

# Rodents

## A World Survey of Species of Conservation Concern

Edited by  
William Z. Lidicker, Jr.  
IUCN/SSC Rodent Specialist Group



Occasional Papers of the IUCN Species Survival Commission (SSC)  
No. 4



IUCN–The World Conservation Union

## IUCN Species Survival Commission

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**Cover photo:** *Sciurus niger avicennia*, Fox squirrel. (Photo by Ralph Palmer)

# Rodents

## A World Survey of Species of Conservation Concern

Based on the proceedings of a workshop of the  
IUCN/SSC Rodent Specialist Group  
held at the Fourth International Theriological Congress

August 17, 1985  
Edmonton, Alberta  
Canada

Edited by  
William Z. Lidicker, Jr.  
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William Z. Lidicker, Jr.

# Endemic Rodents of the West Indies: The End of a Splendid Isolation

Charles A. Woods

## Introduction

The objective of this paper is to summarize the status of endangered, vulnerable, or rare rodents in the Middle American Region. This region includes Mexico, all of Central America south to the Colombian border, and the West Indies. The West Indies are defined as the Bahamas, the Greater Antilles, and the Lesser Antilles. The islands of Trinidad and Tobago and the Dutch Antilles (Aruba, Curacao, and Bonaire) are not part of the West Indies and are not included in this report on the Middle American Region.

This report covers only the West Indies,<sup>1</sup> however, since the information available is the most complete and the problems faced by the endemic rodents the most acute. The status of the rodents of Mexico and Central America is less well documented, and apparently rodents from these areas have been less severely impacted by events during the last 10,000 years than have the endemic rodents of the island arc stretching from Cuba to Grenada.

## Historical Background

Published accounts on the "original" rodents of the Caribbean Basin region are few in number, and in most cases are incomplete. The most complete early accounts of the natural history of the region are by Gonzalo Fernandez de Oviedo. In his *Historia General y Natural de las Indias, Islas y Tierra-Firme del Mar Oceano*, published in Seville in 1535 (and in various subsequent editions), Oviedo listed the animals of which he was aware based on the accounts of early explorers or on his own personal observations. The information is most reliable for the island of Hispaniola, where Oviedo reported the presence of four rodents: 1) the "Hutia", almost certainly *Plagiodontia aedium*; 2) the "Muhoy", which matches the description of a spiny rat and is most likely *Brotomys voratus*; 3) the "Querny", which he described as a large rodent, and which I believe was *Plagiodontia veloz* and not the large Hispaniolan heptaxodontid Miller went on to describe as *Quemisia gravis*; and 4) the

"Cori", which most closely matches the description of the guinea pig (Miller, 1929), but which I recently have come to believe might well have been *Isolobodon portoricensis*.

The status of the endemic rodents within the past 20,000 years can be reconstructed based on an analysis of the remains of rodents found in Indian kitchen middens, cave deposits, and in the bottom of sinkholes, all of which are abundant in the West Indies. Based on data from these sources, Morgan and Woods (1986) were able to determine that 46 rodent species occurred in the West Indies during the past 30,000 years. Of this group, 35 species, or 77 percent, have become extinct. In this paper I have chosen to recognize all of the extant and extinct rodent species proposed from Cuba, which increases the number of species in the genus *Capromys* from 8 (Morgan and Woods, 1986) to 21. The rodents of the West Indies then total 59 species, 46 of which have become extinct. The extinction rate remains approximately the same, however, with 78% of the rodent species having become extinct.

In Cuba, at least four rodent species are known from archaeological sites. They are the echimyids *Boromys offella* and *B. torrei*, and the capromyids *Geocapromys columbianus* and *G. pleistocenicus*. All four of these taxa are now extinct. The surviving rodents of Cuba are all in the genus *Capromys*. These are:

- C. angelcabrerai*, Cabrera's hutia
- C. prehensilis*,\* Prehensile-tailed hutia
- C. nanus*,\* Dwarf hutia
- C. auritus*, Hutia rat
- C. sanfelipensis*, Land hutia
- C. garridoi*, Garrido's hutia
- C. gundlachi*, Chapman's prehensile-tailed hutia
- C. pilorides*,\* Desmarest's hutia
- C. melanurus*,\* Bushy-tailed hutia
- C. meridionalis*, Isla de la Juventud tree hutia

In Morgan and Woods (1986), only four taxa were considered valid species (the taxa designated above with an asterisk). All other taxa were considered to be subspecies of the four

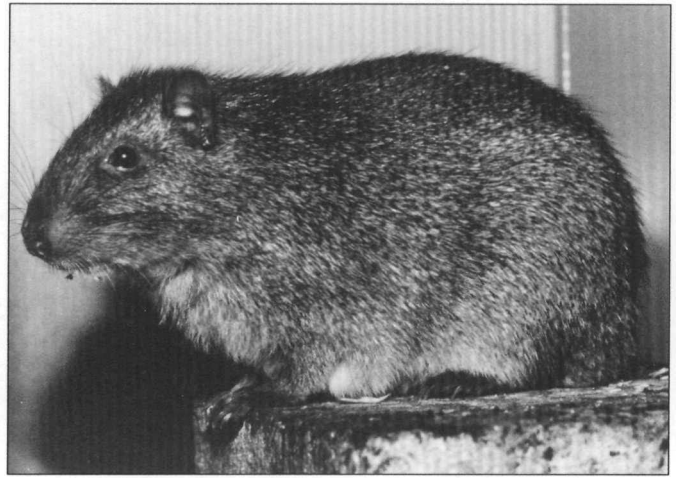
<sup>1</sup>A report on Mexican Rodents of conservation concern is now in press: Caballos, G. and Navarro, D. "Diversity and Conservation of Mexican Mammals." In *Latin American Mammalogy*, M.A. Mares and D. J. Schmidly, eds. University of Oklahoma Press: Norman.

primary taxa. *Capromys gundlachi* and *C. meridionalis* are new taxa at the species level (Varona, 1986), and are restricted to the Isla de la Juventud (formally known as the Isla de Pinos).

