Assessment of Potential Cuban Hutia Management at U.S. Naval Base, Guantanamo Bay, Cuba

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Abstract: The Cuban hutia (*Capromys pilorides*), known locally as the banana rat, is a large rodent native to Cuba. Endemic to the West Indies, most species of hutia are rare or extinct because of over-harvest, exotic species introductions, and habitat modifications by humans. An exception is the U.S. Naval Base at Guantanamo Bay, Cuba, where the Cuban hutia is very common and is responsible for a variety of damage and conflicts. Conflicts with humans include damage to landscaping, gnawing through cables, damage to vehicles, and the accumulation of large amounts of feces in residential areas. Additionally, hutia are primarily herbivores and botanists have documented substantial damage to native vegetation with little subsequent regeneration of many plant species. Current management focuses on population reduction by shooting and some trapping, followed by euthanasia or relocation to remote areas. Although there is little published information on the Cuban hutia, this paper presents a literature review, population survey data (1999-2000), and biological data from a sample of hutia collected in May 2001. It appears that the hutia, the largest native mammal in Cuba, is quite prolific and well adapted to exploit most habitats and plant foods. Some considerations, including advantages and disadvantages, of potential management techniques (habitat modification, exclusion, trapping, shooting, and toxicants) to reduce damage and conflicts with hutia are presented. Finally, several areas of additional data or research needs are identified.

Key Words: *Capromys pilorides*, Caribbean, damage, Cuban hutia, rodent, wildlife management, Cuba

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INTRODUCTION

The U.S. Navy requested assistance from USDA Wildlife Service's (WS) Virginia State Office (WS-VA) in the management of several non-native invasive vertebrate species (feral cats and dogs, chickens, goats, white-tailed deer, guinea fowl, and pigeons) that posed problems (e.g., vehicle strikes, airport hazards, native vegetation damage, and predation on native wildlife) at the Naval Base at Guantanamo Bay (GTMO), Cuba. Several trips to GTMO were made by WS personnel to reduce those populations. Additionally, high densities of a large native rodent (the Cuban hutia, *Capromys pilorides*) caused a variety of damage and conflicts. A research scientist from the WS National Wildlife Research Center (NWRC) accompanied a WS-VA wildlife specialist on a trip to GTMO in May 2001. This trip was preceded by visits by university scientists and personnel of The Nature Conservancy who, along with U.S. Navy biologists, documented vegetation damage by hutia and provided some information on the status of hutia populations. The objectives of the May trip by WS personnel were to further assess the hutia situation at GTMO and to recommend possible management strategies. WS-VA personnel had made several trips to GTMO for hutia control operations before the May trip.

Before the May trip, a literature review was conducted on hutia as well as Cuban vegetation, habitats, wildlife, and wildlife issues. During the trip, discussions were held with Base personnel regarding wildlife damage and management at GTMO. The entire Base property (30,000 acres, of which about 20,000 is terrestrial) was toured, using the existing road system, to familiarize consulting personnel with the habitats. Cuban hutia were collected during the course of wildlife population control operations (trapping and shooting) and later necropsied to obtain biological and demographic information on the species. This paper provides the results of a literature review and population survey, biological data on hutia, and a discussion of potential strategies and techniques for hutia management at GTMO.

LITERATURE REVIEW

Although Cuba has a rich flora and avian fauna, it has few native mammals. Of the 77 native mammalian species, >80% are extinct (Woods 1989, Woods and Eisenberg 1989). Bats comprise the largest mammalian species group on the island: 33 species have been identified (both living and extinct). Rodents comprise the next most common mammalian species group. Historically, there have been as many as 21 species belonging to 2 subfamilies (Capromyinae and Heteropsomyinae), but only 4 species (all *Capromys* spp.) currently remain (Woods 1989). There is also one rare species of insectivore (*Solenodon cubanus*). Human exploitation, habitat modification, and exotic species introductions have caused the demise of most species (Woods and Eisenberg 1989, Wing 1989). It is interesting that so many mammal groups (carnivores, ungulates, rabbits, marsupials, and most rodent genera) that occur in North, Central, and South America are absent from the living or extinct species of Cuba; this is presumably because of the great geographic isolation of the Caribbean Islands (Williams 1989). Most of the native mammalian species of Cuba are rare or endangered; of terrestrial species, only the Cuban hutia is fairly common, especially in the area of Guantanamo Bay (Alvarez and Gonzalez 1991, Anderson and Jones 1984, IUCN 1982, Nowak 1991, Wilson and Reeder 1993).

