

VIRGIN ISLANDS

ENVIRONMENTAL PROJECT

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Table of Contents

Introduction.....	1
Dedication.....	2
ANNALY BAY.....	3
by Mr. Olasse Davis	
MANGROVES.....	5
by Ms. Lynn MacDonald	
SEABIRDS & SHOREBIRDS.....	7
by Mr. Jim Petterson, Jr.	
SALT RIVER.....	9
by Ms. Emy Thomas	
CORAL REEFS.....	11
by Dr. Caroline Rogers	
THE LEATHERBACK TURTLE.....	13
by Mr. Ralf Boulon, Jr.	
Photo Plates & Credits.....	
LIZARDS & SNAKES IN THE VIRGIN ISLANDS.....	15
by Dr. Jack Dammann	
ENDANGERED FISHES IN THE US VIRGIN ISLANDS.....	17
by Dr. Callum Roberts	
FERAL ANIMALS.....	19
by Ms. Jennifer Bjork	
TROPICAL DRY FOREST ECOSYSTEM.....	21
by Dr. Gary Ray	
BUCK ISLAND REEF NATIONAL MONUMENT.....	23
by Ms. Z. Hillis & Ms. B. Wilholm	



Dedication & Acknowledgement

This publication is dedicated to the memory of Erin Gail Allan, who founded and initiated the idea. Erin died shortly after she began the project, however, the persistent dedication of a few individuals has moved the idea to completion. Additionally, individuals, friends, and families who contributed funds or ideas to this project are gratefully appreciated. Special acknowledgements are extended to Mr. Tom Bolt, Esq., Ms. Cheryl Miller, Mr. Ralf Boulon, Jr., and to the Allan-Kelley Family. In addition to the authors and photographers who are credited within the document, the following persons and organizations are specially acknowledged for their generous efforts:

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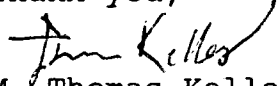
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Thank you,


M. Thomas Kelley
July 13, 1995



ANNALY BAY

The Virgin Islands has a long tradition of using forests, rangelands, and other open or green spaces for outdoor recreation. These traditions include picnics, hunting, biking, horseback riding, camping, and fishing for sport as well as subsistence, and individual exploration of wilderness areas. These outdoor activities have involved all segments of our society as a major expression of our love for the natural environment. History also reveals that outdoor recreation in the Virgin Islands has been one of essentially free access to land to enjoy the natural environment.

Today, the Virgin Islands' natural environment is threatened. St. Croix, being the largest of the three Virgins, is more threatened since more open space is available for development. As a people, we have not begun to understand about the benefits of protecting our natural resources and their important role in our society. Since tourism is a major part of the Virgin Islands economy, it is very important to make provision for preservation of natural and scenic areas and protection of historic and cultural resources.

However, the Virgin Islands have some serious environmental land use management problems including crowding, traffic congestion, user conflicts, preservation of significant ecological areas, maintenance of visual quality, protection future demands, and understanding the satisfactions and benefits resulting from protecting natural resources for future use. Without a doubt, the environment plays a significant role in the tourist industry.

Therefore, we can no longer ignore our limited natural resources in these islands. Opportunities and resources for expanding public recreation in wilderness areas are more limited than they have ever been. On the northwestern side of St. Croix there are areas not yet developed by hotels, condominiums or residential homes. Such an area is Annaly Bay, one of the largest remaining undisturbed tropical semi-evergreen and deciduous forests on St. Croix.

Besides the forest at Annaly Bay, this area includes mountains, open spaces, steep slopes, valleys, pasturelands, and surrounding bays with an algae forest, marine waterfalls, and an spectacular coral reef formation. Coastal areas such as Sweet Bottom Bay, Maroon Hole, Wills Bay, and Hams Bluff, and the inland areas of Caledonia, Spring Garden and Bodkin, each play a significant part in Annaly Bay's ecosystem.

The surrounding area has existing ruins such as sugar mills of historical significance to the people of the Virgin Islands.

The area from Caledonia to Annaly Bay provides an important sanctuary for local birds and wintering migrant land birds from North America. It has been documented that this area provides refuge for about twenty species of migrant land birds. Furthermore, these areas provide breeding habitat for several West Indian endemic species such as quail-dove, Puerto Rican screech owl and the Lesser Antillean bullfinch.

What many people of the Virgin Islands do not understand is that such birds as the red-tailed hawk, Puerto Rican screech owl and bridled quail-dove require deep forest habitat. And this requisite habitat exists in the Virgin Islands. Many bird species need mature trees for nesting in order to reproduce their young. St. Croix has some 30 species of conifers and most of them are found in the Caledonia forest area. It is important to protect Annaly Bay and other areas such as Spring Gardens and Caledonia since some wildlife species require a large area to survive.

Currently the demands on our natural resources from outdoor recreation are steadily increasing. While some economic benefits are necessary and desirable, can the people of the Virgin Islands afford to destroy the natural resource base from which many tourist dollars are derived? We must have a quality environment in order to sustain the Virgin Islands' economy. We must plan, and plan correctly. It is essential to control growth in order to prevent adverse effects on the environment. We can start by preserving areas like Annaly Bay.

A plan for the use of the Annaly Bay area could include foot trails and picnic sites, with wilderness areas for wildlife observation. The bays which surround the northwestern section of St. Croix should also be protected. The marine environment in these bay waters affects the land ecosystem functions and the land ecosystems affect the marine environment.

Let us fight to protect Annaly Bay and the surrounding environment. After all, it is part of our natural heritage.

By Mr. Olasee Davis
 Forest Ecologist
 University of the Virgin Islands
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MANGROVES

"Mangrove" is a generic term used to define a group of woody, salt tolerant plants that grow along sheltered tropical and subtropical coasts. The four most common species of mangroves that grow in the Caribbean are: *Rhizophora mangle*, the red mangrove, black mangroves (*Avicennia germinans*), white mangroves (*Laguncularia racemosa*), and buttonwoods (*Conocarpus erecta*). In the Virgin Islands and throughout the Caribbean mangroves have traditionally been used as a source of lumber, tannin, dyes, fuel and medicines. In the past, mangrove areas were also incorrectly considered "wastelands", swamps and worthless. Since the Virgin Islands were first settled by Europeans in the late 1600s, we have lost as much as 50% of our mangroves to cutting and filling. Those that remain are slowly succumbing to human stresses such as pollution and continued draining for our "development". Fortunately, public awareness of mangroves' ecological importance is growing.