Of the 27 rodents known to have occurred on Cuba and its adjacent offshore islands during the past 10,000 years, 17 (63%) have become extinct (an average of one rodent extinction in the Cuban area every 370 years during the last 10,000 years). It is not possible to calculate the rate of rodent extinction after the arrival of Amerindians on Cuba based on the published data available.

Of the four known valid species of endemic Jamaican rodents, three have become extinct. Remains of the Jamaican hutia, *Geocapromys brownii*, are present in archaeological deposits from throughout the island, and the species continues to survive in several regions of the country (Oliver, 1982; Anderson et al., 1983). The small cricetid rodent, *Oryzomys antillarum*, was also present in archaeological deposits. It became extinct within the past 100 years, presumably from competition with *Rattus*. Until recently, the Jamaican heptaxodontids were considered to be represented by three distinct genera, but MacPhee (1984) has combined them into the single genus *Clidomys*. Remains of this taxon have been dated at 33,250 yBP, and are unknown from Holocene or recent deposits. These large rodents are one of the few groups to have become extinct on an island of the West Indies prior to the end of the Pleistocene, and for which the causes of the extinctions were not related to human activities.

Five species of endemic rodents are known to have occurred on Puerto Rico. Two of these have been found in archaeological sites, the large echimyid *Heteropsomys insulans*, and the capromyid *Isolobodon portoricensis*. The latter does not occur in pre-archaeological sites, however, and is presumed to have been transported to Puerto Rico from Hispaniola by Amerindians. The three remaining species are known only from pre-human fossil deposits. One taxon, *Proechimys corozalus*, an echimyid known only from a single dental fragment found in a rock crevice, is assumed to be much older than the remaining taxa, and probably became extinct before 20,000 yBP. Some

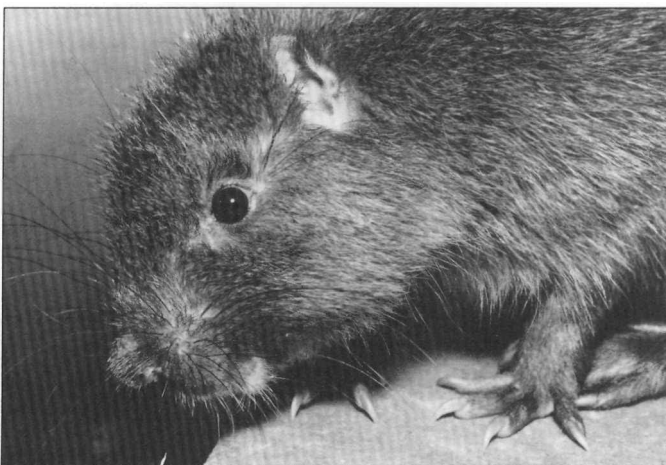


*Geocapromys ingrahami*, Bahamian hutia, in captivity at the Animal Behavior Lab, Florida Museum of Natural History. (Photo by C.A. Woods.)

reports indicate that *Isolobodon portoricensis*, introduced by Indians so many centuries ago, might still survive on Puerto Rico. An in-depth search in the winter of 1985 did not produce any evidence to confirm the continued presence of *Isolobodon* (Woods et al., 1986).

At least 13 rodent species from three families and six genera are known to have been present on Hispaniola. All of these taxa existed into the period when humans occupied the island during the past 4,500 years. Only one taxon continues to survive. This animal, *Plagiodontia aedium*, is called the "hutia" in the Dominican Republic and either the "zagouti" or "rat cayes" in Haiti. After the arrival of Amerindians on Hispaniola, 92% of the endemic rodents became extinct, an average loss of one endemic rodent every 375 years.

Only one native rodent, *Geocapromys ingrahami*, is known to have occurred on the Bahamas. The Bahamian hutia now survives only on tiny East Plana Cay in the southeast Bahamas, and on two islands in the Exuma Cays where it has been reintroduced (see below). The Bahamian hutia has been eliminated from most of its original range by a combination of habitat destruction, overhunting, and predation by dogs and cats. The remains of *Geocapromys ingrahami* are found on many of the islands of the Bahamas, and the species has been divided into three subspecies. The distribution of the subspecies reflects the past history of the archipelago. During times of low sea level, such as at the height of the Wisconsin glaciation 17,000 yBP, sea levels were as much as 120m below their present levels, and the Bahamas were composed of three main island masses. The largest of these was made up of all the region of the Great Bahama Bank. Remains of *G. ingrahami* have been recovered from Andros, New Providence, Eleuthera, Cat, Great Exuma, and Long islands, indicating that the Bahamian hutia was widely distributed on the single island formed by the Great Bahama Bank. The second largest island was formed by the islands of the Little Bahama Bank (Grand Bahama and Great Abaco islands and associated cays). Specimens collected on Great Abaco have been classified as *G.i. abaconis*. Another



