owners and operators

National Wildlife Research Center Scientists Address Problems Associated with Invasive Species and Overabundant Bird Populations

Wildlife Services' (WS) National Wildlife Research Center (NWRC) is the only Federal research organization devoted exclusively to resolving conflicts between people and wildlife through the development of effective, selective, and socially responsible methods, tools, and techniques.

Scientists at NWRC's field station in Gainesville, FL, conduct research to resolve problems caused by invasive species, such as Burmese pythons and monk parakeets, and overabundant native bird species, such as vultures and crows. This research facility is a uniquely designed 26-acre site with large outdoor test pens and aviaries which allow research to be conducted under natural environmental conditions.

As land-use patterns change and urban populations surge into previously uninhabited areas, wildlife conflicts, inevitably, increase. Of growing concern are problems associated with some abundant native bird species that have shown the capacity to readily adapt to residential settings. Additionally, populations of invasive or non-native species, such as feral pigeons, monk parakeets, Burmese pythons and Nile monitors, continue to grow with increasing detrimental impacts to native ecosystems and human health and safety.

Applying Science & Expertise to Wildlife Challenges

Reduction of an Invasive Sacred Ibis Population in South Florida— The "sacred ibis" is a non-native bird from Africa that is seen as a threat to many species native to Florida. This bird is also present in Europe, where it has demonstrated an ability to adapt to human altered environments and spread into natural areas, competing with and preying upon native species. In south Florida, a burgeoning sacred ibis population has developed in recent years. Because of its documented negative impacts in other countries, the sacred ibis population in Florida was identified by agency partners of the Everglades Cooperative Invasive Species Management Area (ECISMA) for rapid response and removal. In 2009, NWRC biologists worked with WS staff in Florida, along with other Federal and State officials, to locate and recover free-flying ibis. Part of this operation involved outfitting ibis with satellite transmitters to help determine the birds' roosting and feeding locations. Recovery efforts resulted in the removal of 73 birds from south Florida, and there have been no subsequent ibis sightings in the area. Monitoring efforts continue to verify that all birds have been found and removed.

Monitoring Vulture Movements With Satellite Telemetry and Avian Radar— Many wildlife management efforts require researchers to monitor the location and movements of animals in situations where it is difficult to detect and monitor individuals visually. Radar and satellite Global Positioning System-Platform Transmitter Terminal (GPS-PTT) transmitters may be useful in these situations, as they provide complementary information on the movements and behaviors of individual animals. The newest GPS-PTT technology can report altitude, speed, and heading in addition to position (latitude and longitude). By updating the data at hourly intervals, a researcher can sample an animal's behavior and location. Digital avian radars, on the other hand, can detect and track birds on a more continuous basis (e.g., every 2.5 seconds, depending on the antenna rotation speed). However, the technology has limitations; radar cannot be used to identify birds by species, let alone distinguish individual birds from one another. Scientists must use other approaches to obtain this information.

NWRC researchers integrated data from both radar and GPS-PTT to continuously monitor the behavior and movements of tagged vultures. Radar detected 40 percent of the locations of vultures carrying GPS-PTT tags that were within 3 miles/5 kilometers of the radar. Approximately 75 percent of the undetected locations were calculated to be above

or below the radar's antenna beam. Speed and direction values recorded by the GPS-PTT tags and the radar were poorly correlated because the vultures were soaring and circling, which produced rapid changes in their azimuth (angular measurement/direction) and ground speed. Nevertheless, findings show that combining these two techniques allows for the monitoring of species when it is otherwise difficult to follow identified individual birds.

Assessing Allowable Take of Migratory Birds— Black vulture populations are expanding throughout the eastern United States, causing an increase in associated problems involving livestock predation, property damage, and aviation strike hazards. Wildlife managers need more reliable methods to determine how many birds can be removed for damage management purposes without endangering the future sustainability of the population. To help address this issue, NWRC scientists and biologists from U.S. Geological Survey and U.S. Fish and Wildlife Service collaborated to develop a method for determining allowable take. Their analysis indicates that greater numbers of birds could be culled than what is currently permitted without adversely affecting population levels. Called "Prescribed Take Level," the method developed in this study includes an estimate of the minimum size of the animal population, its maximum growth rate, and a variable determined by wildlife managers, based on the specific management objective and acceptable risk. Precisely estimating local vulture populations is difficult, due to uncertainties about the birds' lifespan and breeding habits. The researchers relied on annual bird-count data from the Breeding Bird Survey and studies of radio-tagged vultures. This method has great potential value for wildlife management efforts, as it can be adapted for use with other species and situations, such as the incidental take of depleted species, sport harvest, or nuisance control.