It has been already noted that a number of non-native mammalian species occur in Cuba. Some of these were introduced purposefully (cattle, sheep, goats, pigs, chickens, white-tailed deer, and mongoose) while others arrived accidentally (commensal rodents such as *Rattus* spp. and *Mus musculus*). We will not address these species in this report unless they have a bearing on hutia ecology or management.

Because of the rarity of the Capromyids, most human effort with them involves locating and protecting populations, including relocation and captive breeding programs (e.g., Alvarez and Gonzalez 1991, Brochstein 1987, Clough 1985). There is relatively little published literature on the hutia, and some of what may be available is in Spanish and located in Cuban journals that are not readily accessible in the U.S. Much of what we know about hutia comes from observations of captive populations held at zoos or at universities; furthermore, the accounts in mammal books are usually very brief (e.g., Anderson and Jones 1984, Nowak 1991, Wilson and Reeder 1993, Parker 1990). Most of the research on hutia has been done by Charles Woods of the University of Florida, Gainesville (e.g., Woods 1982, 1989; Woods and Howland 1979; Woods and McKeen 1989). Unfortunately for resource managers, his research focuses on species evolution, taxonomy, morphology, and biogeography rather than on ecology, management, and species interactions. Lee (1996) provides a good, general text on the natural history of Cuba, but only a very brief account of hutia. He notes that the Cuban hutia is the largest native mammal in Cuba and is known to Cubans as "juntia Conga," although we found them to be commonly called "banana rats" at the Naval Base.

The following brief account of the biology and ecology of the Cuban hutia has been gleaned from the above citations. The Cuban hutia is the largest of the living species of *Capromys*. Adults average about 4-7 kg (8.8-15.4 lb) with total lengths of 55-60 cm (21.7-23.6 in) of which about 15 cm (5.9 in) is the thick, lightly-haired, presumably prehensile tail. It is the largest living native mammal in Cuba. The fur consists of long, coarse guard hairs and moderately dense, softer underfur. Animals are variously colored from a whitish-gray to a buff to a reddish-brown to a rich, dark brown to almost black. The fur is lighter colored on the underside of the animal.

Hutia of various species are, in general, sexually mature at about 10 months. Based on observations of captive animals, it appears that females can breed and bear young throughout the year, but have a birth peak in June. Females undergo a 15-16-day estrus and have a gestation period of about 110-125 days. The young are very precocial and are fully weaned in about 150 days, although they are sampling vegetation within a few days after birth. Females have a pair of lateral thoracic mammae on each side that are well hidden in the fur of their sides. Females typically have one young during their first pregnancy but usually bear 2-3 (range 1-6) young thereafter. Hutia may live 8+ years in captivity. Hutia, depending on the species, are usually solitary or found in family groups.

The Cuban hutia is primarily nocturnal, spending the days in trees, inside hollowed-out tree trunks, in dense grass, in rocky areas, or underground in natural openings. They forage on a variety of plant parts (bark, stems, leaves, flowers, fruit) of many species and may consume lizards. Presumably, they do not require free water. Cuban hutia use a wide variety of habitats from steep, rocky, ocean cliffs to mud flats to grasslands to forests. The chief predators of hutia are humans, large birds of prey, boas, and introduced dogs and cats. The Cuban crocodile may have been a significant predator of hutia, but that species is now very rare in Cuba. Hutia may feed on the bark that they strip from trees and may feed in gardens, but are not considered an agricultural pest, perhaps because of their rareness throughout most of Cuba.

In addition to the general literature summarized above, there have been some reports generated on hutia and other resources of GTMO that provide more specific information on hutia and their damage. These include a Rapid Ecological Assessment (REA) of the entire Base (ProAmbiente/The Nature Conservancy 1999), an assessment of plant damage (APD) by herbivores at the Base (Areces-Mallea 2000), and a hutia population management (HPM) report (Higginson and Howe 2001). An additional report (USFWS 1978) provides background information on fish and wildlife resources and their potential management at GTMO but makes no mention of hutia.