*Plagiodontia aedium*, Hispaniolan hutia or "zagouti," in captivity at the Animal Behavior Lab, Florida Museum of Natural History. (Photo by C.A. Woods.)

large island of the Bahamian Archipelago that was prominent 17,000 yBP was formed by the Crooked-Acklins Bank. Specimens from Crooked Island have been named as a subspecies, *G. i. irrectus*. These specimens appear to be most closely related to hutias from the Great Bahamas Bank, and several authors have referred specimens collected on Eleuthera, Long, Great, and Little Exuma islands to this subspecies. The subspecies *G. i. ingrahami* is known only from East Plana Cay, which was never a part of any of the other main islands and is located east of the Crooked-Acklins Bank. Remains of the Bahamian hutia have also been reported from San Salvador Island north of the Crooked-Acklins Bank and east of the Great Bahama Bank.

On the Cayman Islands, both *Capromys* and *Geocapromys* are known to have occurred. Some deposits containing remains of these two hutias radiocarbon date as recently as 375 yBP, and some are associated with the remains of *Rattus* in surficial cave deposits on Grand Cayman and Cayman Brae. Both species became extinct sometime during the last 375 years.

On Little Swan Island, 175 km northeast of Honduras, one capromyid rodent is known to have occurred until the last few decades. *Geocapromys thoracatus*, a distinct species from *G. brownii*, became extinct following the effects of a damaging hurricane, and after cats were introduced on the island sometime after 1955 (Clough, 1976).

In the Lesser Antilles, no native non-volant mammals still occur, although at least seven endemic mammals once were present on these islands (Morgan and Woods, 1986). None of the species was of the Family Capromyidae, the dominant group of rodents in the Greater Antilles. The giant extinct heptaxodontid, *Amblyrhiza inundata*, which was almost the size of an American Black Bear, inhabited the tiny islands of Anguilla and St. Martin in the northernmost Lesser Antilles. Like the two species of *Clidomys* from Jamaica, it appears that *Amblyrhiza* became extinct before the end of the Pleistocene, and therefore its demise was not related to human activities. However, a recently extinct species of *Oryzomys* is known from St. Vincent. *Megalomys desmaresti* occurred on Martinique, and *M. luciae* was found on St. Lucia until early in this century. Museum specimens are known of all three forms. In addition, *M. audreyae* is known from a fossil deposit on Barbuda. A new, undescribed taxa of oryzomyine rodent is known from Barbados. A large undescribed genus and species of oryzomyine is known from Amerindian sites on Antigua, Guadeloupe, and Montserrat, and from prehistoric archaeological sites on Barbuda and Marie Galante. A smaller species of undescribed oryzomyine is known from archaeological sites on Montserrat, St. Kitts, Anguilla, and St. Eustatius. The distributions of all these taxa are discussed in more detail in Morgan and Woods (1986), but it is clear that at least seven species of rodents became extinct in the Lesser Antilles within the period of human occupation of the region.

Summarizing the data from the above discussion, it is clear that the impact of humans on the endemic rodents of the Antilles has been dramatic and negative. In most subregions of the Antilles, there has been a total loss of the endemic rodents, and in the few regions where endemic rodents do manage to coexist

with humans and introduced forms such as rats, cats, dogs, and the mongoose, the percent of the remaining endemic species is very low. Only on the island of Cuba does a significant number of endemic rodents continue to exist, but even there over 50% of them are extinct. Most of the remaining endemic land mammals of Cuba are threatened. For the West Indies as a whole, 67 of the 76 species of endemic land mammals ever known to have occurred have become extinct. This figure of 88% is even higher than the 77% of endemic rodents known to have become extinct in the West Indies, and so as a group rodents have not been as badly hurt by the coming of humans to the region as have other groups, such as insectivores, primates, and ground sloths. In the West Indies, bats as a group have been the least damaged by the occupation of humans, with 14% of the 59 known species having disappeared during the same time period.

## Summary of Regional Programs and Conditions

The West Indies are difficult to characterize as a region because they are so geographically and historically diverse. The geographical size of the individual islands ranges from 114,524 sq km for Cuba to 91 sq km for Anguilla. Population estimates range from a high of almost 10 million for Cuba and 6 million each for the Dominican Republic and Haiti (for a combined figure for Hispaniola of at least 12 million) downward to several hundred thousand for the main islands of the Lesser Antilles. The important figure is the density of population per sq km, however. These figures are some of the highest in the world. For Barbados it is 626, for Puerto Rico 439, for Martinique 296, Jamaica 205, Haiti 186, Dominican Republic 117, Cuba 85, and the Bahamas 16. These figures do not take into account the distribution of people or the amount of arable land. In Haiti, for example, much of the land is mountainous, and in the rain shadow of mountain ranges of the more easterly Dominican Republic. Much of the land is not suitable for agriculture because it is too dry, too steep, or too rocky. The population is very dispersed, and most people live on small peasant farms. I will make an attempt to summarize the major features of each of the island nations of the region, however, and to mention the major problems facing each country.

