

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE

CABO ROJO NATIONAL WILDLIFE REFUGE

CULEBRA NATIONAL WILDLIFE REFUGE

SANDY POINT NATIONAL WILDLIFE REFUGE

DESECHEO NATIONAL WILDLIFE REFUGE

BUCK ISLAND NATIONAL WILDLIFE REFUGE

GREEN CAY NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1988

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE

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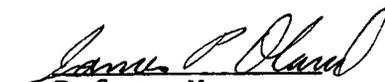
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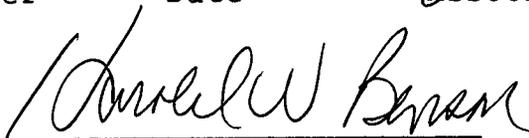
CALENDAR YEAR 1988


Refuge Manager

3/22/89
Date


Associate Manager

3/24/89
Date


Regional Office Approval

4/3/89
Date

SANDY POINT ANNUAL NARRATIVE - 1988 ADDENDUM

5. Research and Investigations

Since 1982, the most extensive research in the world on the leatherback sea turtle has ensued on Sandy Point NWR. The research has been accomplished under the auspices of the U.S. Virgin Islands Department of Planning and Natural Resources. Funding has been provided through Section 6 of the Endangered Species Act and through The Center for Field Research (EARTHWATCH).

Sandy Point NWR supports the major concentration of nesting leatherbacks in U.S. waters, 20-50 individuals per year. The estimated world population of adult females is 115,000 individuals.

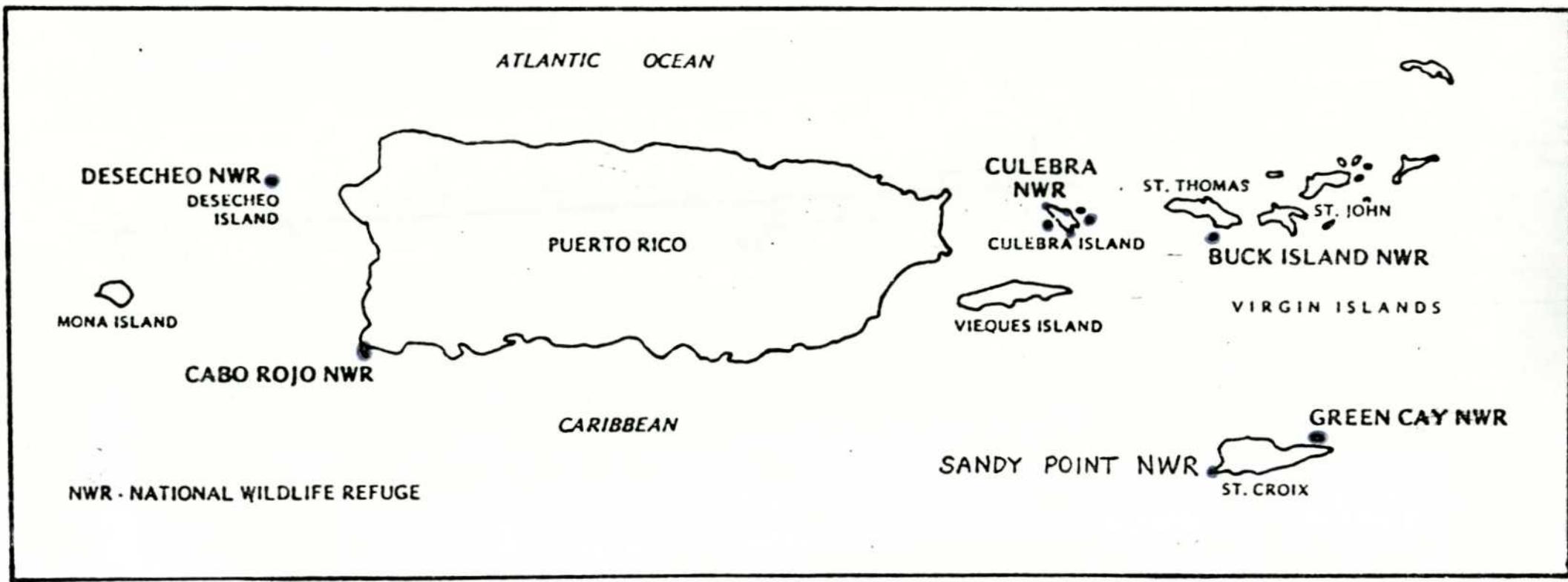
Bob Brandner and Susan Basford were the principal investigators for the research again this year. There were eight Earthwatch teams from April 6 through July 4. Each team came for 10 days totaling 65 Earthwatch volunteers. The volunteers contributed an average of \$1,180 each and a total of 5200 hours of their time to this research.

Nightly foot patrols from 1930h to 0500h commenced on Sandy Point's 3.0 km nesting beach on March 27 and terminated on July 31. There were 347 recorded leatherback activities for the season, 242 nests and 105 dry runs. Of the nests, 141 (59%) were relocated to prevent inundation or loss due to erosion. A total of 10 green turtle activities were recorded, 6 nests and 4 dry runs.

From the 230 nests excavated after hatching, 9,900-10,000 hatchlings had emerged for a success rate of 58%. Relocated nests accounted for 6,000 of those hatchlings. This was the most successful year we have had since beach monitoring began in 1982. Only 2 green sea turtle nests hatched producing in 173 hatchlings.

Egg counts were made with a mean clutch size of 116 eggs, including 79 yolked eggs per clutch. All turtles were measured with a mean carapace length of 153.3 cm (range 137-167 cm). Twenty-four individuals were weighed. Mean weight of the turtles was 322.7 kg (711 pounds). The average incubation period is 60 days. Hatch success has been somewhat lower than in previous years at 58% (59% for relocated nests and 58% for in situ nests). It is believed that dry habitat conditions contributed to this reduction. Temperatures were also monitored in 9 nests.

Erosion is the most significant natural threat to leatherback eggs on Sandy Point. Past history has shown that 50-60% of nests laid on Sandy Point would be lost to erosion without a relocation effort.



ATLANTIC OCEAN

DESECHEO NWR
DESECHEO ISLAND

MONA ISLAND

CABO ROJO NWR

PUERTO RICO

CARIBBEAN

NWR - NATIONAL WILDLIFE REFUGE

CULEBRA NWR

CULEBRA ISLAND

VIEQUES ISLAND

ST. THOMAS

ST. JOHN

BUCK ISLAND NWR

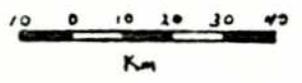
VIRGIN ISLANDS

GREEN CAY NWR

SANDY POINT NWR

ST. CROIX

REFUGES



Caribbean Islands NWR

INTRODUCTION

The Caribbean Islands National Wildlife Refuge began its administrative existence as the Culebra National Wildlife Refuge in 1978 and was named with its present title in 1981. The units of the complex are widely scattered with a distance of about 190 miles from Desecheo (the westernmost unit) to Green Cay (the easternmost). Each unit of the complex has a different animal and plant species composition. Depending upon the refuge, the individual emphasis of units are: seabirds, endangered sea turtles, endangered ground lizards, endangered blackbirds, native waterfowl, or endangered plants. In Puerto Rico and the U.S. Virgin Islands, the complex administers three distinct island units (Desecheo NWR, Buck Island NWR, Green Cay NWR), a unit on the island of St. Croix (Sandy Point NWR), a unit on the island of Puerto Rico (Cabo Rojo NWR) and parts of the Culebra Island and its adjacent islets. Two additional units (Laguna Cartagena and Laguna Tortugero) on the island of Puerto Rico were authorized for acquisition in FY 1985. The current plan is for the Commonwealth of Puerto Rico to acquire the Laguna Cartagena lands and lease them to the Fish and Wildlife Service for management as a part of the refuge system. Action on acquisition of the land and discussions on the terms of the lease were continuing at the end of the year. No action on Laguna Tortugero is anticipated until the Laguna Cartagena agreement is completed.

Because of the separation of the Caribbean Refuges from the rest of the region, we find we are involved in more activities off the refuges than we would be under other circumstances. In addition to sharing office space and equipment with Ecological Services, the personnel work very closely on several projects of mutual concern. Refuge staff provide assistance to FWS and National Marine Fisheries Service enforcement personnel throughout the Caribbean and to the Puerto Rico Department of Natural Resources and Virgin Islands Fish and Wildlife Service personnel.

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A. HIGHLIGHTS

Major changes in personnel occur. (Section E.1).

Collection for contaminant analysis at Laguna Cartagena completed (Section G.14).

Minimal progress made on Laguna Cartagena land easement agreement (Section C.2).

C. LAND ACQUISITION

1. Fee Title

A meeting was held with Samuel Quiñones of Dupont Agrichemicals Caribe, Inc., Hilda Diaz-Soltero (ES) and Oland to discuss the disposition of 336 acres of Dupont owned land in the area of Laguna Tortugero (on Puerto Rico's north central coast). Dupont is interested in obtaining positive public relations relating to environmental activities in Puerto Rico. Therefore, they are interested in keeping this land in an undeveloped state and managed for wildlife. Transferring this land to Fish and Wildlife Service may not be their best option considering the present Puerto Rican administration policy of opposition to federal land acquisition. However, the Fish and Wildlife Service is one of their many options which also includes transfer to a private conservation organization.

Robert Croft from Realty in Jacksonville, Florida reviewed the 90 acre Salt River property along the north central coast of St. Croix and prepared a preliminary acquisition report. Salt River is the largest remaining and most intact mangrove area in St. Croix and is presently under pressure for development. The area includes a freshwater marsh, a salt pond, black and white mangroves and protects the down stream estuary. It is also designated as a National Significant Wetland and provides habitat for two endangered species (Peregrine Falcon and West Indian Brown Pelican and four candidate species). The area is also a major migration and wintering area for passerines.

