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## Development and Assessment of Methods and Strategies to Monitor and Manage Mammalian Invasive Species with Special Emphasis on Rodents

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### National Wildlife Research Center Scientists Assess and Develop Methods to Manage or Eradicate Introduced and Invasive Mammals

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 acceptable methods, tools, and techniques.

The National Invasive Species Council has documented the serious threat to agriculture, property, natural resources, and human health and safety in the U.S. posed by invasive or introduced plants, invertebrates, disease agents, and vertebrates. Pimentel and others (2000) estimated that invasive species result in at least \$138 million per year in losses, damage, and control. About 300 species of invasive vertebrates have been accidentally or purposefully introduced into the U.S., including about 20 species of mammals. These include omnivores (rats,

feral pigs), predators (mongoose, foxes, feral dogs and cats), and herbivores (feral livestock, non-native deer).

WS has a long history of involvement in invasive species management, not only on the mainland U.S., but in Hawaii, the Caribbean, South America, Africa, Indonesia and the Philippines. Research continues to improve methods and strategies to 1) prevent introductions, 2) detect new introductions, 3) eradicate introductions, and 4) support sustained control for well-established invasive species where eradication is not feasible.

### Applying Science and Expertise to Wildlife Challenges

**Developing Methods to Eradicate Gambian giant pouched rats from the Florida Keys**—Introduced Gambian rats have become established on Grassy Key, an island in the Florida Keys. If they reach the mainland, they could cause significant damage to agriculture and natural resources. Studies have been conducted to identify an effective rodenticide for use in eradicating the rats. An eradication strategy has been designed and will be implemented in 2007. Several state, county, and Federal agencies are cooperating in this effort. A grid of bait stations containing a zinc phosphide rodenticide bait will be used. Monitoring will continue to assure that the rats have been successfully eradicated.



**Developing Effective Attractants for Norway Rats**—NWRC scientists are studying potential attractants for use in baiting, capturing and monitoring Norway rats. Effective attractants will help in the eradication of rats on islands to which they have been accidentally introduced. Of the attractants tested, almond, ginger, and lemon extracts have proved the most effective.

**Identifying Effective Commercial Rodenticides for Commensal Rodents**—Many commercial rodenticides are registered for commensal rodents (rats and mice living in close association with humans), but these are not all equally effective across rodent species and settings. NWRC scientists have assessed the efficacy of 12 rodenticide formulations with wild Norway rats and wild house mice; some of these were anticoagulants and some were acute toxicants. Most were effective on Norway rats with a 3-day exposure, but relatively few were effective with house mice even with a 7-day exposure. These results suggest that new methods will need to be explored in order for the successful eradication of house mice from islands to which they have been accidentally introduced.

### Major Research Accomplishments:

- WS organized an invasive species session at the 11th Wildlife Damage Management Conference in Traverse City, Michigan, in March 2005.
- WS identified effective attractants and rodenticides for rats, mice, and nutria.
- WS identified an effective rodenticide bait for use in eradicating the invasive Gambian giant pouched rat in Florida.

### Developing Effective Lures for Nutria

**Control**—NWRC scientists have conducted several studies with captive and free-ranging nutria in Louisiana to identify effective lures. Lures, also known as attractants, are needed to improve capture success and to aid in monitoring nutria populations during control efforts. Fertilized marsh plants have been shown to be especially attractive to nutria during winter months when forage is limited. Additionally, bio-chemicals produced by nutria (fur extractions, anal secretions, and urine) have been effective attractants.

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### Groups Affected By These Problems:

#### Urban citizens

- Farmers
- Livestock producers
- Natural resource managers
- Conservationists
- Military bases

#### Major Cooperators:

- U.S. Fish and Wildlife Service
- U.S. National Park Service
- U.S. Department of Defense
- Florida Wildlife Commission
- Louisiana Department of Wildlife and Fisheries
- Island Conservation, Inc.

### Selected Publications:

Engeman, R., J. Woolard, N. Perry, G. Witmer, S. Hardin, L. Brashears, H. Smith, B. Muiznieks, and B. Constantin. 2006. Rapid assessment for a new invasive species threat: the case of the Gambian giant pouched rat in Florida. *Wildlife Research* 33:439-448.

Witmer, G., B. Burke, S. Jojola, and P. Dunlevy. 2006. The biology of introduced Norway rats on Kiska Island, Alaska, and an evaluation of an eradication approach. *Northwest Science* 80:191-198.

Jojola, S., G. Witmer, and D. Nolte. 2005. Nutria: an invasive rodent pest or valued resource? *Proceedings of the Wildlife Damage Management Conference* 10:120-126.

Lowney, M., P. Schoenfeld, W. Haglan, and G. Witmer. 2005. Overview of impacts of feral and introduced ungulates on the environment in the Eastern United States and Caribbean. *Proceedings of the Wildlife Damage Management Conference* 10:64-81.

Witmer, G. 2005. Wildlife population monitoring: some practical considerations. *Wildlife Research* 32:259-263.

Witmer, G., B. Constantin, and F. Boyd. 2005. Feral and introduced carnivores: issues and challenges. *Proceedings of the Wildlife Damage Management Conference* 10:90-101.

Witmer, G., and J. Eisemann. 2005. An overview of the 2nd national invasive rodent summit. *Proceedings of the Wildlife Damage Management Conference* 10:102-111.