### Cuba

There are active programs for natural resources and conservation in the country, such as the ones administered by the Instituto de Zoología of the Academia de Ciencias. There is also an established university system and several zoos. Efforts have been made to document the ecological and taxonomic status of the endemic mammals of the country. Articles are published each year on the status of various endemic animals in the journal *Poeyana* of the Instituto de Zoología, and many of these have covered endemic rodents. The Institute has also been active in promoting conservation, and has established the

Jaguani and Cupeyal Reserves in the eastern part of Oriente Province. The human population density is relatively low in some regions, such as Oriente Province, and there are still extensive areas where endemic mammals can survive. Legislation in Cuba protects all hutias, and all hunting is prohibited in many regions of Cuba where hutias are found. Resolution 21-79, passed in 1979, sets aside several important wildlife areas where hunting is restricted throughout the year (Varona, 1980). The regions protected by Resolution 21-79 include all of the Zapata Peninsula and Zapata Swamp, areas of Oriente Province, cays of the Sabana Archipelago, all cays in the Gulf of Ana Maria, and many cays in the Gulf of Batabano.

## **Jamaica**

This country has most of the elements needed to form a strong conservation ethic. There is a well established zoo in the capital city of Kingston (Hope Zoological Gardens) that maintains a colony of the Jamaican hutia which seems to be flourishing. The director of the zoo received training at the Jersey Wildlife Preservation Trust (JWPT) in the UK, and a strong tie exists between the two institutions. The JWPT has maintained a large captive breeding colony of Jamaican hutias, and is currently working with several institutions in Jamaica in an effort to train personnel as part of a program to return many of their hutias to a carefully selected location in western Jamaica (see below). There is also an established natural history museum in Kingston (The Institute of Jamaica) and a strong university program (via the University of the West Indies). The Natural History Society of Jamaica is active. However, conservation of the endemic fauna has not been a high priority in the country. Although there is an official government organization charged with enforcing wildlife laws and promoting conservation issues and national parks, the Natural Resource and Conservation Department (NRCD) has been underfunded and shifted from one administrative unit to another. The NRCD has had minimal impact on the major conservation issues of the country, and in spite of the great potential for a strong conservation effort in Jamaica, the issues have been given a low priority by most governmental programs. The economy of the country has suffered during the recent economic downturn in the region.

## **Haiti**

This country has the fewest institutions committed to conservation and the management of natural resources of any major country in the West Indies. There is no zoo and no natural history museum. The university system does not train individuals in biology, and the only educational programs in natural resources are designed to train agronomists. A natural history society has recently been formed, the Society Audubon d'Haiti pour la Protection de l'Environnement (SAHPE), but interest in the society is low. A new program in national parks has been established, but there has been bickering among the two agencies responsible for coordinating the program, and progress has been slow. The major problems in Haiti are a lack of public awareness of and support for conservation issues, and a lack of commitment by institutions within the country. A single, strong conservation agency is needed to supervise the programs and to

be an advocate for the relationship between preservation of endemic species and the conservation of natural resources, water, and soil that will improve the quality of life for a large segment of the population. The major problems can be summarized as a poor economy, a lack of public awareness, a lack of interest at the governmental level, and a lack of any institutional infrastructure to provide jobs or educate people in the importance of the conservation of natural resources. The new national parks program (Pares Haiti) is the best hope in Haiti of initiating a program in conservation, education, and regulation that will take some steps to improve the chances of survival for the two remaining endemic mammals. No administrative structure has been established yet for Pares Haiti, however, and many regions of the two national parks of Haiti are dominated by secondary growth habitats and have people living within the park boundaries. Pares Haiti, therefore, can only be an effective conservation program if it receives support and attention in the near future from the new government of Haiti, and it is unclear if this will happen. Without this support, the future of the Hispaniolan hutia in Haiti is of concern.

## **Dominican Republic**

Like Jamaica, the Dominican Republic has all the major institutions in place to promote the conservation of the two remaining endemic land mammals of Hispaniola (*Plagiodontia* and *Solenodon*). There is an excellent zoo (ZOODOM), a fine natural history museum, and several strong universities that have programs leading to a degree in biology. There is also a strong national parks program and several substantial national parks with staff and facilities in place. A number of people in the country care about wildlife conservation. Articles regularly appear in several newspapers of the country promoting wildlife conservation and discussing the flora and fauna of Hispaniola. With the addition of a new national park in the region of the Sierra de Baoruco, plus additional emphasis on the national parks program in the Dominican Republic, an increased environmental awareness is now spreading throughout the country. With these efforts the Dominican Republic has perhaps made more progress in wildlife conservation in the last two decades than any other country of the West Indies. There is a need in the country, however, to increase the enforcement of existing wildlife regulations and to increase the protection of habitats within the boundaries of the national parks. There is also a need for the various organizations concerned with natural resources of the Dominican Republic to work more effectively together.

## **Puerto Rico**

There is a very strong conservation ethic in place within governmental programs in the commonwealth, and the necessary institutions are in place. However, there are no endemic rodents left to be protected by these programs.

## **Bahamas**

There are several programs in place to protect the remaining endemic rodent of the subregion, *Geocapromys ingrahami*. The most significant of these is the Bahamas National Trust,



which promotes conservation and environmental education and manages the extensive national park program. The "Trust" is an advisory agency to the Ministry of Agriculture, Fisheries, and Local Government whose Department of Agriculture regulates activities that might impact on *Geocapromys*. There is also a substantial private zoological park in Nassau (Ardastra Gardens). A strong effort is being made to protect the Bahamian hutia and its natural habitat. The problem in the Bahamas is that the islands are spread over a wide geographic region, and regulations are difficult to enforce. Economic conditions in the outer islands are poor, and the major concern of the government is promoting jobs and development. However, on balance, the existing programs for conservation are effective, and in spite of economic problems and the lack of a strong conservation ethic among Bahamians living in remote regions, there is a good chance that current programs can succeed in protecting the existing populations of *Geocapromys ingrahami*.