2. Easements

Five major meetings were held during the year to attempt to resolve the Laguna Cartagena purchase agreement problems. Monies were set aside in 1985 by Congress to purchase both Laguna Cartagena and Laguna Tortugero. Since that time FWS, DNR, and the Puerto Rican Land Administration have been working together to effect the agreement. April's meeting discussed the land appraisals which the Land Administration had received. Once the land is purchased by Puerto Rico, the federal government will reimburse Puerto Rico for the purchase price in order to manage the land under a conservation easement agreement. The reason that the federal government is not

purchasing the land outright is because of the present political situation in Puerto Rico. The current administration does not want the federal government to own any additional land in Puerto Rico. Therefore, one way to preserve this land is through an easement instead of a fee simple title.



Aerial view of Laguna Cartagena. JPO-CRB-8801

Another log-jam to be resolved is coming to an agreement on the specifics of the conservation agreement. A reduced term for the agreement was made, changing it from a 100 year renewable to a 50

year renewable (with a second option of 50 years at Service discretion). But the surprise came in December when a revised agreement was received from Puerto Rico which included a disclaimer stating that if the "property becomes destroyed or unfit for the purposes that was destined according to resolution of the planning board of Puerto Rico" that Puerto Rico reserves the right to cancel the agreement. That addition was totally unacceptable to us, as was the lump sum payment increase from \$555,390 to \$771,282.

So, although progress had been made during the year, by December it appeared that we were back to square one. There was no mutually agreeable easement nor purchase price. The new year will bring hope that all the parties will be able to sit together around the same table to work out their differences. Rumors were also rampant at the end of the year that the monies set aside by Congress for this agreement had been rescinded because of budgetary constraints (the money was needed to cover the expensive 1988 fire season).

D. PLANNING

5. Research and Investigations

Cabo Rojo NR87-"Shorebird ecology at the Cabo Rojo Salt Flats" 41520-01.

The annual migratory cycle of shorebirds is highly dependent on the availability of a series of stopover areas connecting breeding and wintering grounds. In Puerto Rico, the Cabo Rojo salt flats have been identified as a major stopover area for shorebirds. Seasonal numbers and species composition of shorebirds have been monitored for the past three years. The goals of this research are to estimate turnover rates and obtain morphometric data to better understand the dynamics of the migrating shorebirds through the area.

Field work involved mist-netting, recording standard morphometric data, color-marking, censusing and observing shorebirds. This year there were five Earthwatch groups for 12 days each. Additionally, two researchers from Manomet Bird Observatory and a graduate student from Clemson University worked at the salt flats. A total of 510 shorebirds were banded and patagial wing tags and plastic leg bands were placed on 13 different species. Wing tags were either orange or yellow in color and leg bands were green over yellow on the left leg.

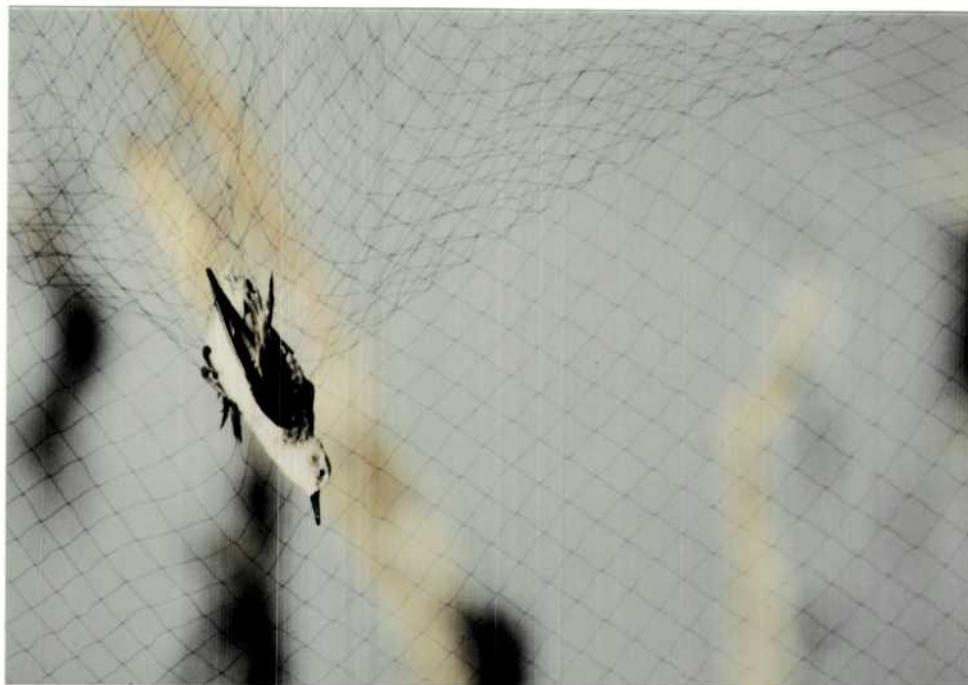


Mist nets set at the salt flats. CRB-8802

Through all this effort it has been determined that the Cabo Rojo salt flats are the most important migratory shorebird stopover in Puerto Rico and the U.S. Virgin Islands. Counts have found that up to 10,000 shorebirds can be seen in a single day with a total of 25 species using the area.

Of this unique coastal habitat 1,100 acres has been designated as a Resource Category 1 site. It harbors no fewer than 6 species of birds, 1 lizard and 4 species of plant with a Commonwealth or Federal endangered species designation.

Jason Grear and Irving Santos from the Manomet Bird Observatory in Massachusetts completed research at the salt flats from late September through December. The purpose of the study was to determine the importance of southwest Puerto Rico as a shorebird migratory route. The researchers were interested in numbers of birds at the flats, how long each individual bird stayed and what stage of molt they were in. Additional work was done on invertebrate load at the salt flats.



One of the little jewels of the salt flats. JC-CRB-8803

Unfortunately this year the shorebirds did not arrive in large numbers until November, and the researchers left soon after their arrival.

E. ADMINISTRATION

1. Personnel

1. James P. Oland, Refuge Manager, GS-12, EOD 12/87, PFT
2. Susan M. Rice, Refuge Manager, GS-9, EOD 4/88, PFT
3. Jaime Collazo, Wildlife Biologist, GS-11, EOD 7/85, PFT, transferred 3/88
4. James Glynn, Refuge Manager, GS-9, EOD 2/87, PFT, trans. 2/88
5. S. Kelly Wolcott, Refuge Manager, GS-7, EOD 7/88, PFT
6. Carmen Mendez-Santoni, Office Assistant, GS-5, EOD 12/82, PFT
7. Mariano Rodriguez, Maintenance Worker, WG-7, EOD 12/84, PFT
8. Henry Morales, Maintenance Worker, WG-7, EOD 8/85, PFT
9. Pablo Torres, Range Aid, GS-4, EOD 7/88, TPT



Refuge Staff. left to right, Pablo Torres, Carmen Mendez, Sue Rice, Mariano Rodriguez and Jim Oland. FL-CRB-8804

1988 was certainly a time of flux and change for the Caribbean Islands NWR. There was a complete change over of professional staff except for the refuge manager who had a month's experience under his belt by the time the year began.

After the untimely desertions of Jim Glynn (Mackay Island), Jaime Collazo (ES, Boqueron) and with the primary assistant position vacant the refuge was finally blessed with the arrivals of Sue Rice (Laguna Atascosa NWR) and Kelly Wolcott (Monterey Bay Aquarium). Because of budgetary constraints, the biologist position remained unfilled at year's end. The refuge has a new policy concerning transfers. All staff must give two years notice prior to leaving any of the Caribbean refuges.

Three employees received cash awards (but not certificates) for special achievements during the past year. The employees are: Carmen Mendez-Santoni, Henry Morales-Solis and Susan Rice.

Pablo Torres was hired as a Range Aid on a 180 day appointment to assist with YCC. He was later converted to a temporary NTE one year appointment to assist with clerical, maintenance and biological activities.

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A table showing the five year staffing pattern for the Caribbean follows:

	<u>Permanent</u>			<u>FTE</u>
	<u>Full-Time</u>	<u>Part-Time</u>	<u>Temporary</u>	
FY 1988	5.1	0.5	0.5	6.1
FY 1987	7	0.8	0.7	7.5
FY 1986	6	0.8	2.5	9.3
FY 1985	6	0.8	3.8	10.6
FY 1984	3	0.6	0	3.6

5. Funding

During FY 88 the funding for the Caribbean Islands was more than adequate to cover our salaries and other needs. (This is probably the first and last time a comment like that will be seen in a narrative report). The primary reason for the funding excess was the untimely dissolution of the primary assistant, Culebra assistant and biologist. Our 1260 O&M funding for FY 88 was \$374,000 with additions for relocation contract costs and subtractions for FERS miscalculations. At the end of the year \$66,000 was reallocated to other refuges because of our salary, travel and other savings. In terms of real dollars available and utilized by the refuge, our O&M budget was \$298,000. In addition to the 1260 O&M funding, the station had a \$23,600 YCC (1210) program and \$700 for quarters (8610) at Culebra.

Since we have refilled the assistant manager positions at Cabo Rojo and Culebra and have a FY 89 O&M funding allocation of \$276,700 (this includes \$14,000 earmarked for contaminants work by ES), we definitely won't have any problems with excess funds and we will not be able to refill the biologist position until late in the FY.