The REA is a lengthy document that reviews the status of all terrestrial and marine resources of GTMO. Although moderately disturbed in the past by human activities, GTMO is considered an important global representative of the arid, tropical ecosystems of the Caribbean. In addition to the need for management of human activities, establishment of "protected" areas, fire control, and an aggressive environmental education program, it is noted that the persistence of exotic plant and animal species will continue to degrade certain native plant and animal communities. The need for protection of certain plant species (especially cactus), certain bird species (especially Cuban endemics and species considered threatened or endangered), and the diverse reptile/amphibian fauna (especially the endangered Cuban ground iguana, *Cyclura nubilia*) is noted in the report and specific recommendations are given. The report spends relatively little space and discussion on mammals, perhaps because only 9 species of native mammals were found, 8 of which were bats. The only confirmed, native, terrestrial mammal was the Cuban hutia and it was described as "extremely abundant" at GTMO, presumably due to a lack of hunting, low densities of natural predators, and an "unlimited" food supply. Another small "mouse" species (listed as a Cricetidae) was captured in grasslands, but not positively identified. Since there are no New World (Cricetidae) or old world (Muridae) mice or rats native to Cuba, perhaps these specimens were introduced commensal rodents such as the house mouse.

The REA team used transects to estimate an average hutia density of 6.5/ha across four different habitats. They remark that their density estimates may be low, that the hutia population is widespread and very abundant, and that they attempted the density estimates only because of the concern expressed by residents of the size of the hutia population. Although they noted that all the mammal species occurring at GTMO are considered "secure globally" according to The Nature Conservancy conservation ranking system, they stated a need to protect the native hutia because it is rare outside of GTMO. They also recommended that the population status should be evaluated periodically, especially since hutia population control measures may be necessary in some areas. They recommended that hutia, where overabundant and causing problems, be live-trapped and relocated to sites off GTMO if a cooperative agreement with Cuban officials and scientists can be reached. They prefer this approach over the use of poison or sterilization because of cost, logistical difficulties, and "strong public and political forces." They make some specific recommendations to help assure the success of a relocation program. They also recommend substantial research on the hutia, including habitat use, densities, food habits, and the impacts of abundant populations on native plants and animals.

The APD report documented the severe effects of foraging by hutia, feral goat, and introduced white-tailed deer on many of the native plant species of GTMO, from grasses and forbs to small and medium-sized trees and their seedlings. The author identified 47 species of plants that were browsed by hutia, of which 9 species appeared to be particularly palatable. Another group of 17 plant species were also heavily used, but the browsing could have been attributed to hutia, deer, and/or goats. Twelve of 19 natural plant communities, most of special conservation concern, were identified as being impacted by excessive browsing. It was recommended that the hutia population be reduced to 1/3 or even 1/4 of its current size and that it be maintained at low density for at least 5 years to document plant recovery. The author also recommended periodic monitoring of hutia populations, using transects, and that permanent plots be established in plant communities to monitor plant growth, reproduction, and damage. Rare plants should be propagated for eventual relocation and native plants not palatable to hutia should be propagated and used for Base landscaping.

The HPM report documents increasing concern of damage to property and vegetation caused by the local hutia population. The authors conducted road transect surveys and reported anywhere from 4-111 (average = 47) hutia sightings per transect mile with more sightings, generally, in the more remote (less disturbed) areas and fewer sightings in the developed, urban or residential areas (Table 1). Fewer hutia were seen in the transect surveys of 1996 than in those of 1999-2000, but the earlier surveys were done somewhat differently. They also used mark-recapture techniques to estimate hutia densities of 3-5/ha and 10-13/ha in residential and remote areas, respectively. Previous efforts to reduce problems with hutia involved relocation to remote areas (primarily to the western, or leeward, side of the Bay). More recently, culling (by trapping and by shooting) has been used in the more developed areas of the Base. There are plans to compare culling records with spotlight surveys to see if numbers are declining in various plant communities and to continue the periodic transect surveys. The report uses this information along with the previous reports and a previous visit by Dr. Woods to recommend an adaptive management approach to hutia at GTMO that would include:

1) continued hutia population reduction,
2) elimination of feral herbivores (deer and goats),
3) a prohibition on the relocation of hutia within GTMO and on the feeding of hutia by humans,
4) use of landscaping plants that are dry-climate adapted and are not palatable,
5) investigation, development, and use of barriers and repellents to reduce hutia damage and conflicts,
6) propagation of rare, native plants in a protected setting,
7) protection and enhancement of populations of native predators of hutia, such as the Cuban boa (*Epicrates angulifer*) and the barn owl (*Tyto alba*),
8) encouragement of the relocation of hutia from GTMO to other parts of Cuba, and
9) education of Base personnel of the importance of restoring ecosystem balance.

The report also proposes 4 types of hutia management zones:

1) hutia-free zones,
2) low density (1-2/ha) zones,
3) moderate density zones, and
4) hutia conservation zones (no population control).

Table 1. Average number of hutia observed per transect mile for various areas of the U.S. Naval Base, Guantanamo Bay, Cuba, 1999-2000.

Transect Area	Ave. No. Hutia/mi	Developed or Remote	Plant Community
West Side of Bay (Leeward):			
1) Port Palma	3.6	Remote	*Coccothrinax* scrub
2) Mop 13	11.3	Remote	*Bucidia* or *Corida* woodlands/mangroves
3) B Ave. Loop	22.4	Developed	Urban/residential
East Side of Bay (Windward):			
4) Toro Cay	5.0	Remote	*Phyllostolon* forest
5) Sherman's Cut	12.8	Remote	Cactus scrub/mixed
6) Granadillo Circle	11.4	Developed	Urban/residential
7) Marine Hill	24.2	Developed	Urban/residential/mangroves
8) Hospital	28.6	Developed	Urban/residential
9) Admin Hill	41.3	Developed	Urban/residential
10) Hazardous Waste	39.8	Remote	Thorn scrub
11) Cable Beach	16.6	Remote	Cactus scrub
12) Cuzco Beach	57.7	Remote	Thorn scrub
13) Mag. #2	109.9	Remote	Thorn or cactus scrub
14) Chapel Hill	43.6	Developed	Urban/residential
15) Ridgeline Trail	13.3	Remote	*Colubrina* scrub
16) Kittery Beach Rd.	46.8	Remote	Cactus scrub/mixed
17) Mag. #1	111.5	Remote	*Phyllostolon* forest
18) Migrant Camp	26.7	Developed	Urban/residential

Table 2. Average weights and measurements (with standard deviation in parentheses) of female and male adult hutia collected at the U.S. Naval Base, Guantanamo Bay, Cuba, May, 2001.

Location/Sex	Weight (kg)	Total Length (cm)	Tail Length (cm)	Hind Foot Length (cm)	Ear Length (cm)	No. of Embryos or Max. Length of Testes (mm)
East Side of Bay (Windward):						
Females:	3.6 (0.5)	73.4 (2.1)	23.5 (1.5)	9.0 (0.5)	3.1 (0.2)	1.5 (0.8)
Males:	4.1 (0.4)	76.4 (1.5)	25.1 (1.7)	9.6 (0.7)	3.2 (0.2)	29.7 (2.9)
West Side of Bay (Leeward):						
Females:	3.8 (0.8)	75.5 (4.8)	23.8 (1.8)	8.9 (0.5)	3.1 (0.2)	1.4 (1.0)
Males:	4.1 (0.8)	77.6 (4.5)	24.5 (1.0)	9.5 (0.5)	3.1 (0.1)	25.6 (3.4)

HUTIA BIOLOGY AND DEMOGRAPHIC ASSESSMENT

During the May trip, through both day and night excursions, hutia were abundant and were observed in all habitats (ocean cliffs, mud flats, grasslands, forest, and residential areas) on both the windward (eastern) and leeward (western) sides of GTMO. The animals were observed "resting" in trees during the day and foraging on the ground at night. Their signs (tracks, droppings, and incisor marks on trees) were visible just about everywhere. They appear to live in extended family groups of 10 or more individuals (adults and young of both sexes).