## Lesser Antilles

There are no remaining endemic rodents in this subregion of the West Indies, and so the major features of the various islands in the subregion will not be discussed.

## List of Species of Concern

This list uses the Red Data Book categories as outlined and defined by IUCN. In each case I have examined the information available at the current time, and upgraded the status from the one reported in 1982. In each case I have indicated what the 1982 Red Data Book status was, and my reasons for changing the designation.

## Cuba

*Capromys nanus*, Dwarf hutia. **Endangered.**

This is the smallest of the hutias. No specimens have been reported since 1937, but the animal probably still survives in the Zapata Swamp. The entire region of the Zapata Swamp is now protected by Resolution No. 21-79. The dwarf hutia was classified as Endangered in the 1982 Red Data Book.

*Capromys angelcabrerai*, Cabrera's hutia. **Endangered.**

This small hutia was discovered in 1974 and is restricted to the mangrove swamps of Cayos de Ana Maria off south-central Cuba, a region protected by Resolution No. 21-79. Cabrera's hutia was classified as Endangered in the 1982 Red Data Book and has recently been proposed as an endangered species by the U.S. Fish and Wildlife Service (USFWS, 1985).

*Capromys auritus*, Large-eared hutia. **Endangered.**

This large hutia was described in 1970 and only occurs in a mangrove swamp on Cayo Fragoso, a small, low island off the north-central coast of Cuba protected by Resolution No. 21-79. The large-eared hutia was classified as Endangered in the 1982 Red Data Book and has recently been proposed as an endangered species by the U.S. Fish and Wildlife Service (USFWS, 1985).

*Capromys sanfelipensis*, Little earth hutia. **Endangered.**

This hutia may be closely related to the one above and is found in the low dense vegetation of Cayo Juan Garcia and nearby Cayo Real off southwestern Cuba. This region is protected by Resolution No. 21-79. The little earth hutia was classified as Endangered in the 1982 Red Data Book and has recently been proposed as an endangered species by the U.S. Fish and Wildlife Service (USFWS, 1985).

*Capromys garridoi*, Garrido's hutia. **Endangered.**

This hutia was described in 1970 from a single specimen. It is believed to occur on small islands in the Banco de los Jardines y Jardinillos of the Archipelago de los Cannaroes south of the Zapata Peninsula and east of the Isle of Pines. This region is protected by Resolution No. 21-79. Garrido's hutia was classified as Endangered in the 1982 Red Data Book.

*Capromys gundlachi*, Chapman's prehensile-tailed hutia. **Insufficiently Known.**

This arboreal hutia is restricted to the Isla de la Juventud (formerly known as the Isla de Pinos). The taxon was originally described as a subspecies of *C. prehensilis* by Chapman in 1901 and proposed as a distinct species by Varona in 1986. The Isla de la Juventud is 3000 sq km in size, which makes it the sixth largest island in the West Indies and larger than all but one of the Bahama Islands. The mammalian fauna of this island is of great importance and should not just be lumped with Cuba. I recommend that this species receive immediate attention to determine the extent of its distribution and its current status on the Isla de la Juventud. This species was not discussed by the Red Data Book in 1982, and *C. prehensilis* previously has not been considered as a species of special concern.

*Capromys melanurus*, Bushy-tailed hutia. **Rare.**

This large, dark-colored hutia is arboreal and inhabits the humid montane forests of eastern Cuba. All hunting is now prohibited in certain parts of its range in Oriente Province by Resolution No. 21-79. It is not known if the species occurs in the areas set aside as reserves. The bushy-tailed hutia was designated as Indeterminate in the 1982 Red Data Book. I have chosen to upgrade its status to Rare, because the range of the species is so limited and its habitat requirements so specific to areas of dense mesic forest.

*Capromys meridionalis*, Isla de la Juventud tree hutia. **Insufficiently Known.**

This arboreal hutia was discovered in 1978 and described as a new species by Luis Varona in 1986. It is restricted to the southwestern region of the Isla de la Juventud. Because of the limited distribution of this species on the island, I recommend that immediate studies be undertaken to determine the status of this new taxon. This species was not discussed in the Red Data Book in 1982.

## Haiti and the Dominican Republic (Hispaniola)

*Plagiodontia aedium*, Cuvier's hutia. **Vulnerable.**

This hutia is now very rare in most parts of its original range. Habitat destruction exposes the animal to predation by dogs and

other introduced predators. During the last decade, many areas of natural habitat have been destroyed in both Haiti and the Dominican Republic. The lowland swamp forest east of Sabana de la Mar in the Dominican Republic was recently cut down and turned into rice fields. It is possible that most or all of the *Plagiodontia aedium hylaeum*, a separate subspecies that inhabited this region, was eliminated. A captive breeding program for this subspecies is now underway. The captive colony is very inbred, however, and the gestation time of the Hispaniolan hutia is long. Only one young is usually born at a time, and a female usually has only one young each year, so the growth of the colony is slow. The long range goal for the captive breeding program is to establish a joint program between the Florida State Museum and Parque Zoologico Nacional (ZOO-DOM) with the objective of establishing a large viable colony and eventually to reintroduce surplus animals into suitable habitats of Hispaniola. Animals from the subspecies of the northeastern Dominican Republic will be maintained as a separate colony, and a special effort will be made to ensure the survival of this population. The Hispaniolan hutia was designated as Indeterminate in the Red Data Book. The status of the species has been upgraded to Vulnerable because recent studies suggest that the animal is rarely encountered in most of its previous range in the Dominican Republic (R. Sullivan, pers. comm.), and that many of the known populations of the species in Haiti have been significantly reduced in numbers since 1980 (Woods, 1986).