FIVE YEAR BUDGET SUMMARY

<u>FY</u>	<u>Wild Res.</u>	<u>End. Sp.</u>	<u>YCC</u>	<u>Total</u>
1985	\$416,000			\$416,000
1986	483,600	22,000		505,600
1987	404,000			404,000
1988	374,000		23,600	397,600
1989	276,700		?	276,700

7. Technical Assistance

In February, Oland met with Algie Badovinack and Wolf Didlaukies to discuss future plans for the Navy's land on Culebra. The Navy is in the process of drafting an agreement to turn over 87 acres of land and several buildings on Punta Flamenco to the FWS. Badovinack is interested in developing wildlife interpretive facilities on a concession basis at the site. Included in her plans are developing cabins for rental and using the largest Navy building as her residence. On the other hand, the Mayor of Culebra is interested in using some of the facilities as office space and developing a youth vocational training program on the Navy's land. As yet, we have not obtained the land (with probably one of the prettiest views in the Caribbean), but we also don't know whether it will be feasible or cost effective to rehabilitate the site.

In February Collazo worked with personnel from the National Audubon Society to set up a program to allow the transfer of data on shorebirds to several cooperators in North and South America. The cooperators are part of the International Shorebird Reserve Network which is sponsored by Audubon Society.

A local citizen informed the refuge of a wetland area for sale (Laguna Cuevas) near the town of Cabo Rojo. We informed this citizen that we could assist with a management plan for the wetland if the owners were interested.

Tara Evans, Yale University student, talked with Oland concerning the possibility of doing research on St. Croix. The discussions are at a preliminary stage and she will be developing a proposal for approval.

On December 20, Oland attended his first meeting with the Culebra Conservation and Development Authority (CCDA).

F. HABITAT MANAGEMENT

2. Wetlands

Although Laguna Cartagena has not been acquired yet, the Soil Conservation Service was contacted concerning the design of dikes and water control structures. They indicated that they would be able to provide assistance.

G. WILDLIFE

14. Scientific Collections

Ecological Services staff, accompanied by refuge personnel, collected soil samples and birds for contaminant analysis at Laguna Cartagena. The collections were sent to the Environmental Trace Substances Research Center for a priority review. Organochlorine analysis did not reveal any traces in the sediments, however, low traces of organochlorines (including DDE) were found in both bird liver samples. Heavy metal analysis showed very slight bioaccumulation of mercury in waterfowl.

H. PUBLIC USE

In a Commonwealth, where nearly 90% of the registered voters turn out to vote, and all discussions in the year prior to the elections always seem to come back to politics, it is no wonder that the elections affected the Commonwealth hunting season. The first three days of the hunt November 5-7 were cancelled because of the elections on November 8. This change didn't seem to cause much of a raucous either.

Oland and Rice assisted with law enforcement during the hunt. The assistance was quite minimal since there were very few ducks.

11. Wildlife Observation

The annual Christmas Bird Count was held on December 17. Twelve people participated from 6am to 6pm, tallying 95 species of birds. Two unusual records were obtained. A female Bufflehead was seen, this is only the second record for Puert Rico, with the last sighting being made during the previous century. A Marbled Godwit was also spotted. This makes the third sighting for this bird on Puerto Rico. The count circle has Laguna Cartagena as its center.

17. Law Enforcement

During the last week of April, Oland spent three days with Special Agent Randy Armstrong investigating and staking out some of the beach areas at Culebra. We had received reports that turtle eggs

were being illegally removed. No activities were detected during the stake-out period.

J. OTHER ITEMS

3. Items of Interest

Regional Refuge Supervisor, Travis McDaniel, visited the complex May 16-20 to conduct a refuge evaluation and meet the new staff. The whirlwind evaluation included stops at Sandy Point NWR, Culebra NWR and Cabo Rojo NWR. A visit was also made to Cartagena Lagoon.

The third Symposia and meetings of the Society for the Study of Caribbean Ornithology was held in St. Croix May 20-22. Several people that have completed research on the Caribbean Islands NWR's presented papers at this conference including Cindy Staicer (Adelaide's Warblers-Cabo Rojo), Fred Schaffner (White-tailed Tropicbirds-Culebra NWR), Jorge Saliva (Sooty Terns-Culebra NWR), Jaime Collazo (Migratory Shorebirds-Cabo Rojo NWR).

Oland and DRD Dave Allen were flown to Culebra on July 20 and 21 by SA Armstrong. They viewed the Navy Observation Point, nesting islands and headquarters area and discussed programs at the Culebra Refuge.

Lynn Wilhite, RO-Realty, conducted Refuge Revenue Sharing Appraisals on Cabo Rojo, Green Cay and Sandy Point in September.

4. Credits

Kelly Wolcott wrote the Culebra and Buck Island sections of the narrative. Jim Oland wrote the Desecheo section and sections E.5 and K of the Caribbean Islands NWR narrative. Sue Rice wrote the remainder of the Caribbean Islands narrative and the Cabo Rojo, Sandy Point and Green Cay narratives. Carmen Mendez typed the narratives and everyone pitched in with editing.

Photo credits are as follows:

JC-Jose Colon, RD-Roger DiRosa, SF-Sean Furniss, DH-Doug Hall, FL-Felix Lopez, JPO-Jim Oland, SMR-Sue Rice, JS-Jorge Saliva, SKW-Kelly Wolcott.

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE
CABO ROJO NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT
Calendar Year 1988

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

Cabo Rojo NWR

INTRODUCTION

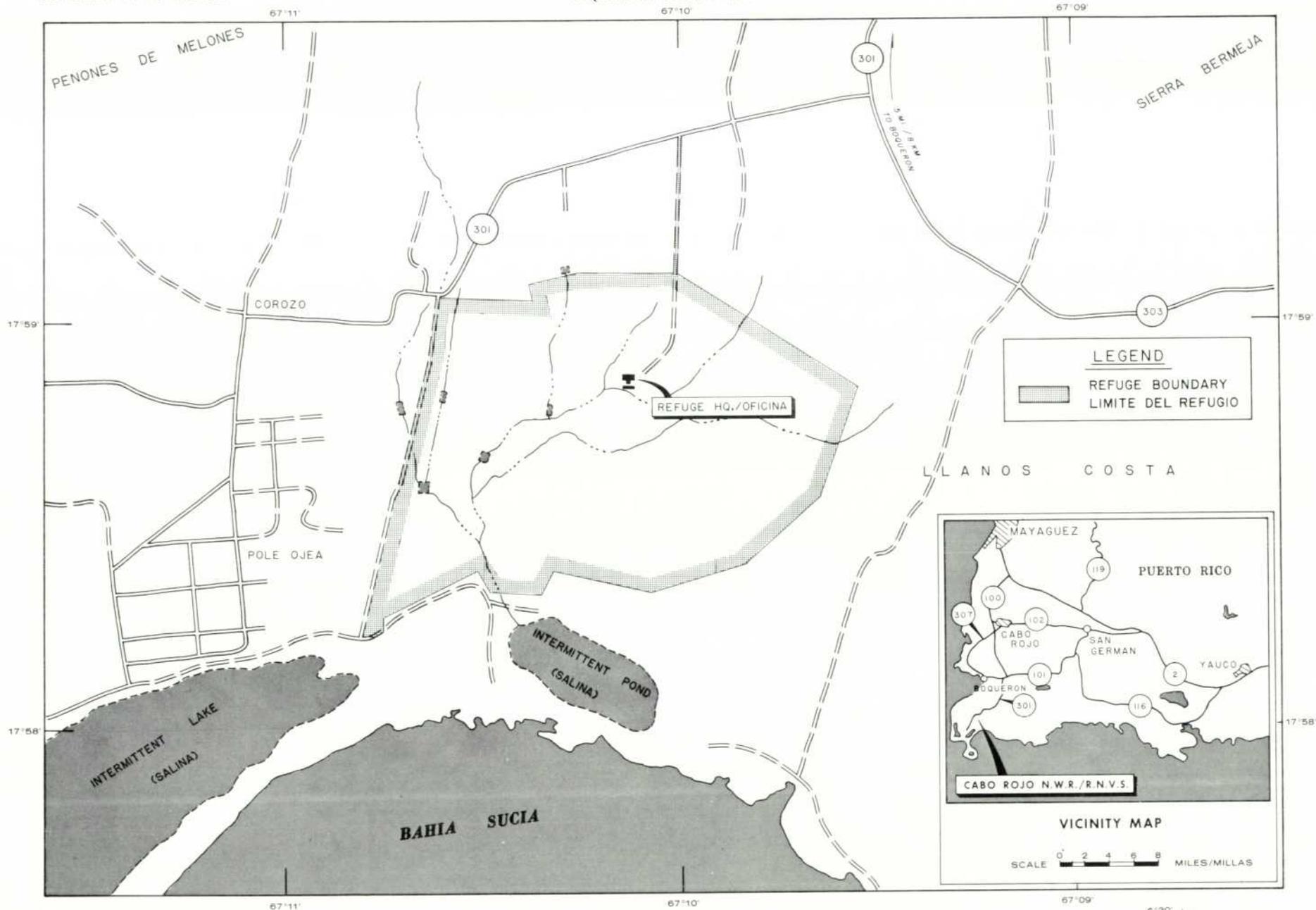
The Cabo Rojo National Wildlife Refuge was established in 1974 when 587 acres of upland habitat were obtained from the Central Intelligence Agency. The refuge lies along a coastal plain and has a few gently rolling hills overlooking the southwestern tip of Puerto Rico. The establishment of the refuge was justified for the value that the habitat held for migratory birds, doves and pigeons, in particular. The area has turned out to be increasingly valuable as the only block of wooded upland in southwestern Puerto Rico remaining in public ownership and for the great variety of native birds species, including the endangered Yellow-shouldered Blackbird. The habitat on the refuge consists of roughly 210 acres of grassland, 320 acres of forests and 50 acres of brush. The area is classified as sub-tropical dry forest under the Holdridge classification of world life zones. A total of 245 species of plants and 145 species of birds have been identified on the refuge and adjacent lands through 1988.