Mangroves serve many important ecological functions and they are one of the most biologically productive ecosystems in the world. The maze-like root systems of the red and black mangroves trap sediment and debris and so act as "land-builders" and help to stabilize the shoreline. Their roots filter land runoff and can remove or absorb pollutants from the water around them. Mangroves also serve as valuable habitat to numerous organisms such as birds, many invertebrates, algae, and most fish species. Virtually every species of commercially important fish and shell fish spend at least a portion of their life cycle in mangrove areas. Finally, mangroves play an important role in shoreline protection, serving as hurricane buffers by absorbing wave energy and preventing erosion along shorelines.

The reduction or destruction of our mangroves can have repercussions affecting a broad range of environmental, economic and social issues. Their loss can reduce marine fisheries, affect habitat for residents and migratory wildlife, and impact the lives of each one of us. Protection of this hardy, but often ignored and abused ecosystem is essential. Public education and support for these areas is important to their continued existence and health, and consequently, our quality of life.

By Ms. Lynn Hinkey
 Marine Advisory Service
 Eastern Caribbean Center



SEABIRDS & SHOREBIRDS

People who flock to the Virgin Islands to enjoy its beautiful scenery and rich culture are not the only visitors here. Throughout the year there is a constant movement of birds to and from the Virgin Islands. Some species of birds arrive in fall and stay until spring, others only spend the summer months, while others remain here year round. The patterns and cycles of bird migrations, as with nature in general, become more apparent if one is fortunate enough to observe a region for an extended period of time. Upon arriving here, these birds depend on the mainland areas, offshore cays, and surrounding waters for feeding, nesting, and resting.

The smaller offshore islands (also called cays), many of which are uninhabited, are particularly important to seabirds as areas for nesting. While the name seabirds refers to a group of birds of many different species that spend most of their time out at sea and/or over water, they must come ashore to breed. Seabirds that nest in the Virgin Islands include: brown boobies and masked boobies, red-billed and white-tailed tropicbirds, magnificent frigatebirds, brown pelicans, laughing gulls, and eight species of terns. Nesting activity varies according to species, with boobies and tropicbirds generally nesting in winter and fall, and terns and gulls in spring and summer.

The relative isolation of these smaller offshore islands means that disturbances to nesting birds from humans and their pets, and introduced rats and mongooses are minimized. All over the world, seabird nesting colonies have been severely disrupted by introduction of rodents and predators to islands that historically did not have predators. Luckily, many of the smaller islands within the Virgin Islands are still free of rats and mongooses. However, encroaching residential development and increasing amounts of disturbance from a burgeoning population threaten the smaller islands that are so important to the nesting seabirds.

Another group of birds that migrate to the Virgin Islands are shorebirds. Shorebirds are long distance travelers which typically feed and rest in close proximity to the margins of oceans, lakes, and ponds. Some species only stop briefly on their way south in the fall, and north in the spring, whereas others stay all winter. In fact, some shorebirds that arrive here in the fall have begun their journey from breeding grounds all the way up in Alaska, a distance of 7,000 miles! Examples of shorebirds that overwinter here are semi-palmated sandpipers, spotted sandpipers, ruddy turnstones, lesser yellowlegs, and long-billed dowitchers. The common species of shorebirds that remain here year round are black-necked stilts and Wilson's plovers.

The habitat types in the Virgin Islands that are very important to shorebirds are wetland areas, which includes salt ponds and mangrove lagoons. Mangroves are trees that are specially adapted to live in the saturated and salty soil conditions found near the coast. These coastal habitats are rich in foods that shorebirds need, such as crustaceans, insects, and fish. In addition, mangrove swamps tend to trap soil runoff, filter pollutants from terrestrial sources, and provide for a breeding/nursery area for many marine wildlife species. Unfortunately, these habitats are frequently the first areas to be cleared and filled in, as resort hotels and other waterfront developments are built. Consequently, the remaining wetlands in the Virgin Islands are precious important, not only to birds, but to the health of coral reefs and fisheries resources, and ultimately to the collective health of this wonderful island community.

No matter what time of the year it is, there is always something interesting to observe in the bird world. Pick up a pair of binoculars and see what you can find!

By Mr. Jim Petterson, Jr.
 Wildlife Biologist
 National Park Service

SALT RIVER

Nature created a masterpiece at Salt River in St. Croix; a tranquil bay with a complex assortment of wildlife habitats unsurpassed in the Virgin Islands and probably the entire West Indies.

All the ecosystems of the tropics are represented in all their glory there, on a uniquely uninterrupted continuum that flows in both directions, between uplands and abyssal depths.

Upstream, the network is activated when it rains on Blue Mountain in the center of St. Croix. The water washes soil and nutrients down the slopes, across the riverbed and into the marine system through one of the best mangrove forests in the Virgin Islands.

Even hurricane Hugo, which killed many of the trees, couldn't disrupt the food chain. The tangled roots of the mangroves continue to create nurseries for fish and other marine life and to filter out sediment and pollutants, allowing the natural nutrients of the bay to continue supporting fantastically diverse colonies of flora and fauna-- on the muddy shores, in the sea grass beds and algae flats of the bay and on out to the coral reefs, which in return protect the inlet from the ocean's full force.

Oysters and turtles, crabs and lobsters and all manner of fish thrive in the Salt River, as does the most varied bird population in the Virgin Islands, including at least eleven endangered species. Most visible are the cattle egrets, which commute daily to the island's pastures, flocking out at sunrise and returning as the sun sets. The mangroves also provide a seasonal haven for several migratory species, such as warblers, the original "snow birds."

Salt River's perfect continuum carries on beyond the barrier reef to a remarkable sub-marine canyon where for several years the National Oceanic and Atmospheric Association operated an underwater habitat allowing marine scientists to conduct research for days or weeks at a time without having to come up for air. And beyond the canyon is a spectacular shelf-edge reef known to scuba divers as "The Wall." And finally there is the open sea.

There is a smattering of private homes on the hills overlooking the bay, but otherwise the site looks much the same today as it did 500 years ago, when Columbus anchored outside the reef (on his second voyage), and sent a boat ashore to look for fresh water.