Culling operations (conducted from a pick-up truck mostly at night with .22-caliber rifles and spotlights) were used to collect specimens for necropsy. Necropsies were performed on 57 hutia. Weights and measurements of adults, along with numbers of embryos or testes lengths, are summarized in Table 2. On average, weights were lower, and standard body measurements greater, than those reported in the literature. The sex ratio of the sample was somewhat skewed towards females: 1.4 females per male. Although adult males were somewhat larger than adult females, the species does not appear to be sexually dimorphic. A wide variety of pelt colors was observed. Based on weights, measurements, and colors, animals from either side of the bay were very similar. All animals appeared healthy and no external or internal parasites were noted. A few animals were missing a portion of their tails. All stomachs were full of a finely ground/digested green plant material, usually dark green, but at times some bright green or yellow material was visible. As an interesting observation, all individuals had lacerated or dissected livers. Twenty-two of 26 adult females (84.6%) were pregnant, averaging 1.7 embryos per pregnant female.

Females were at all stages of pregnancy, suggesting that reproduction may occur throughout the year. Additionally, some females were both lactating and in the early stages of pregnancy, suggesting that they might have the potential to produce 2 litters per year. Additional population data could be gathered at other times of the year to confirm and expand upon this preliminary database and these speculative statements.

MANAGEMENT CONSIDERATIONS AND FUTURE DATA NEEDS

Rodents cause considerable damage and problems for humans worldwide and substantial resources are expended every year to reduce those problems (Witmer et al. 1995). After careful assessment of the species involved, the setting, and the peculiarities of the situation, a variety of methods can be evaluated for potential use in an integrated pest management strategy (e.g., Engeman and Witmer 2000, Witmer et al. 2000). On islands where non-native rodents have been introduced, eradication may be the goal of the strategy (e.g., Witmer et al. 1998). Hutia are native to Cuba and rare outside of GTMO, however, and a management strategy must be developed that will reduce damage and conflicts while protecting the long-term viability of the species.

The hutia situation at GTMO is made more complex by the fact that we know relatively little about the biology and ecology of hutia and the species has never been managed in the sense of modern-day wildlife management. Consequently, it is likely that there will be trial-and-error, research and data requirements, and a need for adaptive management. In general, methods will involve hutia population reduction or means to exclude hutia from certain areas or resources. Numerous current and potential management techniques should be evaluated, including 1) habitat modification, 2) exclusion, 3) trapping, 4) shooting, and 5) toxicants. The first two involve non-lethal approaches and the latter two lethal approaches, while trapping can be done in a lethal or non-lethal manner. The techniques mentioned are discussed at some length in the text by Hygnstrom et al. (1994). We will point out some areas where suspected deficiencies in data or knowledge should be addressed.

Habitat Modification

Because hutia do not require free-standing water, can utilize a wide variety of plant foods, and are adapted to many of the diverse, arid habitats of Cuba, it is difficult to imagine being able to manipulate habitats so as to reduce the carrying capacity for hutia. The flip side to this would be to improve habitats elsewhere (away from developed areas) to lure hutia away from areas where they are not wanted. This has been done, for example, to reduce deer damage to croplands. Unfortunately, this approach might just raise the overall carrying capacity for hutia and lead to more hutia dispersing into developed areas (i.e., source-sink dynamics). Finally, it is difficult to modify habitats in such an arid environment.

Improving conditions or carrying capacity for predators would, in theory, increase mortality rates of hutia. Artificial perches, and sometimes nest boxes, have been used in efforts to increase raptor predation on rodents in orchards and at suburban prairie dog colonies (Witmer et al. 2000). While these structures are used by raptors, a significant reduction in rodent populations has rarely, if ever, been documented. Boas and birds of prey are already protected at GTMO and there are abundant perch and nest trees already present. It is difficult to imagine raising the current carrying capacity for raptors or snakes. The current policy of removing feral dogs and cats is a sound one, but it is probably, inadvertently and incidentally, reducing predation pressure on hutia.