Preliminary objectives of the area are to restore the native vegetation in such a manner as to provide optimal habitat for both native woodland and grassland species, with special considerations for locally and federally listed plant and animal species. Recent information regarding the Yellow-shouldered Blackbird and its feeding habits, indicate that we may find ourselves managing exotic grasses for exotic caterpillars to provide forage for the native endangered species.

CABO ROJO NATIONAL WILDLIFE REFUGE
CABO ROJO REFUGIO NACIONAL DE VIDA SILVESTRE
 BOQUERON, PUERTO RICO

UNITED STATES
 DEPARTMENT OF THE INTERIOR

UNITED STATES
 FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY
 FROM SURVEYS BY U.S.G.S.

ATLANTA GEORGIA DECEMBER, 1979

6°30' True North
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 MEAN DECLINATION
 1956

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K. FEEDBACK

(NTR)

A. HIGHLIGHTS

A temporary weather station was erected and guarded by the drug interdiction agency. (Section J).

Refuge personnel began building an ark to survive the August rains. Later, we were shaken by an earthquake. (Section B).



Welcome to the Cabo Rojo headquarters! JPO-CAB-8801

B. CLIMATIC CONDITIONS

Cabo Rojo NWR is located in the path of the easterly trade winds that promote a stable temperature throughout the year. The long term average temperature varies between 78 degrees and 82 degrees, with a record low of 55 degrees and a record high of 96 degrees. Of the seven years of complete weather data, this year had the warmest average daily temperature of 81.08 degrees, compared with the coolest average daily temperature of 78.08 degrees in 1984. December was the only month all year that did not have a high temperature in the 90's.

A total of 30.04 inches of rain fell, which is eight inches below average. The first eight months of the year were characterized by parched habitat conditions. But the dam broken in August with the onslaught of three tropical waves and a tropical depression. When the month ended, it was recorded as the third highest monthly rainfall received since records have been kept (13.26 inches).

The following page has graphs depicting the average monthly rainfall and the average monthly variation in temperature.

An earthquake was felt on the refuge November 2nd! The epicenter was located 65 kilometers north of Boriquen and registered 5.7 on the Reitcher Scale. This was the strongest earthquake to affect the island since 1979 when a quake registered 5.9. The recent earthquake lasted 5-7 seconds and caused no noticeable damage to refuge property.

D. PLANNING

2. Management Plan

The fire dispatch plan for Cabo Rojo was updated to include new personnel and additional necessary actions needed.

5. Research and Investigations

Cabo Rojo NR86-"The song and behavioral ecology of the Adelaide's Warbler (Dendroica adelaide)" 41521-01.

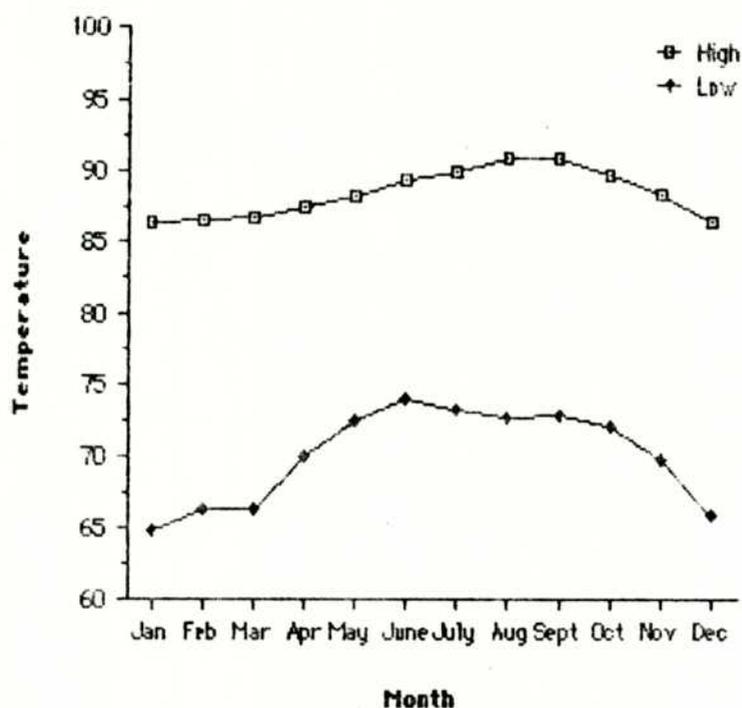
The purpose of this study is to understand the system of vocal communication and its relationship to the behavior and ecology of the Adelaide's Warbler. The investigator, Cindy Stacier, University of Massachusetts, arrived on May 3 and remained for 4-1/2 weeks to complete the last experiment necessary for her Ph. D. dissertation. The experiment involved locating two pairs of nesting Adelaide's Warblers and removing the female for two days. The male vocalization was recorded prior, during and after the removal and later analysed by spectral analysis to determine the type of song. To date the final report has not been submitted with the results of this experiment.

Cabo Rojo NR86-"Movement patterns and habitat utilization of Shiny Cowbirds in southwestern Puerto Rico." 41521-10.

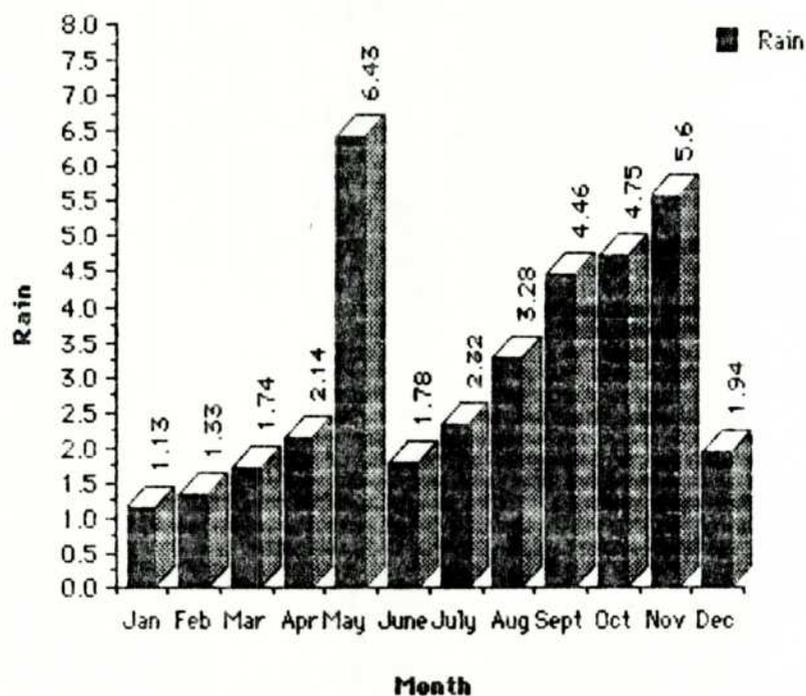
Brood parasitism by the Shiny Cowbird is the most significant factor contributing to the population decline of the endemic Yellow-Shouldered Blackbird. Work began in 1986 to obtain information on cowbird movement patterns and habitat preferences in order to design a more effective removal program.

During 1988 over 900 hours of data on observation of habitat use by Shiny Cowbirds was summarized. The data shows that in SW Puerto Rico mesquite woodland is the most frequently used habitat by Shiny Cowbirds. Additionally, it was found that the foraging behavior of the cowbird is dictated by rainfall. It was noted that 7-12 days after a significant rainfall (>1.75") that the cowbirds

MONTHLY VARIATION IN TEMPERATURE, 80-88



MONTHLY VARIATION IN RAIN, 81-88



foraged on different species of caterpillars. The caterpillars are used as a primary food source until the cowbirds switch to a secondary food source (berries, seeds and grain). This pattern continues until another significant rain is received and the cycle starts anew.



Mocis latipes on Panicum maximum. PM-CAB-8802

Researcher Paul McKenzie returned to Puerto Rico from August 23 to September 10 to collect Shiny Cowbirds and Greater Antillean Grackles after a significant rainfall was received. Fourteen Shiny Cowbirds and 28 Greater Antillean Grackles were collected in the same areas that icterids were foraging on caterpillars in 1987. Preliminary results show that the birds were indeed feeding on the same species of caterpillars as recorded in 1987. Previous to this study, no observations had been recorded of Shiny Cowbirds (or the endangered Yellow-shouldered Blackbird) foraging on caterpillars in Puerto Rico.



Mocis latipes a favored food of the Yellow-shouldered Blackbird. PM-CAB-8803.

This information will be analysed more during 1989 and management suggestions on Shiny Cowbirds will be forthcoming.

A surprise was received in October in the form of a letter from LSU requesting additional time and funding (to the tune of \$17,865) to complete the cowbird study and cover cost overruns on the 1986 contract which covered three studies (Cowbirds-Cabo Rojo, St. Croix Ground Lizard-Green Cay and Goats-Desecheo). We responded with a recommendation for increased funding for the cowbird project which is providing good information for future management programs. However, the funding is not currently available through any of our normal sources.

Cabo Rojo NR87-"Breeding biology and foraging ecology of the Puerto Rican Flycatcher at Cabo Rojo NWR. 41521-08.

The Puerto Rican Flycatcher is an endemic species to the Greater Puerto Rican region. This species nests on the refuge in natural cavities and nesting boxes. The purpose of this research is to study the nesting biology and foraging behavior of the Puerto Rican Flycatcher.