People from South America "discovered" Salt River centuries before Columbus, and several cultures had lived on the banks of the beneficent bay. One of them had built a ceremonial ball park there. After Columbus, early European settlers focused their colonies there. The Dutch built an earthen fort on the western headland. Evidence of both pre and post-Columbian civilizations can still be found.

Today Salt River is the favorite "hurricane hole" for boats on St. Croix and a popular center for all water sports. Developers wanted Salt River for resorts and marinas, but thanks to the tenacious resistance by conservationists, the bay and its surrounding wetlands were hopefully saved in 1992 by the creation of the 916 acre Salt River National Historic Park and Ecological Preserve.

By Ms. Emy Thomas
Author, Editor
St. Croix Environmental Association



CORAL REEFS

Coral reefs are beautiful and diverse ecosystems with great scientific and economic value. Many corals resemble colonies of sea anemones which secrete hard skeletons. Hard corals are the major architects of the reef, depositing calcium carbonate rock as they grow over hundreds of years. In a fascinating example of a symbiotic relationship, reef-building corals contain microscopic plants within their tissues. The presence of these plants, which require light for photosynthesis, accelerates the growth of corals. Reefs form natural breakwaters, dissipating the force of storm waves and allowing the formation of the beautiful white sand beaches which attract tourists to our shores. The sand on our beaches is made up of particles arising from the disintegration of hard corals and certain green algae. Endangered hawksbill sea turtles eat sponges which grow on reefs and find shelter under coral ledges. Many commercially important fish depend on the reef for food and shelter. The reef is home to fish with brilliant colors and interesting patterns, such as spotted drums, queen parrotfish, green morays, queen angelfish, rock beauties and 4 eye butterflyfish. Some soft corals, or "gorgonians", contain medically important compounds.

Reefs in the USVI, as in the rest of the Caribbean, are suffering degradation from a variety of causes. Anchors of large ships are causing especially severe destruction. Most of this damage occurs in deep water and goes undetected. A potentially more serious and more insidious problem is the runoff of eroded soils associated with careless costal development. Excessive sedimentation reduces light needed for photosynthesis by the microscopic plants within coral tissues and for free-living algae. It also smothers corals and other reef organisms. Sewage effluent leads to rapid growth of algae which sometimes smothers living coral colonies. Overfishing can upset the ecological balance on the reef if it reduces the number of plant-eating fishes, leading to excessive algal growth. Because most corals grow less than one-half inch a year, recovery is slow, if it occurs at all.

Not all of the stresses which are currently affecting coral reefs are attributable to human activities. Hurricane Hugo in September 1989 smashed and dislodged hard and soft corals, especially on reefs on the southern shores of St. John and the other islands. The shallow reef crest off Buck Island, St. Croix, actually moved landward (towards the island) because storm seas carried coral rubble into shallower waters.

Long-term monitoring programs have been established on several reefs around the USVI by scientists from the National Park Service, University of the Virgin Islands, and other agencies. These programs will allow us to differentiate between changes on the reefs which are occurring because of human activities and those which are from natural processes.



THE LEATHERBACK TURTLE

Also called "Trunk" turtle, "Leathery" turtle or "Tinglado"

Having been on this planet virtually unchanged for over 100 million years, the leatherback turtle, *Dermochelys coriacea*, can truly be said to be the last dinosaur. Female leatherbacks weigh over one thousand pounds and the largest male seen weighed 2,017 pounds. These turtles can have carapaces up to six feet long, covered with a soft, leathery skin, and their flippers can be eight feet from tip to tip. In the Atlantic, females nest in the tropics every two or three years, returning to the North Atlantic to feed on jellyfish and other soft-bodied organisms, and to store up energy for their next trip south for nesting. Leatherbacks usually start to nest in February and finish in mid July with a peak in mid to late May.

The leatherback turtle is an endangered species with just over an estimated 100,000 nesting females worldwide. The species has become endangered through the taking of eggs and the loss of nesting habitat to coastal development. Leatherbacks also are known to consume plastic bags, mistaking them for jellyfish. Many dead leatherbacks have washed ashore along the eastern U.S. with their stomachs full of plastic bags.

Sandy Point, the southwestern point of St. Croix, has the largest nesting population of leatherbacks in the United States and the Northern Caribbean. Sandy Point was purchased by the U.S. Fish and Wildlife Service as a National Wildlife Refuge in 1984 to provide protection for these turtles.

The Division of Fish and Wildlife of the Department of Planning and Natural Resources has been studying the nesting biology of the Sandy Point Leatherback Turtle population since 1981. No other nesting population of Leatherbacks in the world has been so intensively studied. All night beach patrols, assisted by Earthwatch volunteers, are conducted every night from April 1 to the beginning of July. Since 1981, from 18 to 55 turtles have nested each year and have laid from 82 to 345 nests. The turtles return to the beach approximately every 9 days during the season and lay an average of 5 nests per season. Nests contain an average of 80 yolked and 36 yolk-less eggs. No one is sure yet of the purpose of the yolk-less eggs. Approximately one-third of the turtles nesting on Sandy Point each year have nested there before, as determined by

tags that have been placed on the turtles. In fact, one turtle, called G603, was first tagged in 1979 and has returned to Sandy Point in 1981, 1983, 1985, 1987, 1990 and 1992, for 14 years of observation, possibly a world record for leatherbacks.

Hatching has resulted in from 2,000 to over 12,000 hatchlings successfully emerging from nests on Sandy Point annually. Once hatchlings have emerged from the nest they have to outrun a gauntlet of predators to reach the sea. Yellow-crowned night herons and ghost crabs catch and consume a number of hatchlings each season. Once in the sea, hatchlings face hungry fish (jacks, barracuda, sharks) and seabirds. It is estimated that only one in a thousand hatchlings emerging from the beach ever makes it to maturity. Upon emerging, a hatchling heads towards the brightest horizon, which in the natural state is generally the open ocean. Lights from development may cause hatchlings to cross roads, get trapped in drainage ditches or die in the sun the following day. Proper lighting or shielding of lights can minimize this problem. Once reaching the sea it is believed that leatherback hatchlings swim to open ocean and live in floating mats of seaweed where they feed on other organisms living there and find refuge from predation. We do not know how long it takes for a leatherback to reach maturity or how long they live. Other species of sea turtles are known to take 30 or more years to mature in captivity, something no one has been able to do with leatherbacks.

