



Natural Resources Conservation and Mission Sustainability through Rat Removal on Wake Island and Applicability to other DoD Islands

Project # 09-438

Background:

Introduced rats, *Rattus* spp., can drastically alter tropical island biotic communities (e.g. Varnham 2010). Two species, *Rattus exulans* and *R. tanezumi*, reside on the 1800 acre Wake Island, an Air Force airfield in the central tropical Pacific Ocean. On Wake Island, these two species of rats predate seabird chicks and eggs, and likely affect a variety of biota including plants, terrestrial arthropods, and intertidal organisms. In addition to ecological impacts, rats on Wake Island spoil food stuffs, consume garden production, and pose a health hazard when entering cooking facilities and living areas. Rats on Wake also impact the mission directly. In 2008, rats twice chewed through an electrical wire controlling the runway's barrier cable required for safe operation of fighter aircraft. In one instance, F-22s on the island were subsequently forced to remain grounded until replacement parts could be flown in and the wire repaired, costing the Air Force upwards of \$1.0M in transportation costs and mission delays. In 2007, The Air Force initiated a program for the complete eradication of rats from Wake Island. The operation was originally scheduled for 2009, but was delayed for a variety of fiscal and logistical reasons and the island's transfer of command from Hickam AFB to Joint-Base Elmendorf-Richardson. The operation is currently scheduled for summer of 2012.

REF: Varnham, K (2010). Invasive rats on tropical islands: Their history, ecology, impacts and eradication. RSPB Research Report No. 41. Royal Society for the Protection of Birds, Sandy, Bedfordshire, UK.



Aerial View of Wake Island (courtesy of Wikipedia)

Objective:

In FY 2009, Hickam Air Force Base received DoD Legacy funding to study the response of Wake's biotic community to removal of introduced rats, and to document operational lessons that could be applied to future rat eradications at other DoD installations in the

tropical Indo-Pacific. Due to the postponement of the Wake Island eradication, the scope of this Legacy project was modified to meet the following objectives: 1) Conduct pre-eradication sampling of intertidal invertebrates, terrestrial arthropods, vegetation community composition, and, in concert with base-funded efforts, seabird and shorebird abundance; 2) Compile a list of DoD islands in the tropical Indo-Pacific for which rat removal may provide a military and conservation benefit.



Rattus exulans on Wake Island (photo courtesy Eric VanderWerf)

Summary of Approach:

For Objective #1, pre-eradication biotic entomological surveys were conducted by Dr. Sheldon Plentovich and Pacific Island Conservation Research Association (PICRA) using pitfall traps and sweep nets at random locations within different habitat types across the island. Pacific Island Conservation Research Association (PICRA), under subcontract with the Air Force to conduct seabird and shorebird monitoring, collected information in support of this Legacy project on vegetation community structure, sea turtle presence, and rat abundances at random locations across the atoll. Dr. Chela Zabin conducted repeatable intertidal surveys using permanent quadrats installed in seven locations around the island's perimeter. For Objective #2, information on DoD islands in the Indo-Pacific was obtained from published articles, government reports, Integrated Natural Resource Management Plans, and personal communications with Natural Resources personnel at Navy Facilities Engineering Commands Far East and Pacific, US Army Japan, Pacific Air Forces, Kadena Air Base, and US Fish and Wildlife Service. Some non-DoD islands were included in the analysis if they had



previously been or reasonably could be proposed as sites for which conservation actions could occur to mitigate for DoD activities on nearby lands. Data were compiled on island geography, human presence, and biotic considerations (i.e., presence of ESA-listed and rare/sensitive species likely to benefit from rat removal, and presence of other introduced mammals and predators). A total of twenty-two islands or island groups were analyzed.



Drupa ricina and *D. morum* found along an intertidal monitoring transect (photo courtesy Chela Zabin) .

Benefit:

Rat eradications have the potential to directly benefit personnel and mission activities through mitigating adverse health-related impacts and rodent-induced infrastructure degradation. Rat eradications may also indirectly enhance the military mission by reducing stressors on listed and sensitive species (e.g., reducing the likelihood that a species proposed for ESA listing, such as the Black-footed Albatross, which resides on Wake, could become listed). Direct potential eradication benefits to natural resources include improved seabird breeding performance and potential recovery of terrestrial land crabs, *Pisonia/Cordia* forest stands, and other terrestrial and intertidal organisms. This work provided an initial set of biological sampling data that, when coupled with a post-eradication set of studies, will provide insight into how

biotic communities on Wake Island respond to rat removal. These results will have broad applicability to other Department of Defense-managed islands in the tropical Indo-Pacific.



Above: Sooty Terns (*Sterna fuscata*), likely beneficiaries of the planned rat eradication, are among the 15 species of seabirds nesting on Wake Island (photo courtesy Tiffany Patrick) **Below:** A Sooty Tern chick with a lethal rat-induced wound. Rats were observed taking large numbers of tern hatchlings and even depredating large chicks (photo courtesy Lisa Sztukowski).

Accomplishments:

The following deliverables have been submitted to the Legacy Office: 1) Ecological Monitoring on Wake Island Prior to Rat Removal; 2) DoD Island Restoration Opportunities in the Tropical Indo-Pacific through Removal of Introduced Rats.

Contact Information:

Aaron Hebshi, PhD, Natural Resources Specialist
 Naval Facilities Engineering Command, Southwest
 937 N. Harbor Dr. San Diego CA 92132
 Phone: (619) 532-1448; Fax: (619) 532-4160
 Email: aaron.hebshi@navy.mil