This year, due to time constraints, the researcher was unable to complete any research. However, he intends to complete the study in 1989.

E. ADMINISTRATION

2. Youth Programs

A ten person YCC crew was hosted at Cabo Rojo this summer. We had a very bumpy beginning when it was determined that four of the enrollees were not within the age restrictions. After finally securing a full crew the program progressed fairly smoothly. Enrollees assisted in kiosk building, trail development, fence building windmill repairs and assisting with bird censusing and tree trimming. The enrollees also took two all-day field trips. Unfortunately there were several problems with payroll. These problems arose partially because of the enrollees who had worked for a short time before we discovered they were not of legal age. However, it was three months after the program was over before everyone was paid. The enrollees did not receive a very positive image of the federal system.



Pouring the kiosk floor. SMR-CAB-8804

Despite those problems, YCC was once again a positive program for the refuge and community. The refuge accomplished several labor intensive jobs and the enrollees gained a better understanding of what the refuge is about and were given employment for the summer.



The 1988 YCC crew. SMR-CAB-8805

4. Volunteer Program

Our source of volunteers this year came predominately from Earthwatch. There were five groups for a total of 32 volunteers. Each volunteer donated approximately 10 hours a day for each of the 12 days they were at the refuge.



Volunteers come in all ages to help with refuge programs.
CAB-SM-8806

6. Safety

CPR was given to all employees and YCC enrollees by Rodriguez. Additionally, safety meeting topics included hurricane and fire preparedness, seat belt safety and accident prevention.

F. HABITAT MANAGEMENT

1. General

Habitat conditions were poor because of lack of rainfall throughout most of the year until September when several tropical storms moved through the area. The landscape came to life after the rains making everything verdant and lush.

3. Forest

The refuge is classified as sub-tropical dry forest. Historically the refuge predominately had a hardwood forest consisting of ucar (Bucida buceras). Commercial interests, grazing and clearing of 40 acres for the Foreign Broadcast Information Service severely altered this composition. Consequently, the ucars were cut and cattle brought many exotics with them.

The endangered Yellow-shouldered Blackbird historically used the mature hardwood forest which we are now trying to re-establish.

This was the third year of a ten year reforestation plan. The plan calls for planting 5,000 trees per year spread between the two wet periods (spring and fall), and obtaining growth rate measurements, utilization by avian species and determination of survival rates. This past year these tasks were not completed. This was due to the absence of a biologist and a complete changeover of professional staff. However, the clearing of grasses from around the base of the ucars was accomplished by YCC during the summer.

5. Grasslands

Because of preliminary data collated by McKenzie, experimental mowing commenced in two areas of the refuge. A two acre plot near the salt flats on the southern boundary was cut and an acre plot near the windmill was cut. The mowing is in an effort to stimulate new grass growth and use by caterpillars that provide food for the endangered Yellow-shouldered Blackbird.

9. Fire Management

A wildfire was reported to Rodriguez on March 23 at 4:00 pm. The fire started on an adjacent farm and spread onto the refuge. It was not completely under control until 8:00 pm. Suppression efforts involved refuge staff, Department of Natural Resources personnel, the local volunteer fire department and locals concerned about their nearby homes. About 80 acres burned, 18 of which were on the refuge (mostly grassland and mesquite).

G. WILDLIFE

2. Endangered and Threatened Species

Peregrine Falcons, a winter resident of Puerto Rico, were occasionally sighted on the refuge during the winter.

Yellow-shouldered Blackbirds (YSBB) were seen infrequently foraging on the refuge during the year. Refuge staff assisted with the Yellow-shouldered Blackbird survey in the fall.

The semi-annual YSBB research review meeting was held in November. All facets of the year's research were discussed with a synopsis of necessary future research reviewed. The Louisiana State University (LSU) study concerning management of grasses and caterpillars on Cabo Rojo NWR was also discussed. However, presently this research is on hold until funding can be found. A propagation program for the YSBB is also being considered since their numbers have declined so drastically. There are four potential sites for the aviary, one site is on the Cabo Rojo NWR.

Oland attended a manatee conference held on November 19. Regional manatee coordinator, Glen Carowan, gave a talk at the Interamerican University in San German.

7. Other Migratory Birds

In the fall it was a common sight to see numerous Cave Swallows using the telephone lines along the entrance to the refuge. The refuge was used as a resting and feeding area. An estimated peak population of 4,000 Cave Swallows was seen in mid-September.

10. Other Resident Wildlife

Dr. Roy Horst, State University of New York at Potsdam, arrived in April with eight students and an assistant to study the mongoose population. Mongooses (or is it mongeese) were radio collared and studied to determine home range and daily movements. A final report on this aspect of the study has not been received. However, assessing our ability (or lack thereof) for controlling mongooses is very important since these exotic mammals are opportunistic predators on ground nesting birds as well as sea turtle eggs.

Horst and three students returned in June to collect ten mongooses for rabies testing. From a previous trip it was found that a high percentage of the mongooses carried the rabies antigen in their blood. To determine if the animals were actually infected with rabies they had to be collected and taken back alive to the States for further testing. The whole gaggle tested negative for rabies.



Dr. Roy Horst feeding the ubiquitous mongoose. SMR-CAB-8807

Jorge Moreno, University of Colorado, attempted to mist net the exotic African Hooded Mannikin on two occasions. He is studying the effects exotic birds have on the native bird populations. He was unsuccessful in capturing these birds because of the extremely dry habitat conditions.

Patas monkeys, another of the growing number of Puerto Rican exotics, were seen infrequently on the refuge. The monkeys, originally brought here to be used for scientific experimentation, have escaped and are a potential source of major problems in Puerto Rico to both agriculture and native wildlife.

H. PUBLIC USE

1. General

The refuge has a small, but well designed, visitor contact center. This is one of the few natural history centers with displays in the Caribbean. Many visitors enjoyed these exhibits this year, however the viewing is limited by week-end closures.

6. Interpretive Exhibits/Demonstrations

Work ensued with Wilderness Graphics to fabricate a display for the Visitor Center. This display, of the habitat types of Puerto Rico, was in the original VC plans, but had never been completed. During the year, text with translation, illustrations and slides journeyed back and forth between the contractor and refuge. By year's end, however, we had not received a finished product.

In November, Wilderness Graphics was awarded a contract for design and development of the kiosk panels. Although we discussed general ideas and topics, no work will be completed on these displays until next year.

7. Other Interpretive Programs

Several programs were given during the year to schools and other groups. In February a group from the Caribbean Christian Academy (60 students and 5 adults) were given an orientation to the refuge and programs on the Parrots of Luquillo and Sea Turtles.

In March, 24 recreation students from the University of Puerto Rico visited and were given a program. During the same month, Collazo spoke at a conference hosted by Sacred Heart University concerning exotic species of Puerto Rico. His main topic concerned patas and rhesus monkeys.

Second graders from Ponce were presented a program on sea turtles and shown a cowbird trap on the refuge along with a short trip to the salt flats to view shorebirds.

In June, 30 10th graders from Mayaguez viewed the sea turtle slide program and were given a program by a DNR representative.

Four more programs were given during the year, one to a group of 10 high school students from San German, another to an 8th grade group from Ramey, another to a college botany class and lastly to a Yale University group.

10. Trapping

The land crab (Cardisoma guanhumii) spends most of its time in burrows during the dry season, coming out only occasionally at night. At the start of the wet season they are found in great numbers on the surface during the day as they migrate to the sea to breed. As the wet season progresses, they stay in their burrows on hot, sunny days and emerge during rain.

The local folk are well aware of the crabs' behavior patterns and take advantage of this knowledge. Several times during the year, after a rain, land crabbers and their traps were found on the refuge. Several traps (about 75) were destroyed since crabbing is illegal on the refuge. Additionally, three men were contacted concerning refuge regulations. No citations were written. The land crabs are part of the cuisine in Puerto Rico, and land crabbing is a common practice. It's difficult for the locals to understand why they can't take crabs, when there are so many available and it is commonly done on surrounding lands.

11. Wildlife Observation

YCC built a walking trail which connects several intermittent ponds on the refuge. This trail was used by some of our visitors, along with our numerous service roads to view wildlife and vegetation. There are presently no interpreted trails or tour roads.



An injured Short-eared Owl, a resident raptor. SMR-CAB-8808

17. Law Enforcement

Oland attended a 40-hour law enforcement refresher in Tallahassee, FL in May. Rice had attended a refresher prior to her arrival in Puerto Rico. Then, in October, Refuge Officers requalified with their side arms in preparation for the PR waterfowl hunt season.

The refuge has a large evidence room that is used solely by the Special Agent and his office. In September they closed several cases that were open only because of outstanding evidence (i.e. a large pile of evidence was destroyed).

The Department of Natural Resources occasionally stores evidence (usually confiscated sea turtles) in the refuge freezers.

I. EQUIPMENT AND FACILITIES

1. New Construction

Rodriguez spent the major part of February through April building and relocating kitchen and dining facilities. The facilities were located adjacent to the Habitat Enhancement office and used by all staff and volunteers. Since the Habitat Enhancement office was expanding they needed this area as office space, the volunteer/researcher kitchen and dining facilities were relocated to a large open area in the back of the building. Walls, water facilities, cabinets, etc. needed to be constructed to develop this area into a usable facility. Rodriguez was assisted by one employee from the Department of Natural Resources to complete all these changes.

A new kiosk was constructed by YCC during the summer under the able supervision of Rodriguez. The structure is complete, but no displays have been fabricated as yet.



The new kiosk, built by YCC. SMR-CAB-8809

Finally, the omni-talented Rodriguez designed and built a dual computer work station to accommodate both refuge computers. This is a vast improvement over the desk-top situation that preceded this addition.