Exclusion

Exclusion includes the use of physical devices that encompass a sizable area (i.e., fencing) or those designed for individual structures (i.e., tree guards). In some cases, wildlife can also be excluded from areas through the use of chemical repellents. Chemical repellents usually work by eliciting pain (e.g., capsaicin or "hot sauce"), causing illness (e.g., thiram, lithium chloride), or by evoking a fear response such as when a predator is nearby (e.g., predator odors– urine, feces, gland extracts: sulfur-based compounds such as fermented eggs or blood/bone meal). While repellents usually show limited effectiveness and durability with most mammals, they could be investigated for use with hutia. Several commercial repellents have shown promise with various rodent species and could be tried in some simple trials at GTMO. An effective repellent might, for example, exclude hutia from individual trees, yards, or gardens.

Physical barriers are being used to a limited extent to reduce hutia problems. Hutia are capable climbers, which makes effective barriers more difficult to devise. On the other hand, we do not know how well hutia can dig; a few simple trials with captive hutia could provide that information. Metal flashing has been wrapped around and nailed to trees in an effort to exclude hutia from trees. This can be effective, but care must be taken to avoid injuring or damaging the tree. Other materials, such as wraps of porcupine wire (used to keep birds from perching on ledges), could be tried. Such approaches might be less likely to damage trees.

Hutia access to buildings does not seem to be a problem unless the structures are abandoned. There are numerous guidelines available that explain how to rodent-proof buildings (e.g., Hygnstrom et al. 1994).

Because hutia are good climbers, wire mesh or chain-link fencing is not likely to exclude hutia from an area unless the material is entirely intact and encloses the sides and top of the area. It was noted on the trip that a resident at GTMO had attached two electric wires to his/her chain-link-fenced yard with one "hot" wire high and one low. The yard was luxuriously vegetated, suggesting that the arrangement was, indeed, excluding hutia. Such arrangements could be investigated further under varying designs. A single strand of electric wire placed about 6 inches above the ground surface, or 2 wires at 6 and 12 inches, have successfully excluded some species of large rodents and medium-sized omnivores such as raccoons. This design could be easily tested on hutia at GTMO. A strobe light-siren device, activated randomly throughout the night by a timer, might keep hutia off grassy areas at night, but this method could only be used in remote areas of GTMO. Laser lights are also being investigated as wildlife frightening devices and could be tested. The large, grassy firing range of the Base, which is used intensively by foraging hutia at night, would offer a good location to test these devices.

Trapping

Trapping is often used to control rodent populations. There are 2 basic categories of traps: kill traps and live traps. It appears that only live traps have been used to manage hutia at GTMO. Kill traps (e.g., Conibear traps) placed in trees could be effectively used to remove hutia because of the tendency of hutia groups to rest in trees during the day. These traps are not baited, but they could pose a hazard to non-targets such as birds and boas that activate the trap as they pass through or over the body-gripping trap. Kill traps probably could not be used on the ground without significant hazard to non-target species such as land crabs, boas, birds, and lizards, including the Cuban ground iguana.

Live traps are not as efficient as kill traps for removing animals, but they have some distinct advantages. Non-target animals can often be released unharmed, and target animals can be euthanized, relocated, or used as study subjects. Although captured hutia were relocated to remote areas of GTMO in the past, current policy calls for all live-trapped hutia to be euthanized to avoid "moving the problem elsewhere" – a common problem with relocation. Mortality rates are typically high for many species of relocated animals, but this is not considered a problem at GTMO where an increased mortality of overabundant hutia is considered acceptable. There has been discussion about donating captured hutia to the Cuban people to restore populations of this mammal, which is rare in other parts of its range. Studies should be conducted to determine how to make this efficient and humane: multiple-capture traps should be tried (i.e., large traps with one-way doors) so that entire groups can be captured in a single trapping event. Since the animals in a group are socially adapted to each other, and many are probably genetically related, the probability of successful relocation may be increased. A multiple-capture trap would also be much more efficient. Many "baits" have been used in hutia traps and melons have been found to be highly attractive. Another aspect of live-trapping and relocation of hutia involves a determination of ways to maintain and transport hutia while minimizing injuries and mortalities. This may not be too difficult since hutia have been successfully maintained in captivity in zoos, but trials should be conducted at GTMO prior to mass relocation.