## Jamaica

*Geocapromys brownii*, Jamaican hutia. **Rare.**

This hutia is still present in widespread regions of Jamaica but is rare or missing from many areas of suitable habitat, such as the Cockpit Country of central Jamaica. During the course of a three-month island-wide survey of Jamaica in 1982, William Oliver identified 16 separate population sites (Oliver, 1982). All these areas were in places where massive deposits of exposed limestone offer an abundance of hiding places for the animals in natural fissures and solution cavities (Oliver, 1985). The animal may be at risk over the next few decades unless some large areas of suitable habitat (karst regions with extensive forest cover) are set aside away from inhabited regions. However, the Jamaican hutia is so widespread in its distribution on the island that it is one of the most secure species of capromyid rodent surviving in the West Indies. Only *Capromys pitorides* of Cuba appears to be more widespread in distribution in its natural habitat and more resistant to the threats of extinction outlined in this report. There has also been a very successful captive breeding program for the Jamaican hutia at the Jersey Wildlife Preservation Trust. This captive breeding project has been so successful that more than 40 individuals were introduced into an area of western Jamaica in early 1986 by William Oliver and Laurie Wilkins in a joint project between the Jersey Wildlife Preservation Trust and the Florida State Museum. The Jamaican hutia was designated as Indeterminate in the Red Data Book. Its status has been upgraded to Rare because we now know that its present distribution does not include many areas previously occupied by the species nor

many areas of potential habitat (Oliver, 1982; 1985; Anderson et al., 1983).

## Bahamas

*Geocapromys ingrahami*, Bahamian hutia. **Rare.**

This small hutia is abundant on East Plana Cay, a small island of 1150 low-lying acres in the eastern Bahamas. Animals from East Plana Cay have been introduced onto two additional islands in the Exuma Cays Land and Sea Park: Little Wax Cay in 1973 and Warderick Wells Cay in 1981. These introduction efforts are known to be successful on Little Wax Cay, and although the status of the animal on Warderick Wells Cay is unknown, reports of tracks from a variety of locations on the island suggest that this introduction was also successful (Kevin Jordan, pers. comm.). The population of Bahamian hutias on Little Wax Cay has increased to the point that it is the subject of a year long study by Kevin Jordan, a doctoral student at the University of Florida. The status of the species is improving and should get better if efforts to introduce the Bahamian Hutia to other islands and cays are successful. These efforts should proceed cautiously so that the animals are not released onto islands where factors are not suitable for their survival, or where they will negatively impact other endemic plants or animals. From my discussions earlier in this paper, however, it is clear that the Bahamian hutia was once widespread throughout the Bahamas, and that the release of animals on suitable islands and cays is really a reintroduction program rather than an introduction effort. There are no known negative factors influencing the populations of Bahamian hutias on any of the three small islands where they now occur. Because the range of the species is limited to such small low-lying islands, however, the animals are "vulnerable" to a chance introduction of cats or dogs or to the disaster of a tropical storm with a large surge of water, high winds, and heavy rains. The combination of these problems eliminated *Geocapromys thoracatus* from Little Swan Island before anybody was aware that the problems were severe enough to cause the extinction of the species. Based on a series of recommendations by Kevin Jordan, I suggest that the Bahamian hutia be recognized as "Vulnerable". I have classified the Bahamian hutia as Rare because the status of the animal does not fit the technical definition of the term Vulnerable as used in the IUCN Red Data Book. The unique and very vulnerable status of the Bahamian hutia as a result of its very limited distribution should be taken into account by all individuals and organizations concerned with planning future programs that will affect the species. The Bahamian hutia was designated as Rare in the 1982 Red Data Book.

## Regional Priorities

### Cuba

The status of the remaining endemic rodents of the mainland can be improved by strictly enforcing Resolution No. 21-79 and the other existing legislation protecting endemic rodents and by establishing additional reserves in critical habitats. These

actions are especially important in relation to the two new species of concern on the Isla de la Juventud. Areas of mangrove swamp near the Zapata Swamp and the swamp itself should be protected from fire. Access to the offshore cays where hutias occur should be restricted so that fishermen do not kill the animals found there or introduce cats or mongooses. A nationwide education program at the primary school level that would emphasize the uniqueness of the endemic mammals of Cuba could have beneficial effects in time to improve the chances of survival of the remaining endemic rodents. The taxonomic status of some of the forms that may not be distinct enough to be designated as full species, but which are currently recognized in the literature as such, should be investigated (*Capromys sanfelipensis*, *C. angelcabrerai*, *C. auritus*, *C. garrioi*, *C. gundlachi*, and *C. meridionalis*). High priority should be given to completing studies on the ecological status of the two possibly distinct endemic species of *Capromys* on the Isla de la Juventud. The ecological status of the three clearly distinct species of *Capromys* that are of special concern (*C. nanus*, *C. melanurus* and *C. prehensilis*) should be carefully reevaluated via an island wide survey by a team of investigators utilizing the same census techniques.