The new computer work station, designed and built to our specifications. CAB-SMR-8810

2. Rehabilitation

Sections of the refuge boundary were rehabilitated by YCC and new boundary signs installed.

A ballast in the DNR office light system burned out. These lights are approximately 25 years old and the ballasts are no longer available. Rodriguez replaced the lights in that office and will replace others in critical areas prior to "meltdown".

4. Equipment Utilization and Replacement

A new "Cristal Tips" ice maker with water filter was installed in July. YCC was able to reap the benefit of the ice maker for two weeks before the program ended. The ice machine is supposed to produce 100 pounds ice/day, but in this climate will only produce about 25 pounds/day.

The Chevy 4x4 transfer case was disassembled by Rodriguez and Torres. After being told that a new transfer case would cost over \$2,000 Rodriguez had the old one welded along the cracked area which encompassed the entire case. The crank case was also spot welded in 6 areas because of major rust problems. These rust problems have resulted from previous use on the salt flats. The



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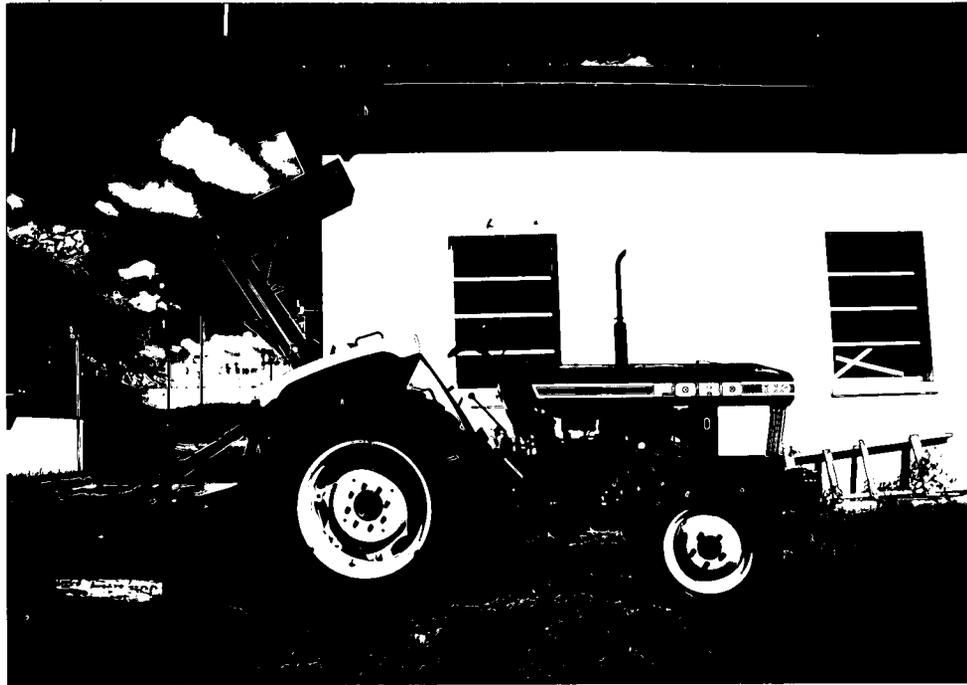
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Dodge 4x4 drive shaft also broke. Again, it was weakened from rust.

During October the refuge office changed its looks! Rodriguez installed six inch aluminum lettering to identify us as the Caribbean Islands NWR even though, with the antenna still overhead, we look more like a CIA facility.

A new Sears push lawn mower was purchased in May so that we can maintain the headquarters area.

In December the refuge tractor had a close encounter with a tree limb. While watching the mower, Torres drove under a branch that was slightly lower than the ROP. Although of minimum impact, the rust weakened frame broke loose from the bolts giving the tractor a "reclining seat" feature. Within a week the tractor was repaired to a sturdier condition than prior to the accident.



Mowing "southern style", with a reclining seat tractor. CAB-SMR-8811

5. Communications System

A new phone system, which was installed to provide additional phone lines for ES, a modem for refuges and the capability to separate the answering and billing programs became operational in September. The theory of all this was good, however, it seems that we created a monster. A month after installation a phone representative gave

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the staff training on use of these new machines.

6. Computer System

A Dell System 200 computer was received in July, a modem in May, software programs in September and a printer in October. Now all that we need is a little know-how. Oland and Mendez attended a computer orientation in October with the LE office, and the local support person from Ecological Services (Mary Conser) has been very helpful in assisting us with our computer questions and problems.

The McIntosh computer mouse "died" in September. It was nearly four months before we could obtain a replacement. We realized how much we depended on our computer as we limped along during those interim months.

7. Energy Conservation

The refuge is involved in a mandatory energy conservation program. On the average of one time per month our electricity goes out for an undertermined amount of time. However, we went beyond the call of duty in October when the water pressure was low or non-existent for six days. When the town water pump broke down parts had to be ordered from the States.

8. Other

A Civil Air Patrol representative talked with the refuge in June concerning the removal of the wire net antenna covering the headquarters area. Evidently they were interested in using the antenna to improve communications between the east and west ends of Puerto Rico. However, by October, it was obvious that they did not have the capability of completing this task. (Perhaps we should camouflage the wires by growing vines over the refuge HQ).

A portion of the refuge office building has been converted into crew quarters with beds. Kitchen, dining and shower facilities are also available. The idea was to provide housing for researchers and volunteers. The illustrious "Club Fed" had a banner year with Earthwatch volunteers, DNR staff, researchers from the University of Massachusetts and numerous other areas using the facilities.

A memo concerning the usage of this facility was drafted and sent to RO in June. In the memo we suggested criteria for priority of room usage and possibly the initiation of a charge for non-FWS oriented research usage. By year's end we had not received a response.

J. OTHER ITEMS

1. Cooperative Programs

A temporary weather station was erected in June by the Puerto Rican drug interdiction agency. The 120 foot tower with wind meter was assembled and raised in place on the northern boundary of the refuge. The station, and its 24-hour guard, remained on the refuge for 5-1/2 months. The purpose of the station was to monitor local winds to determine if this area of the island would be suitable for locating an aerostat balloon mounted radar system.



Raising the weather station for detailed wind measurements.
SMR-CAB-8812

The Border Patrol vocalized their desire to obtain office space at the Cabo Rojo complex. No definite plans or serious discussions have occurred on this matter yet.

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE
CULEBRA NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT
Calendar Year 1988

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

Culebra NWR

INTRODUCTION

Culebra, an island of approximately 6,747 acres, lies 17 miles east of Puerto Rico, and 12 miles west of St. Thomas in the U.S. Virgin Islands. The Culebra archipelago is part of the Puerto Rico Bank, a group of islands extending from Puerto Rico to the Virgins Islands.

An archaeological survey in 1979, revealed the presence of two distinct aboriginal populations, one occurring between 800-1000 A.D. and the other between 1200-1500 A.D. Columbus discovered the Culebra archipelago (his second NWR of the trip) during his second voyage to the new world in November, 1493. Early settlers on the island included Taino Indians who were escaping from Spanish slavery in Puerto Rico in the early 1500's. Culebra was later reported to have been a base for pirates who operated against Spanish commerce. Due to the lack of a potable water source on the island, Spanish colonization was delayed until 1889, when the settlement of San Ildefonso was built at what is now called Lower Camp. The settlement was moved twice before permanent establishment at Lobina Lagoon.

After the Spanish-American War of 1898, the residents of the island came under American jurisdiction. Between 1902 and 1911, Culebra was the main anchorage for the U.S. Caribbean Fleet, which was then relocated to Guantanamo, Cuba. It was probably during this time that an American officer, noting the vast seabird populations, recommended the designation of the surrounding islands as a wildlife preserve. On February 27, 1909, by Executive Order 1042 of President Theodore Roosevelt, the publicly owned islands and cays of the Culebra group, excluding the main island of Culebra, were designated as a wildlife preserve subject to uses for naval and lighthouse purposes.

The Navy became active in the Culebra area again in 1936 when target ranges for naval ships and aircraft were established. Naval exercises continued until 1973 on many of the outlying islands and cays (which had been included in the refuge) and on the northwest peninsula of Culebra Island (Peninsula Flamenco). Between 1972 and 1976, the Navy exceded most of its land holdings in the Culebra archipelago, and primary jurisdiction for the outlying islands and cays was passed to the Fish and Wildlife Service. In 1982, 776 acres on the main island of Culebra were transferred to the Service. In 1985, 90 acres belonging to the Navy were placed under long term lease to the Fish and Wildlife Service. The refuge currently totals 1,568 acres.

The refuge's diverse wildlife habitats include: a subtropical dry forest unit; two mangrove units; a peninsula covered with grasslands, shrubs and isolated woodlands, surf swept rocks, sedge covered cays, and islands covered with grasslands, shrubs and forest.

The Mt. Resaca unit is the largest remaining forest block on the island of Culebra. The northern slopes host microenvironments of tropical rain forest types. These areas, occurring chiefly in boulder strewn cayons and ravines, are host to one of the most unique vegetative communities in Puerto Rico. Trees in this area have canopies of 50 feet or more, and trunk diameters of three feet. Natural thorn thickets occur on the drier sites of this unit. Wildlife here includes many of the 25 reptile and amphibian species of the island, including the endangered Culebra giant anole (although it may be extinct). A variety of avian species is found here, as is the introduced white-tailed deer.

Peninsula Flamenco is currently in a subclimatic grassland state. The climax forest vegetation was cut over for timber by the local residents and mechanically destroyed through bombardment and fires when used by the Navy. The largest seabird colony of the refuge is the Sooty Tern colony (30-40,000 birds) located at the northwest tip of the peninsula.