Prior to the start of this project, most nests were poached or lost to beach erosion annually on Sandy point. The presence of researchers on the beach every night has eliminated poaching of leatherback nests on this beach. Relocation of all nests laid in erosion prone parts of the beach has reduced nest loss to less than three percent annually.

In many ways the leatherback turtle has become an environmental mascot for St. Croix. The Sandy Point project has attracted many people who have come to see these ancient mariners and have left with a greater understanding and appreciation for this great turtle's plight. Whereas in 1981 less than 50 people came out to see the turtles, in recent years over 700 people visit the project annually, many of them school groups. Both locals and visitors to the island have demonstrated an increasing awareness and desire to learn about sea turtles in general and leatherbacks in particular. Through education, understanding, and management, greater protection has been achieved for this, our own Virgin Islands' dinosaur.

By Mr. Ralf H. Boulon, Jr.
 Endangered Species Coordinator
 Dept. of Planning & Natural Resources



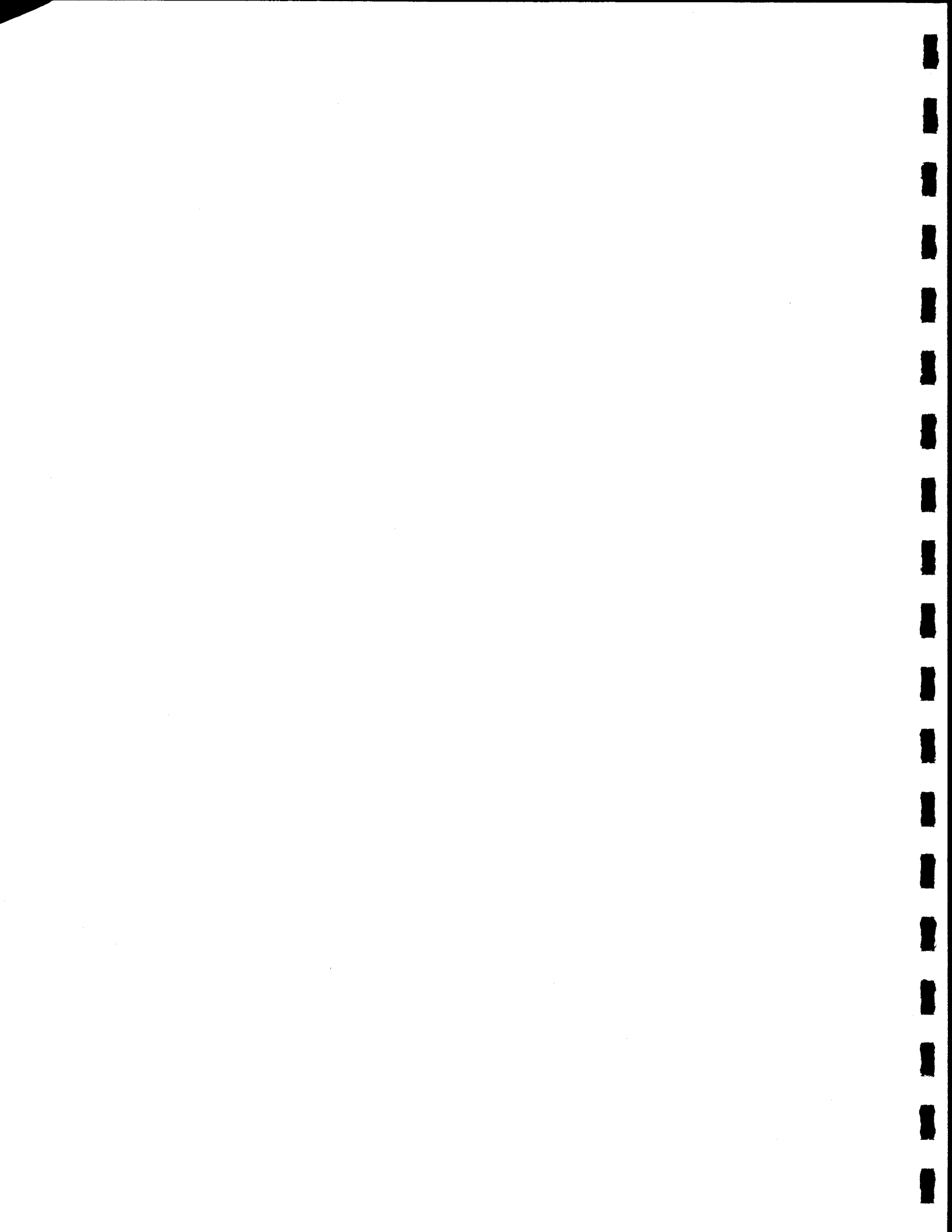
Immature Brown Pelican

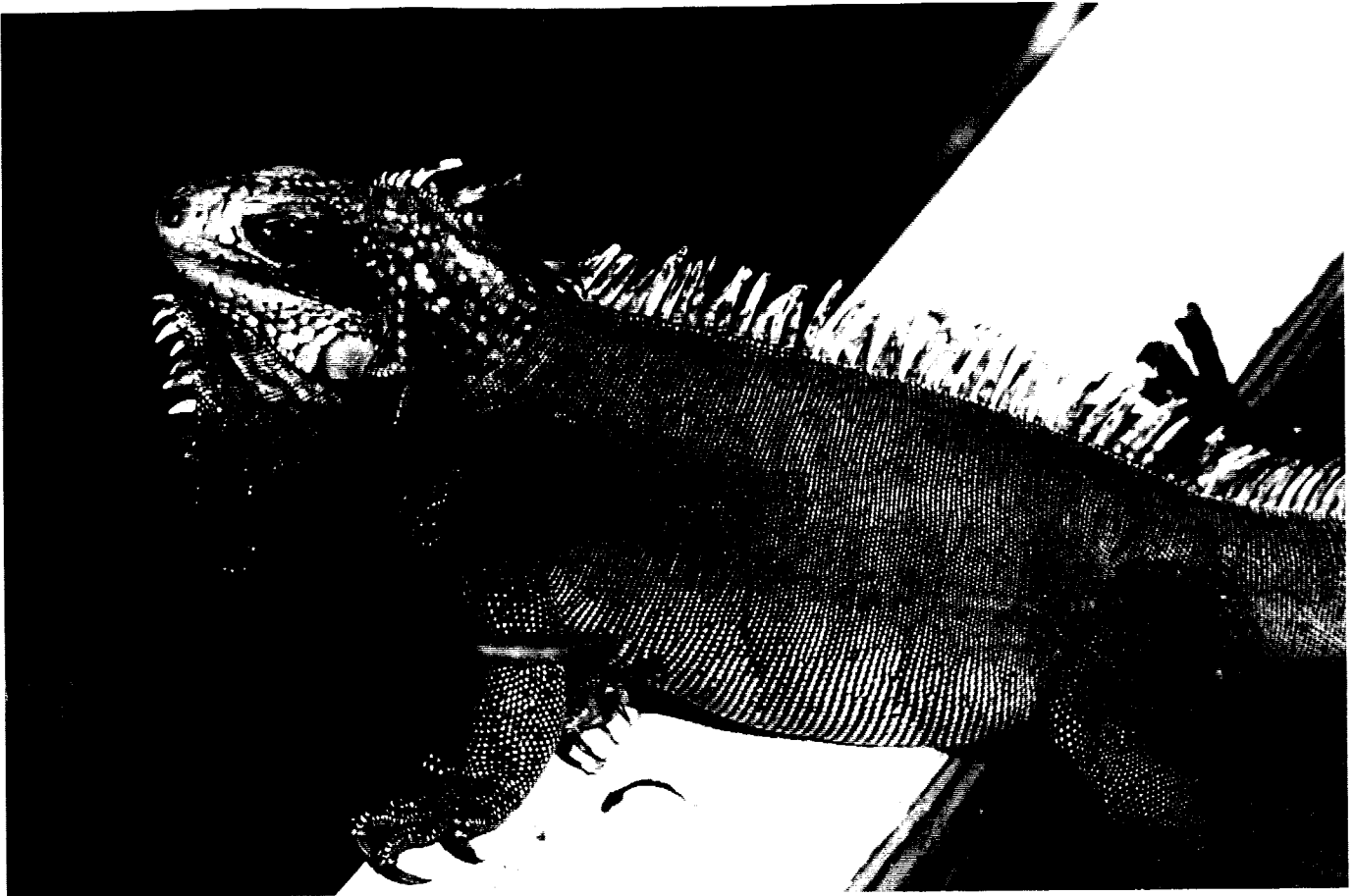
by Tom Kelley



Annaly Bay, St. Croix

by Ray Kamorowski





Iguana

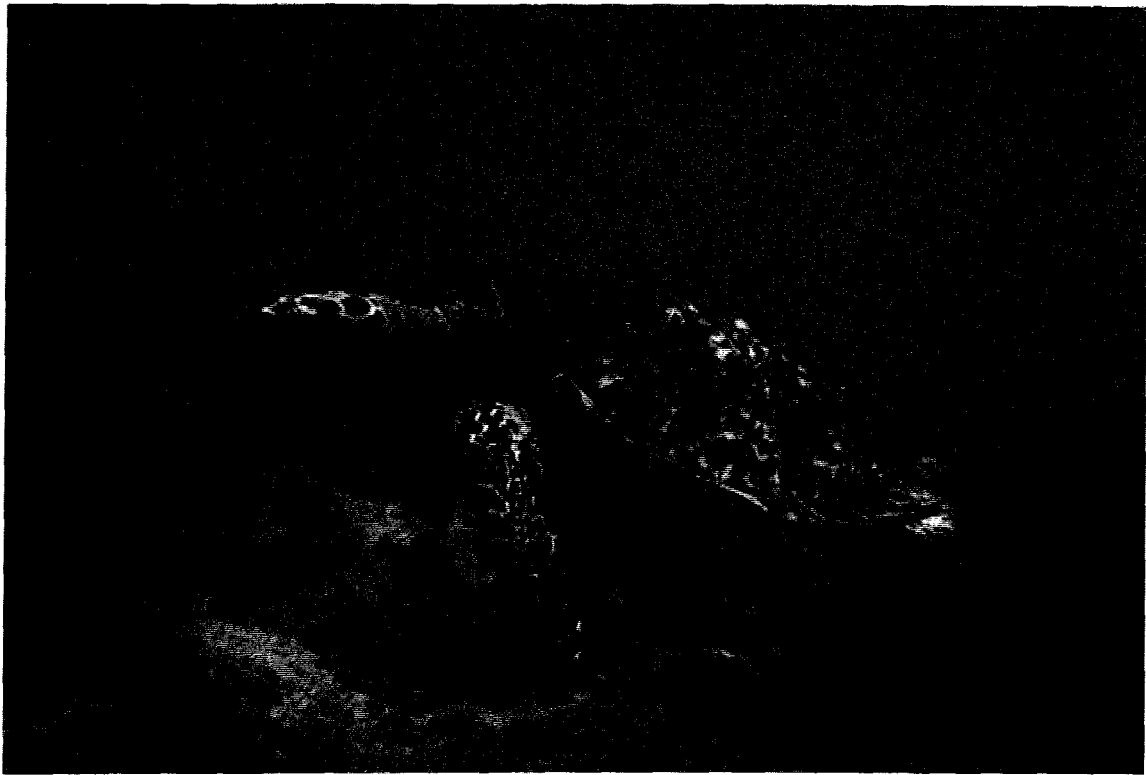
by Dr. Dave Nellis



Mangrove Lagoon, St. Thomas

by Alan Brin





Hawksbill Turtle

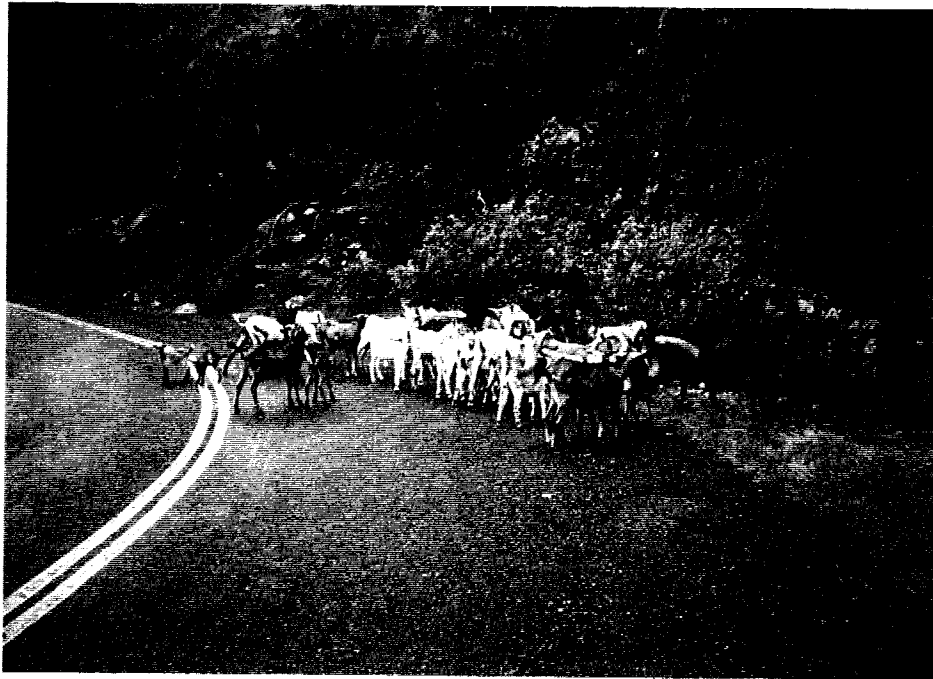
by Laurel Brannick



Nassau Gruoper

by David Boaz, M.D.





Introduced Goats

by Tom Kelley



Corals

by Dr. Caroline S. Rogers

LIZARDS AND SNAKES IN THE VIRGIN ISLANDS

Because the Virgin Islands, both American and British have never been connected to a continental land mass, such as the North and South Americas, their biological diversity is not great when compared with continents at the same latitude. Furthermore, they do not provide the same range of habitats as the large land masses do. Several other factors are involved but the outcome is that, just as for all other plant and animal groups, there are only a few species of lizards and snakes to be found in the Virgin Islands. However, for the same reasons, most of the animals that are found here are different species or subspecies from their nearest relatives.