## Jamaica

An educational program should be undertaken to point out the unique importance of Jamaica's one surviving non-volant endemic mammal. As some of the remaining populations of the hutia, or "Indian coney" as it is frequently called in the countryside, are in close proximity to areas of high use by humans, it is necessary for the general population to want to save the species if it is going to continue to survive in most regions of the island. All coney hunting should be prohibited. A special effort should be made to create some of the national parks that exist only on paper and to strengthen the role of the Natural Resource and Conservation Department. A previous director of this program believed that the animal was a pest and not worth saving, which is a widespread misconception that must be addressed at all levels. Since the remaining populations of the coney are still safe enough from immediate exploitation, a long-term educational program could have beneficial effects on the status of the animal in the coming decades as the human population of Jamaica further increases and remaining pockets of semi-natural habitat are further fragmented.

## Haiti

Educational programs and strict laws will have little effect on the effort to keep *Plagiodontia aedium* from becoming extinct, because only a small percentage of the general population is able to read, and most people who live near the remaining areas of suitable hutia habitat are remote from any areas of authority. If the animal is to be saved in Haiti, suitable habitat must be set aside and protected from deforestation. The highest conservation priority in Haiti should be to finish the creation of a national parks program with a single administrative infrastructure, and to promote and protect the habitat within the boundaries of the two existing parks (Woods, 1986). Since these parks are in

regions of significance for water and soil conservation, the emphasis should be on setting these areas aside to protect the habitat and improve the quality of life for people living below or near the parks. People living in the parks should be relocated outside the park boundaries. In Haiti *Plagiodontia* can only be saved as part of a package to save Haitians and ward off famine and disease. This can best be accomplished by linking the future of the animal with watershed and soil conservation (Woods and Harris, 1986).

## Dominican Republic

As previously mentioned, all of the institutions are in place in the country to ensure that something can be done to save *Plagiodontia aedium* from extinction. High priority should be given to developing unified goals in wildlife conservation. All agencies with responsibilities in the area of managing and protecting the natural resources of the country should work together to develop a master plan that will take advantage of the substantial programs already in place. The endemic mammals can best be protected on a long-term basis by including measures to improve their status in plans that will improve the status of a large number of species, such as in existing national parks. An immediate survey of the status and distribution of *Plagiodontia aedium hylaeum* is needed to establish whether any animals or suitable habitat remain, so that a decision as to what to do about the preservation of this form can be a part of the joint planning of the major conservation agencies of the country. I also recommend that priority be given to the existing plans for a large captive breeding facility for endemic mammals to be established at ZOODOM.

Captive breeding programs for several species of threatened Hispaniolan reptiles, birds, and mammals have been high among the priorities of ZOODOM since it opened in 1975, and breeding success has been achieved for most species. At the initiative of ZOODOM, an agreement with wildlife authorities in the country was reached so that all reptiles, birds, and mammals confiscated by these officials are delivered to ZOODOM for rehabilitation, and either subsequent release into the wild or use in captive breeding programs. Reintroduction of captive-bred progeny into suitable natural habitats by ZOODOM was initiated in 1978 with the release of West Indian tree ducks, native *Epicrates*, and two species of iguanas (*Cyclura*). However, breeding success of species requiring special diets and/or breeding facilities not readily available were affected by the reduced budget of ZOODOM during recent years. Any serious effort for a successful breeding colony of native mammals at ZOODOM will depend on the efforts of the institution to increase the funds available for the program.

## Bahamas

The status of *Geocapromys ingrahami* in the Bahamas is secure and improving. Unless a natural disaster or human error occurs, there is a reasonable chance that the animal can survive the threat of extinction in spite of a very limited distribution. To guard against the consequences of a natural disaster caused by weather or disease, or a chance introduction of dogs, cats, or the

mongoose on the three islands where the Bahamian hutia currently occurs, additional reintroductions on islands in different parts of the Bahamas should be encouraged. There are reports of Bahamian hutias having been seen on other islands and cays within the Bahamas. All these reports should be carefully investigated and documented. There should be a central location in the Bahamas where all information on the status of the Bahamian hutia is maintained and regularly updated. I recommend that this be with the Bahamas National Trust. The Trust should make a special effort to share all of this information and coordinate all of these activities with the Department of Agriculture so that members of this governmental organization will have access to all available information on *Geocapromys ingrahami* when making policy decisions, or acting on requests for permits. Before reintroductions of the Bahamian hutia on other islands are undertaken, a careful survey should be made of all the plants and animals on the proposed island or cay to ensure that no other endemic species are negatively impacted, and the files in the proposed database at the Bahamas National Trust should be carefully consulted. No reintroductions should be allowed without a permit issued by the Department of Agriculture.

## Conservation Priorities

In an effort to rank the various endemic rodents discussed above in terms of the priority that should be placed on implementing a conservation program, I have developed a point scale. The maximum number of points that a species can receive is 50. There are four categories. Category A ranks taxonomic considerations, with an animal receiving 10 points if it is a distinct genus and restricted to an island, and another 10 points if a distinct species and restricted to an island. Category B evaluates the status of each species, with Endangered species receiving 10 points, Vulnerable species 8, Rare species 6, Indeterminate species 3 and Out-of-Danger species 1. Category C evaluates the prospects of a successful conservation effort, with a high probability receiving 10 points, a moderate 5, and a low probability 0. Category D evaluates the immediate threat faced by the species, with a high threat being assigned 10 points, a moderate threat 5 points and a low threat 0 points. I have attempted to apply the same criteria to all of the surviving endemic rodents of the West Indies based on an evaluation of the literature and discussions with as many authorities as possible. The list is presented as Table 1.