Two mangrove units of the refuge help assure protection of these vital links between terrestrial and marine ecosystems. The Ensenada Honda unit consists of mainly red mangroves and is the largest mangrove tract in the archipelago. The Puerto Manglar unit is a fringe of mangroves around a highly productive bay. It is an important area for Brown Pelicans and protects the coastal fringe of the phosphorescent bay which is a nursery and feeding area for marine life including green turtles and spiny lobster.

CULEBRA NATIONAL WILDLIFE REFUGE

CULEBRA ISLAND GROUP—PUERTO RICO

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE

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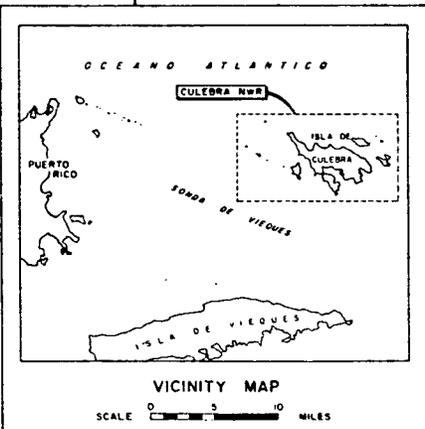
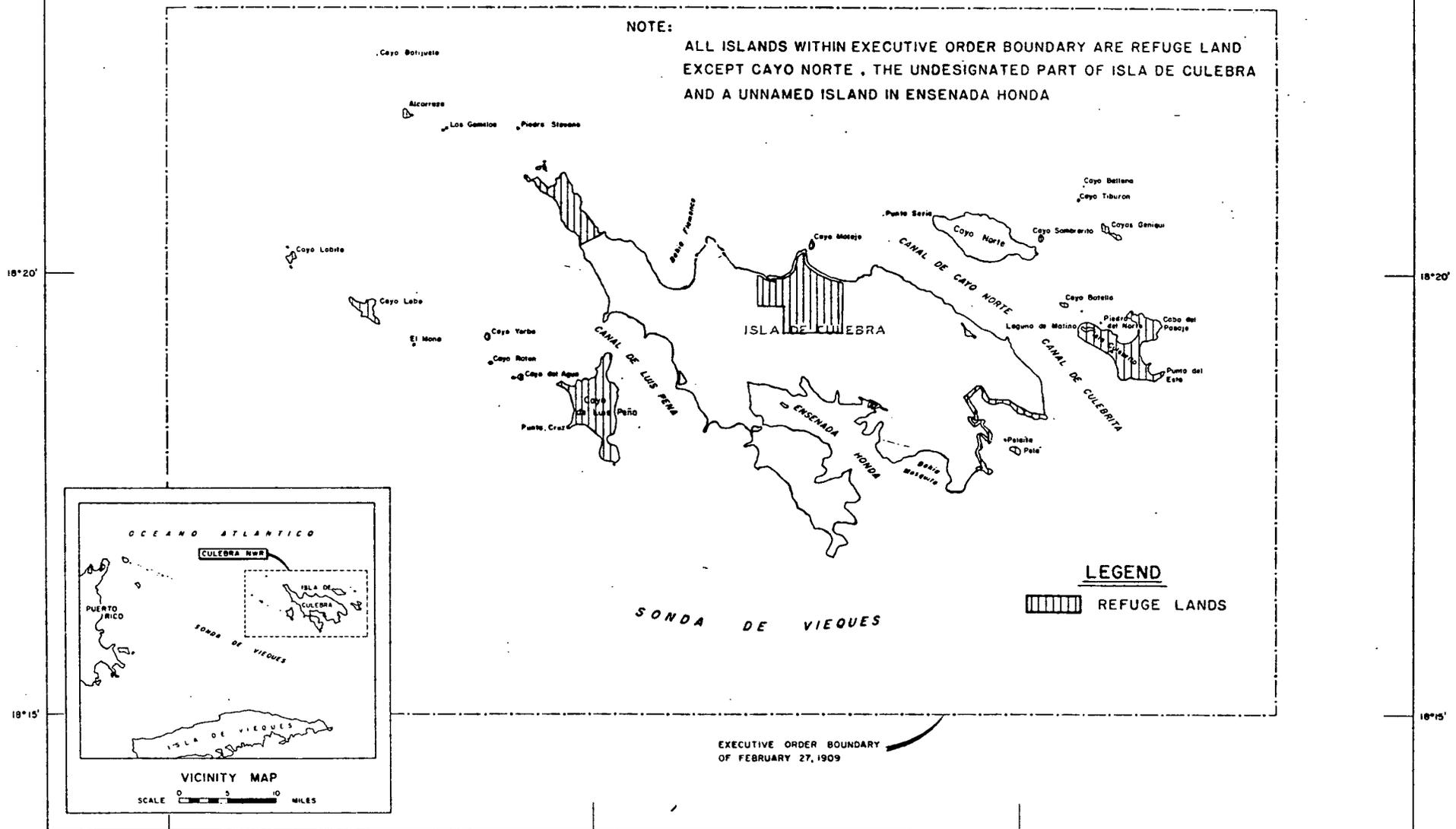
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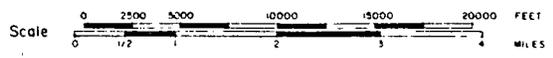
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COMPILED IN THE DIVISION OF REALTY FROM SURVEYS BY USGS

ATLANTA, GEORGIA
REVISED 12/66

APRIL, 1969



EXECUTIVE ORDER BOUNDARY OF FEBRUARY 27, 1909

U.S. GEOLOGICAL SURVEY

MEAN DECLINATION 1969

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15.	Off-Road Vehicling.....	NTR
16.	Other Non-Wildlife Oriented Recreation.....	22
17.	Law Enforcement.....	22
18.	Cooperating Associations.....	NTR
19.	Concessions.....	NTR

I. EQUIPMENT AND FACILITIES

1.	New Construction.....	NTR
2.	Rehabilitation.....	23
3.	Major Maintenance.....	NTR
4.	Equipment Utilization and Replacement.....	23
5.	Communications Systems.....	24
6.	Computer Systems.....	24
7.	Energy Conservation.....	NTR
8.	Other.....	24

J. OTHER ITEMS

1. Cooperative Programs.....	25
2. Other Economic Uses.....	25
3. Items of Interest.....	NTR
4. Credits.....	NTR

K. FEEDBACK 25

A. HIGHLIGHTS

Culebra said goodbye to one Refuge manager and hello to another this year. Between the exit and entrance of refuge managers and 10 weeks of Federal Law Enforcement Training Center, Culebra managed along without a resident refuge manager for eight months of 1988.

Maintenanceman Henry Morales received his 10-year pin this year.

B. CLIMATIC CONDITIONS

Two year-end tropical storms that turned into hurricanes narrowly missed Culebra in September, but brought more than 17 large sailboats into the Ensenada Honda mangrove unit for protection. Although tying boats to the mangroves is generally prohibited, the special nature of a hurricane requires some flexibility.



Hiding from the hurricane. SKW-CBR-8801

<u>CLIMATOLOGICAL DATA - CALENDAR YEAR 1988</u>	
<u>Month</u>	<u>Inches of Rainfall</u>
January	2.10
February	Not Available
March	" "
April	" "
May	2.60 (incomplete)
June	3.60 (incomplete)
July	6.50 (incomplete)
August	4.40
September	5.15
October	2.55
November	5.00 (incomplete)
<u>December</u>	<u>2.55 (incomplete)</u>
<u>Total</u>	<u>34.15 inches</u>

Average Maximum Temp. (F)	Average Minimum Temp. (F)
86.5 degrees	75.8 degrees

C. LAND ACQUISITION

3. Other

At various times during the year, discussions passed between the regional realty office and the Navy regarding some remaining Navy lands on Culebra. The primary area of focus was the "Observation Post" (OP) at Flamenco Point. The area is 87 acres and has several run down, concrete buildings on a hill overlooking Flamenco Peninsula and Resaca Beach. Since the Navy is interested in the use of a site at Sandy Point NWR (St. Croix) for a theodolite station, Realty has informed them that the agreement for that facility will be contingent on completion of the agreement at Culebra. In addition to the OP site, the Navy now concedes that it has rights to Flamenco Lagoon and Zoni Lagoon, the two areas on Culebra that receive the most use by waterfowl and wading birds. According to the most recent correspondence with the Navy, these areas will be included in any transfer.

Because of the discussions of a transfer of the OP site, the refuge has received several inquiries about the use of the facilities. Suggested uses include a concession-operated visitor center with cabana rentals, an Earthwatch research center, office space and vocational training center to be administered by the municipality of Culebra. We've also heard rumors that the Puerto Rico Drug Interdiction Agency (FURA) is interested in the site for use of its helicopter landing pad.

All the parties interested in the site have been informed that the FWS (i.e. refuge) will not make any commitments or recommendations for use until we have a formal agreement for the site and the facilities have been reviewed by engineering personnel.

At the end of the year we did not have any official use of the lands, but the Navy had indicated that they were planning to enter into a five-year use agreement pending formal transfer.