The small Virgin Islands Tree Boa is an example of such an animal. It is, with one exception, found nowhere except Puerto Rico and the Northern Virgins. The "hundred fathom curve" of fisherman and yachtsman delineates this platform. To the south on its own isolated platform is St. Croix. Just west of Puerto Rico on its own platform is the small island of Mona. It is this latter island that provides the only exception to the distribution of the tree boa. It is also found there, but as a different subspecies from the one found only in the Red Hook - Cowpet Bay area of St. Thomas. It has never been found on St. John but has been found at a half-dozen places in the British Virgins.

This little, harmless, highly endangered snake lives only in dry areas. It spends the daylight hours hidden in rock piles and burrows on the ground. During the night it travels from branch to branch in shrubs and trees searching for lizards. In turn its major enemies are probably introduced rats and cats. It probably escapes mongooses because its daytime hiding places are secure and mongooses neither climb readily nor hunt at night. At present there is a captive breeding program with the objective of releasing the progeny on rat-free cays near St. Thomas.

Quite another story is the large common iguana lizard. This species is found from Mexico south across South America and all the way up to the British Virgin Islands. Throughout most of this region it is eaten by a great variety of other animals including humans. During its progress from soft-shelled eggs buried in sandy soil to the impressive mature male, it is, in the Virgin Islands, preyed upon by rats, mongooses, cats, dogs, pigs, herons, red-tailed hawks, kestrels and pearly-eyed thrashers, but seldom by man except for those killed by automobiles during the spring reproductive season.

In spite of all of this, the iguana lizard lives contentedly with humans and does not hesitate to eat our garden plants and swim in outdoor swimming pools. In the past twenty-five years, from introductions at Chocolate Hole and Whistling Cay on St. John, it has increased in its range and numbers to include almost the entire island. Its nearest geographic relative, a distant cousin, is the ground iguana of Anegada.

By Dr. Arthur E "Jack" Dammann
Division of Fish & Wildlife
(Retired)

ENDANGERED FISHES

IN THE U.S. VIRGIN ISLANDS

Over 400 species of fishes are known from the waters of the Virgin Islands. For the great majority we are simply unable to say whether they are doing well, poorly or are threatened. Unlike birds, for example, which have a long history of careful observation, our acquaintance with the animals that live in shallow seas is brief. People have only regularly dived and snorkeled for the last forty years and careful studies of underwater life reach back thirty years at most. What we do know is that in this short time there has been major degradation of coastal habitats around the Virgin Islands and we can guess that this has had many adverse effects on marine life.