Shooting

Shooting is currently used to reduce the hutia population in many areas of GTMO. This is accomplished by the use of .25-caliber pellet guns and suppressed .22-caliber rifles, mostly at night, from a pickup truck with the use of a spotlight. Hutia are commonly encountered foraging along roads and in grassy areas at night, making this technique relatively efficient for vehicle-accessible areas. Groups of hutia also can often be found resting in groves of trees during the day and are easily shot. The carcasses are usually left where scavengers (in particular, turkey vultures *Cathartes aura*) quickly devour them. While shooting can be used efficiently and effectively in residential areas during daylight hours, it is more difficult to logistically implement because of restrictions, public concerns, safety consideration, and limited "clear shot" opportunities. Other techniques (trapping, barriers, toxicants) should be investigated and integrated into residential area hutia control.

There are many remote areas at GTMO where shooting does not– and probably cannot– effectively reduce hutia populations because of logistical and access limitations. Consequently, it would be informative to learn how effective shooting is in reducing hutia numbers over the long-term, or if, on the other hand, dispersal from surrounding areas quickly replenishes hutia numbers (i.e., source-sink dynamics). This could be investigated at select places (such as the Base firing range where a large number of hutia, perhaps 200, were shot in May 2001) by going back and doing a second round of shooting, or at least spotlight-counting, at those locations.

Toxicants

Rodenticides are commonly used for rodent control around the world (Witmer et al. 1995). It does not appear that they have ever been used at GTMO beyond, perhaps, commensal rodent control applications. Of course, the use of rodenticides always raises concerns of non-target hazards, residues, and other issues. These issues can be effectively addressed and resolved, especially on islands where the native mammalian fauna is very limited (e.g., Witmer et al. 1998). It appears that there is a potential for rodenticides to be used effectively and efficiently for hutia control at GTMO despite an underlying "aversion" to rodenticide use expressed in several GTMO reports. A large number of factors can be controlled or manipulated to greatly reduce the potential hazards of rodenticide use: these include the choice of active ingredient, the formulation, the timing of use, the placement, etc. (e.g., Record and Marsh 1988). For example, baits could be placed in trees to lessen bait consumption and hazards to Cuban ground iguanas, land crabs, etc. Baits could also be used in bait stations in residential and other developed areas where shooting is restricted or of limited effectiveness.

A preliminary step to the use of rodenticides for hutia management would be an efficacy trial with captive hutia using a commercial, anticoagulant rodenticide bait such as diphacinone, which was recently used to safely eradicate rats from Buck Island, U.S. Virgin Islands (see Witmer et al. 1998 for background information) and is being proposed for use on conservation lands in Hawaii. This has become an effective tool for the control of commensal rodents as well as rodents on islands and remote areas where populations of native mammalian species and other sensitive species are small or non-existent, access is very difficult, and other approaches are not practical. No non-target losses were noted in the Buck Island operation, despite intensive ground searches (G. Witmer, unpublished data). Furthermore, only anticoagulant rodenticides have been recommended for use outside of buildings at GTMO (Kincaid 2001). If initial trials with captive hutia reveal a high (≥80%) efficacy, large, wax bait blocks could be wired to trees being used by hutia to test this approach to hutia control.

CONCLUSIONS

It is important to gather additional information on the hutia population of GTMO before a long-term population and damage management strategy is developed and implemented. Additional demographic data could be used to model that population as well as the efficacy and effects of control methods. Because the species is rare throughout most of Cuba, a monitoring program is essential to assure that activities to reduce hutia damage do not result in long-term harm to the overall population at GTMO.

There are advantages and disadvantages to most methods of rodent population and damage management that must be carefully assessed before a strategy is devised and tested (e.g., Engeman and Witmer 2000). Among the things to consider for each potential method are the cost per application, the number of applications required per year, the efficacy, the duration of effectiveness, logistical requirements, environmental and non-target concerns, safety concerns, and public acceptance. Any given method might rank high in some of these categories, while ranking lower in others. Developing a strategy that incorporates several methods often results in a high level of efficacy, is cost efficient, and minimizes the disadvantages associated with reliance on a single method. There appear to be numerous methods that could be developed to help reduce hutia populations and their damage at GTMO.

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