Burmese Python and Nile Monitor Lizard Bait Preferences— The pet industry legally sells Burmese pythons and Nile monitor lizards in the continental United States; however, these reptiles have become established invasive species in Florida. Most likely, they were introduced into the environment by escaping from captivity or through intentional release by their owners or by pet traders to establish populations that could be culled and sold. Invasive populations of Burmese pythons and Nile monitor lizards need to be controlled and eradicated because both species can survive in ecologically sensitive habitats where they pose serious threats to native wildlife. While there are no established, systematic, operational control techniques for these reptiles, Florida State and Federal agencies have initiated inquiries and meetings for developing control strategies. Acetaminophen, currently used in an integrated program for controlling brown tree snakes on Guam, could have a role in controlling pythons and lizards. In 2009, NWRC investigators found that acetaminophen-treated dead neonatal mouse baits are lethal to both small pythons and lizards. In anticipation of the development of acetaminophen as an oral toxicant for these two species, NWRC researchers also conducted bait evaluations to determine bait preference for pythons and lizards. Only two of the nine baits tested—a dead neonatal mouse and quail chick—were accepted by both pythons and lizards.

Effects of Cold Weather on Burmese Pythons— The Burmese python has invaded and become established in Everglades National Park and neighboring areas in south Florida. Beyond its substantial ecological impacts to native fauna in south Florida, there have been concerns about its potential to occupy other parts of the United States, even areas as far north as Washington, D.C. During a period of cold weather, seven of nine captive Burmese pythons held in outdoor pens at the NWRC field station in Gainesville, FL, died or would have died in the absence of intervention. This cold-induced mortality occurred despite the presence of refugia with heat sources. These serendipitous findings cast doubt on the ability of free-ranging Burmese pythons to establish and persist beyond the subtropical environment of south Florida.

Selected Publications:

AVERY, M. L., R. M. ENGEMAN, K. L. KEACHER, J. S. HUMPHREY, W. E. BRUCE, T. C. MATHIES, AND R. E. MAULDIN. 2010. Cold weather and the potential range of invasive Burmese pythons. Biological Invasions 12:3649-3652.

BEASON, R. C., J. S. HUMPHREY, N. E. MYERS, AND M. L. AVERY. 2010 Synchronous monitoring of vulture movements with satellite telemetry and avian radar. Journal of Zoology 282:157-162.

COOEY, C. K., J. A. FALLON, M. L. AVERY, J. T. ANDERSON, E. A. FALKENSTEIN, AND H. KLANDORF. 2010. Refinement of biomarker pentosidine methodology for use on aging birds. Human-Wildlife Interactions 4:304-314.

ENGEMAN, R. M., A. BARD, H. T. SMITH, AND N. P. GRONINGER. 2009. Relating ten years of northern raccoon roadkill data to their attraction to sea turtle nests. Herpetological Conservation and Biology 4:340-344.

ENGEMAN, R. M., B. U. CONSTANTIN, K. S. GRUVER, AND C. ROSSI. 2009. Managing predators to protect endangered species and promote their successful reproduction. Pages 171-187 *in* A. Columbus and L. Kuznetsov, editors. Endangered Species: New Research. Nova Science Publishers, Hauppauge, New York.

ENGEMAN, R., B. U. CONSTANTIN, S. HARDIN, H. SMITH, AND JR. W. E. MESHAKA. 2009. "Species pollution" in Florida: a cross-section of invasive vertebrate issues and management responses. Pages 179-197 *in* C. P. Wilcox and R. B. Turpin, editors. Invasive species: detection, impact, and control. Nova Science Publishers, Hauppauge, New York.

GONCALVES DA SILVA, A., J. R. EBERHARD, T. F. WRIGHT, M. L. AVERY, AND M. A. RUSSELLO. 2010. Genetic evidence for high propagule pressure and long-distance dispersal in monk parakeet (*Myiopsitta monachus*) invasive populations. Molecular Ecology 19:3336-3350.

MOULTON, M. P., W. P. CROPPER JR., M. L. AVERY, AND L. E. MOULTON. 2010. The earliest house sparrow introductions to North America. Biological Invasions 12:2955-2958.

RUNGE, M. C., J. R. SAUER, M. L. AVERY, B. F. BLACKWELL, AND M. D. KONEFF. 2009. Assessing allowable take of migratory birds. Journal of Wildlife Management 73:556-565.

Major Research Accomplishments:

- WS developed crucial information for a black vulture management model that provides a scientific basis for evaluating impacts of lethal control on sustainability of populations.
- WS provided key research findings for the development and registration of acetaminophen to reduce populations of nonnative Burmese pythons and Nile monitor lizards.
- WS observed cold-induced mortality to Burmese pythons casting doubt on the ability of free-ranging Burmese pythons to establish and persist beyond the subtropical environment of south Florida.