For a relatively small number of fishes, the ones we eat, historical records of past numbers are much better. The figures tell a sad tale of decline, population crashes and near disappearance. A photograph published in National Geographic magazine in 1956 clearly illustrates the extent of these losses. It shows a very happy spearfisherman by the rocks of Water Island, in St. Thomas harbor, landing a huge catch dominated by large groupers. Today, such fish are conspicuous by their absence.

Groupers are the lions and tigers of the coral reef. They are large and active predators, feeding on smaller fishes, crabs and shellfish. They also make excellent eating and are very easy to catch. The largest of the groupers is the jewfish, *Epinephelus itajara*, which can reach the massive size of 6 feet 7 inches, weigh 1000 pounds, and live to the remarkable age of 37 years. Unfortunately, jewfish do not mature until a size of 3 feet and 6 inches is achieved, and the great majority have been caught before they reach sexual maturity. When reproduction is prevented for many individuals over successive generations, a precipitous and often irreversible decline is realized in the population. The jewfish is the first, and so far only, marine fish federally listed as endangered in the Virgin Islands.

The Nassau grouper *Epinephelus striatus*, shown in the photograph, has also nearly disappeared from local waters. Once among the commonest fish in catches it is now rarely landed or even seen underwater. The downfall of this fish has been swift (in the early 1970's it was still abundant) and is largely due to overfishing of its spawning aggregations. In what must have been one of the most amazing spectacles in nature, hundreds of thousands of Nassau groupers would gather each year at a few traditional spawning sites to reproduce over a brief two week period. When these sites were discovered it was found that the fish could be caught extremely easily because of their urge to aggregate, cramming into fish traps until they were

nearly bursting. The spawning sites were literally strip-mined as the Virgin Islands community joined in the annual bonanza. Each year many tons of fish were wasted as the harvest outstripped the capacity of people to sell and eat the fish. Yet the bounty was short-lived. One spawning aggregation was reduced from nearly two hundred thousand fish to a bare handful in only five years. The rest have gone the same way. While the Nassau grouper is still occasionally seen locally, most of these fish have probably hatched from eggs laid in the British Virgin Islands.