## Conclusions

The splendid isolation of the West Indies produced a remarkable radiation of endemic mammals. At the close of the Pleistocene, at least 77 endemic land mammals inhabited the West Indies, and some islands had over 20 species of endemic mammals filling a variety of niches. After the arrival of Amerindians about 4,500 years ago, a dramatic reduction in the numbers of these animals began, which accelerated at an alarming rate after the arrival of Europeans following the discovery

**Table 1. Ranking of all endemic rodents from the West Indies in terms of their priority status in implementing a major conservation effort.**

Taxon	Category				Total Points	Rank
	A	B	C	D		
<i>Capromys nanus</i>	20	10	3	10	43	3A
<i>C. angelcabrerai</i>	20	10	3	10	43	3B
<i>C. auritus</i>	20	10	5	10	45	2A
<i>C. sanfelipensis</i>	20	10	5	10	45	2B
<i>C. garridoi</i>	20	10	5	10	45	2C
<i>C. gundlachi</i>	10	3	10	5	28	7A
<i>C. melanurus</i>	20	6	10	5	41	4
<i>C. meridionalis</i>	10	3	10	5	28	7B
<i>C. prehensilis</i>	20	3	10	3	36	5
<i>C. pilorides</i>	10	1	10	0	21	8
<i>Geocapromys brownii</i>	10	6	10	5	31	6
<i>G. ingrahami</i>	10	8	10	3	31	6
<i>Plagiodontia aedium</i>	20	8	10	10	48	1

A: Taxonomic considerations  
 B: Status  
 C: Prospects of conservation success  
 D: Immediate threat

of the islands by Columbus in 1492. Many smaller endemic mammals that had survived the effects of habitat alteration and overhunting by Indians and early settlers fell prey to the effects of predation and competition from introduced species such as black and Norway rats, feral dogs and cats, and finally, the mongoose, which was introduced into the region in the late 1800s. As a consequence of the end of the splendid isolation that produced and protected the 12 insectivores, 16 ground sloths, 3 primates, and 52 rodents known from the islands, conservationists and concerned governments are left with the difficult task of trying to save the remaining endemic mammals. These 13 rodents and 2 insectivores are surviving on just three main islands (Cuba, Jamaica, and Hispaniola), one lesser island (Isla de la Juventud, Cuba), and a series of small cays off the coast of Cuba and in the Bahamian archipelago. Accounts of additional animals that might still survive are frequently heard, but a serious effort to confirm any of these reports in Haiti, the Dominican Republic, and Puerto Rico (including offshore islands of all three countries) was not successful (Woods et al., 1986). As a consequence, we are left with the conclusion that only 15 endemic mammals continue to survive, and with the need to find a way to preserve these mammals in the face of rapidly expanding human populations on islands with serious economic and social problems. The rodents on some of these islands are considered to be pests by influential government

officials who are responsible for formulating policy on the conservation of natural resources, and by local residents. These misconceptions can only be corrected by strong programs in environmental education and by the implementation of single-minded programs with a clear mandate to identify, promote, and protect the national natural patrimony. In most countries of Latin America, these responsibilities are assigned to a Department of Agriculture or programs in natural resource management. These countries usually have substantial game, forestry, and mineral resources that create a need for strong programs around which a conservation ethic can be built. In many of the island nations of the Caribbean, however, there are not as many game, fish, or forest resources, and the organizations usually responsible for regulating these resources do not receive as much emphasis as they do in other parts of Latin America. This is especially true in Jamaica, Haiti, and the Bahamas. Therefore, I recommend that the major conservation effort in the West Indies be associated with programs concerned with protecting the national natural patrimony. The concept of promoting the importance of the endemic rodents as part of a package that includes a variety of endemic plants and animals found in selected regions is the method most likely to succeed in the face of all the other serious priorities that each country of the region must establish. If the concept of protecting "packages" of national natural patrimony can be coupled with an emphasis on the importance of certain regions (national parks) in the conservation of water and soil, then it is a package that has a good chance of being successful for many decades in spite of strong and compelling counter pressures for development and/or exploitation of natural resources.

Only so much time and money exist that can be used to promote the conservation of the remaining endemic rodents of the West Indies. Because the major forms left are scattered among five different countries, each of the efforts should be given a high priority, since each is a chance to save an endemic species of importance to that particular country. I believe that all of the 11 remaining endemic rodents can and should be saved from extinction. Table 1, however, ranks the species in terms of the priority that should be placed in committing funds and time if a decision has to be made as to what situation needs the most emphasis. The two species of the genus *Geocapromys* are in the best shape, and the continuation of existing programs should protect the species. The eight species of the genus *Capromys* include four species which inhabit extremely fragile and vulnerable habitats that will be difficult to protect. The latter four species are identified in Table 1 as priority 2 and 3 primarily because the chances of success of a long-range conservation effort are more limited. The animal for which there is a major concern for its future welfare, but for which there is a reasonable chance of success in preserving it over a long period of time, is *Plagiodontia aedium*, the Hispaniolan hutia. I recommend that the conservation of this animal be given the highest priority in the Middle American Region by the Rodent Specialist Group; however, I wish to emphasize that all

of the endemic rodents of the West Indies, with the exception of *Capromys pilorides*, are of special concern and should be closely monitored.

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