Other species of grouper are also in trouble and regulations to protect their spawning sites have been slow to be introduced. In Puerto Rico, over 90% of the Red Hind *Epinephelus guttatus* are caught before they are sexually mature. Not surprisingly, catches of this species are dropping sharply as the population fails to replace itself. In 1989 the main red hind spawning site south of St. Thomas was officially closed to fishing from December to February each year.

What can we do to secure a future for these fishes? Regulating fishing and protecting spawning sites is not the only step that has to be taken. We must also halt the degradation and loss of coastal habitats that have happened as our islands become more and more crowded. Reducing the amount of silt, nutrients and pollution which wash into the sea and smother and poison the reefs is an essential first step. Only by taking firm and effective action now can we ensure that our fishes do not follow the passenger pigeon into history.

By Dr. Callum Roberts
 Marine Ecologist
 Eastern Caribbean Center

FERAL ANIMALS

Between 1873-1876 the British vessel, HMS Challenger, arrived in Charlotte Amalie, St. Thomas with naturalist Sir John Murray aboard. His "trip report" is used as a description of the natural history of post-colonial West Indies. It is surprising that even in the 1870's, he described the presence of feral animals, which he described as "animals that breed in the wild condition in various parts of the island having offspring, in most instances, from stock which escaped and scattered during the hurricanes". Feral goats, pigs, guinea fowl and domestic fowl were encountered, the fowl being very wary of hunters.

So, what of it? Regions, ecosystems and especially islands develop a characteristic group of plants and animals over time that have adapted to the weather, soil conditions, predators, grazers, available food and each other. Each species evolves into a particular niche with a specific function or job. This evolutionary process takes thousands of years. Plants and animals that can't survive and aren't compatible die out. In many cases, specific plant or animal species evolve or occur in only one region or island; found nowhere else on earth. The result is an endemic species, and islands traditionally have several endemic species due to their relative isolation.

The only native mammal species left living in the Virgin Islands are the bats. All domestic animals and a few wild species were brought to the islands by the Europeans during colonization. These include cows, horses, mules, donkeys, goats, pigs, sheep, white-tailed deer, mongooses, cats, dogs, mice, rats and fowl. A feral animal is a domestic animal that can breed and sustain itself in the wild. Since they now roam freely, they eat and uproot native vegetation, enter private gardens eating and uprooting plants, wander the highways becoming traffic hazards, eat and spread garbage and kill native birds and wildlife. Since the introduced species are new to the islands, the older native species have not formed defenses against them. The feral animals which live and thrive in the Virgin Islands have no natural predators to keep their population in check or balance.

Several kinds of feral animals are decimating native plant and animal populations, and some to the point of possible extinction. Iguanas, lizards and ground nesting birds are hunted by mongooses, dogs, cats, and rats, and their numbers have been severely reduced. The mongoose has also learned to dig up and eat the eggs from endangered sea turtles. Donkeys, goats, pigs, sheep and horses graze on plants. The black mangroves (*Avicennia germinans*) are favorite plants eaten by donkeys. These plants are becoming rarer in our forests. Feral cats eat or simply kill lizards and small birds. All feral animals are becoming opportunistic omnivorous, eating many different types of foods through easy access to garbage.

Feral animals also spread the seeds of exotic or introduced plants such as guinea grass in their droppings. The guinea grass is now displacing many native grasses and other species along many donkey trails. Pigs forage on roots and downed fruits. Their diggings look like a roto-tiller has turned the soil removing all plants for a garden. In these disturbed areas native plants have a hard time competing with exotic plants. Feral pigs are destroying the only habitat for one rare orchid and one endangered plant on St. John. However, dozens of plant species and their related insect and wildlife systems are jeopardized by feral pigs. Seeds of the introduced "tan tan" are in the soil everywhere. When the soil is disturbed and the shade is removed, these plants sprout and spread.

The National Park Service will perpetuate the native animal life in the parks for their essential role in the natural ecosystems. Such management will strive to maintain the natural abundance, behavior, diversity and ecological integrity of native animals in natural portions of parks as part of the park ecosystem. The environmental changes that result from the introduction of plants and animals, particularly mammals, can be disastrous. Whenever possible and practical, non-native species should not be allowed to roam freely. Non-native species should not be allowed to permanently displace native species if the displacement can be prevented by management.

The need for and results of regulating animal populations, both native or non-native, should be documented and evaluated by research studies.

By Ms. Jennifer L. Bjork
 Resources Management Specialist
 National Park Service

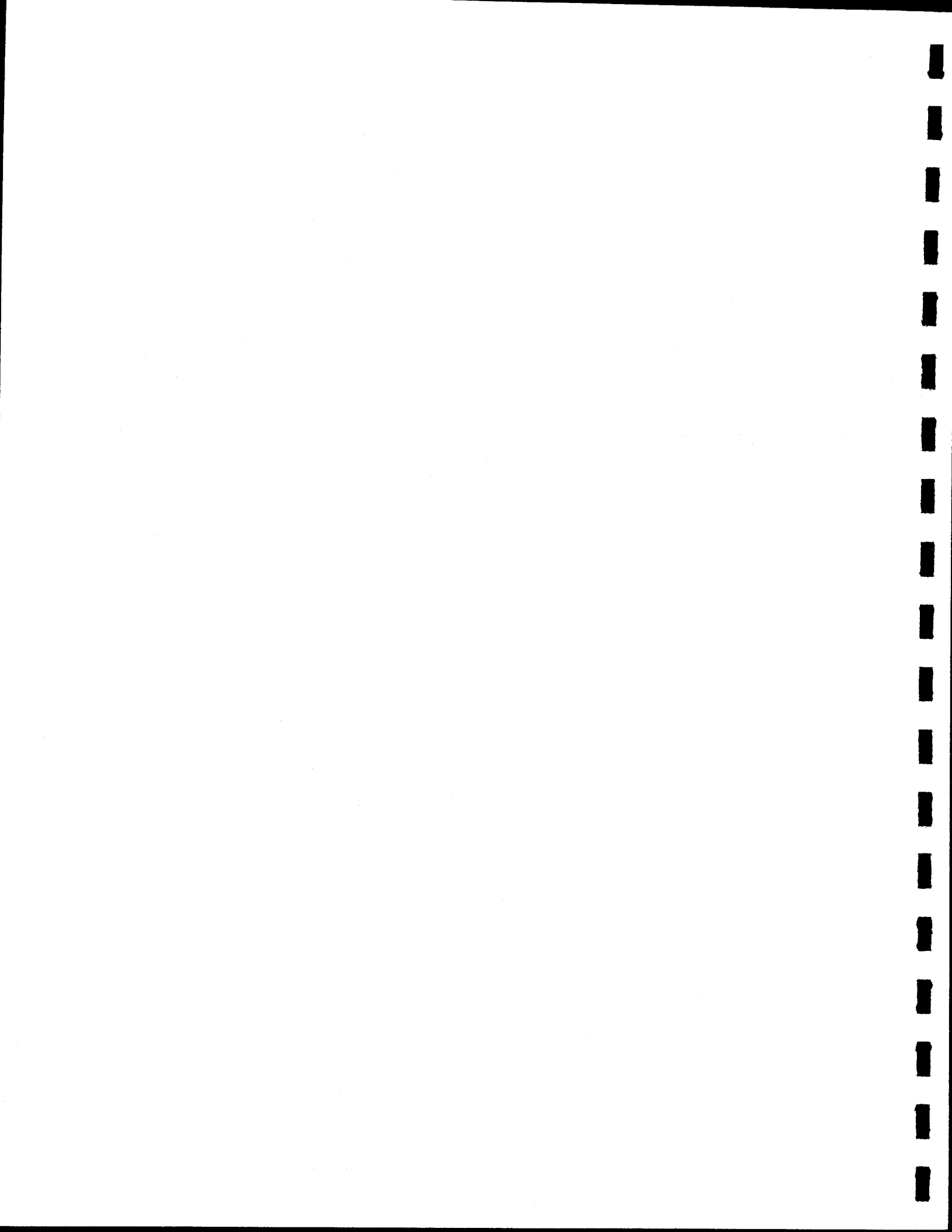
TROPICAL DRY FOREST ECOSYSTEM

AND ITS CONSERVATION STATUS

Tropical dry forest was once the dominant terrestrial ecosystem of the Lesser Antilles prior to European contact in the late 15th century. The dry forest is the vegetation type which covers the hillsides of our islands from sea level to approximately one thousand feet. This forest community is highly diverse, containing most of the 800 plant species native to the Virgin Islands, numerous bird species (resident and migratory) and untold thousands of insect species, fungi, and microorganisms, many of which may occur only in the Virgin Islands. Following hundreds of years of woodcutting for commerce and fuels, forest clearing for plantation agriculture, intensive and widespread livestock grazing, and land development associated with expanding human populations, this native forest of the islands is virtually extinct. In fact, all of the original forest is gone, and less than 3% of the second growth forest has survived.

The Virgin Islands National Park contains the best protected large piece of dry forest left in the Eastern Caribbean, and free-ranging livestock (donkeys, pigs, and goats) now threaten its recovery. Please join local conservation efforts aimed at protecting the dry forest and many of its endangered inhabitants. These include initiatives to stop new road building and residential development of cays, forest restoration experiments using only native trees, and environmental education programs designed to inform and to raise the consciousness of Virgin Islanders about our natural heritage.

By Dr. Gary J. Ray
Conservation Projects Coordinator
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BUCK ISLAND

REEF NATIONAL MONUMENT

The original name has been lost to antiquity. The French called it Isle Verte, and the Dutch, Pocken Island, for the dark green ligumvitae trees covering its slopes. Through a map making error it became Bocken Island, later shortened to Buck. It has been park an playground, and today it is a national monument established for its coral barrier reef. This small island is visited by tens of thousands yearly, but few have the time to fully experience the wonders of Buck Island Reef National Monument.

Approached by boat, the islands silhouette looks like a sleeping dragon. The broad coral sand beach is empty and quiet, swept clean by the night winds. You step ashore like an early explorer venturing onto an unknown island. your footsteps greeted only by the tracks of a night heron, ghost crab, or what remains of a sea turtle's arduous crawl ashore to nest.

Exploring beyond the beach the texture of the island softens under the green shade of manchineel and tamarind trees, one native - one exotic. Beware the manchineel apple! and savor the tangy tamarind. Today, these trees, and the turpentine, sage, and white frangipani, color the hills which once were covered by hard wood forest. Man, fire, logging and goats have transformed the island. The majority of the surviving plants are tough and thorny, but adapted, as did the delicate pink and brown spotted Sandy Point orchid, defiantly sprouting out of the top of an organpipe cactus.

From the top of the trail the coral reef shimmers golden brown through the turquoise waves below. The reef protects the island and is home to myriads of colorful marine plants and animals. At the underwater trail snorklers glimpse many of these wonders for the first time. Alone at the top of the island a magnificent frigate bird soars before your eyes effortlessly gliding into the trade winds. From the treetops below, brown pelican chicks cry for food while harried parents fly in and out delivering gullets full of silver fish.

Walking down the trail the paperwing seed pods of the fishpoison tree rattle overhead. The leaves were once used by indians to stun and catch fish. At the edge of the forest a sea of grass engulfs you. No longer eaten by goats, the exotic African guinea grass is carelessly pushing out native plants. At the edge of the sea the trail enters an ancient grove of tamarind trees; giants fallen by hurricanes lie twisted growing along the ground. Here, in the seaside forest, the hawksbill sea turtle prefers to nest, above high-tide, hoping her nest will be missed by storm waves and poachers. The hawksbills nesting at Buck Island are being studied by biologists who are seeking answers to aid in their survival.

As you return to the beach you will be amazed at the change a few hours have made; what seemed an isolated unexplored island has been discovered. People from all over the world come to visit this national treasure. Our ambition is to balance our love of this island and protect its fragile ecosystem from over use. For those who make the short ride from civilization to Buck Island Reef National Monument we hope you will always find it the same quiet island, guarded by its coral reefs and clear blue waters. and when you leave, leave behind only footprints in the sand.

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and

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