D. PLANNING

5. Research and Investigations

Culebra NR84 - "Leatherback Turtle (*Dermochelys coriacea*) nesting in Culebra, Puerto Rico" (41522-6)

The northern beaches of Culebra are major nesting sites for leatherback sea turtles in Puerto Rico. Researchers and volunteers have patrolled Playas Resaca and Brava since the 1984 nesting season, tagging and recording information about all nesting turtles on these two kilometer-long beaches. This year researcher Teresa Tallevast began diurnal patrols of the two beaches on February 25 in order to record early nesting activity and to camouflage nest sites in an attempt to discourage poachers. Tallevast and 179 local volunteers participated in nightly patrols beginning on April 25 until June 19. Tallevast recorded the first nest of the season on February 25 and the last on July 17, counting 151 nests laid between those dates. Forty-seven percent of the activity occurred on Playa Brava, 39% on Playa Resaca and 11% on Playa Zoni. Researchers and volunteers inspected each turtle for tags and/or tag scars, then fastened monel tags (AAV 400-500 series) supplied by the National Marine Fisheries Service on untagged individuals. Diurnal surveys of nesting sites allowed a close monitoring of hatching success. The overall hatching success was 81.7% on 67 nests.



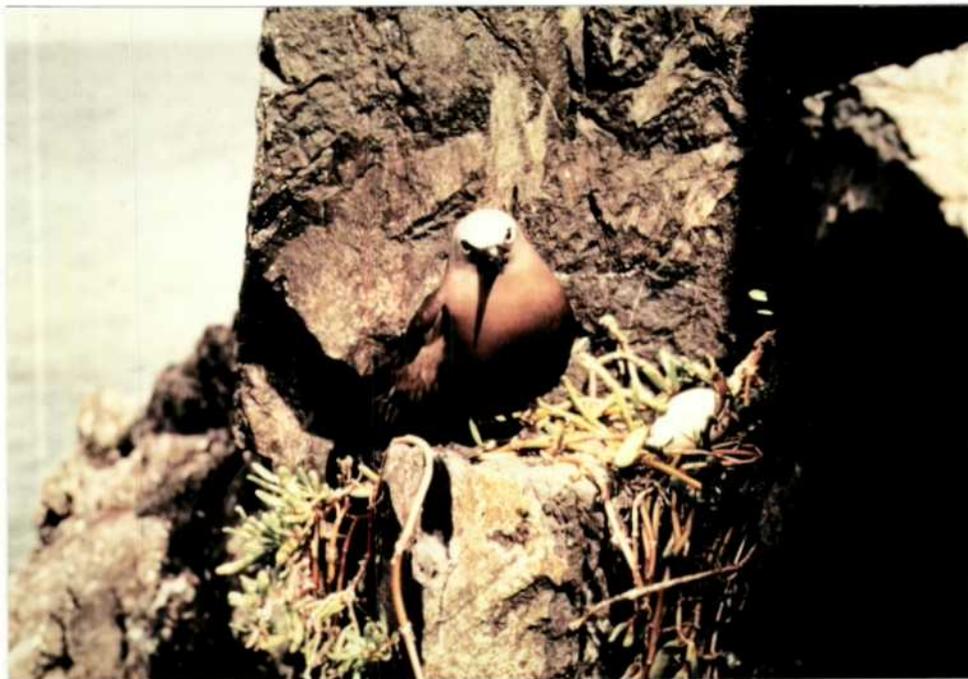
Coop student and turtle researcher Teresa Tallevast and her YCC assistants count fertile and infertile eggs from recently hatched nests. SKW-CBR-8802



The leatherback nesting projects helped guarantee the successful hatching of this 2-1/2 inch leatherback sea turtle. SKW-CBR-8803

Culebra NR85 - "Parental behavior and foraging ecology of Brown Noddies (Anous stolidus)" (41522-7)

Brock University researcher Ralph Morris and his associate Dr. John Chardine arrived in Culebra on June 1 to carry out field research from June 2 to June 15. Their objectives this year were to determine site and mate fidelity in Brown Noddies, to take morphometric measurements and color-band captured birds and to determine the color-morphs of all chicks hatched from eggs laid by known females. Drs. Morris and Chardine captured forty-three previously unbanded Brown Noddy adults on Cayo Noreste during the 1988 field season and gave them unique color band combinations. They also captured three previously banded birds in order to adjust the color bands. The researchers also captured and banded ten Brown Noddy adults on Cayo Yerba. The 1989 research season should show the first chicks from the 1985 cohort back for breeding. The study will continue in 1989.



A Noddy Tern tends it's nest on Cayo Noreste. SF-CBR-8904

Culebra NR86 - "Behavior and habitat preferences of Sooty Terns (Sterna fuscata) nesting under varying percentages of vegetative cover and vegetation types" (41520-9)

Doctoral student Jorge Saliva came back for the third year of his study on the breeding behavior and nesting success of the Sooty Tern under varying nesting cover. His study will provide information on Sooty Tern habitat requirements and hatchling success rates as well as predation patterns and rates. The study will continue in 1989.

E. ADMINISTRATION

1. Personnel

Culebra was again without a resident refuge manager for half the year when manager Jim Glynn left in February to take a position at Mackay Island National Wildlife Refuge. Maintenance man Henry Morales held down the fort as the only full-time employee in Culebra until refuge manager Kelly Wolcott and his wife Lorena arrived in mid-July.

For his solo work between refuge managers, Morales received a Special Achievement Award this year as well as his 10-year pin.

The following volunteers, turtle project and YCC personnel worked at the Culebra NWR in 1988:

Volunteer biologists

Jorge Saliva
Dr. Joanna Berger

Local Leatherback Project Employees

Julian Howell
Elizabeth Ayala
Sonya Monell
Shirley Nazario
Francisco Martinez
Lissette Sanes
Mario Romero
Wanda Colon
Sixto Colon
Paulino Espinosa

YCC Enrollees

Joanna Perez
 Wanda Osario
 Jesus Ortiz-Santiago
 Efrain Monell-Ayala
 Luz N. Bermudez-Villegas
 Maria E. Peña-Velez
 Edilberto Romero-Llovet
 Ernesto Garay-Figueroa

Other Volunteers

Laurie Smelter
 Lisa Smelter

2. Youth Programs

The sixth annual YCC program was successfully completed with one of the best working crews yet. Working alone at the refuge, Morales managed the 9 crew members so well that they finished the major fencing and maintenance duties in record time.

As in past years, volunteer biologists assisted with the environmental education program, presenting YCC enrollees with opportunities to count turtle eggs, observe and record the behavior of Sooty Terns and surveys shorebirds. A year end trip to El Yunque National Forest provided a strong contrast to the environmental conditions in Culebra (it rained the whole time). This year's group seemed so exemplary to refuge staff that the entire group was chosen as "Worker of the Year".



Youth Conservation Corps enrollees pose with maintenanceman Henry Morales. SKW-CBR-8805.

4. Volunteer Programs

This year's decision to not bring in Earthwatch volunteers and to hire local help was an unprecedented success. Thanks largely to researcher Teresa Tallevast's interest in working with local help, the program mushroomed from the nine local employees to over 170 local volunteers that gave their nights and sleep to the turtle project.

As mentioned earlier, Tallevast's ability to organize and attract local residents to help with the turtle project has helped publicize Fish and Wildlife Service activities in a positive and constructive manner.

6. Safety

A YCC enrollee stepped on nail during the building of the new deck and received the only injury recorded on the refuge this year. Although the injury was not serious, it could have been prevented by more vigilant picking up of the nails.

Another "almost" accident occurred when Wolcott went to Cayo Luis Peña to check a sign and lost the propeller off the 155 hp motor. The cotter/shear pin had broken and the restraining nuts had come off, leaving the propeller free to back itself off. Fortunately, the propeller took the dive in shallow water and could be recovered by free diving. The incident reinforced the previous decision to buy dual motors for the Boston Whaler.

7. Technical Assistance

Culebra Refuge staff provided special assistance this year to the Coast Guard in maintaining the Culebrita lighthouse and in a local assessment of law enforcement needs; and to Fish and Wildlife-Ecological Services for help in the turtle research project and the prevention of illegal projects in the navigable waters around Culebra.

8. Other

On July 21, Dave Allen, Deputy Regional Director, came for a visit accompanied by Project Leader Jim Oland.

F. HABITAT MANAGEMENT

2. Wetlands

Although water conditions in the seasonally flooded, brackish lagoons of Culebra declined during October, replenishment in November and December allowed for reasonable habitat conditions for

the wintering White-cheeked Pintails and other water and shorebirds. End of the year counts were normal for the lagoon. We do not yet have an ongoing monitoring program for lagoon water conditions and levels. Aside from the large 74 acre Flamenco Lagoon there are eight smaller lagoons and 12 ponds that serve as waterbird habitat. Although Flamenco Lagoon is currently being considered for inclusion in the refuge, only four of the remaining smaller lagoons are on refuge property. No active management has been applied to these lagoons nor is any anticipated.

3. Forests

The 485 acre Mt. Resaca unit comprises the last remaining tract of relatively undisturbed semi-evergreen to deciduous tropical forest on the island. The unusual "boulder forest" formation that occurs commonly within the unit and in several other areas of the island is known for its serene beauty, difficult access and profusion of ferns, orchids, and intertwined air roots from Clusia rosea (Cupey, wild mammee) and Ficus trigonata (Jaquay, wild fig). The boulder forest forms the natural habitat of the endangered Wheeler's Peperomia (Peperomia wheeleri) and is the assumed habitat for the endangered Culebra giant anole. Common trees in the area include Guapira fragrans (Corcho), Bucida bursera (Ucar, Oxhorn bucida), Bursera simarouba (Almacigo, gumbo-limbo), Mastichodendron foetidissimum (Tortugo amarillo, mastic-bully) and Spondias mombin (Jobo). These trees can reach heights of more than 50 feet and have diameters up to three feet. Natural thorn thickets also occur on drier sites as well as on more disturbed sites within the unit.

Isla Culebrita and Cayo Luis Peña also contain small patches of deciduous, semi-evergreen forest consisting of Bursera simarouba, Pisonia subcordata, Bourreria succulenta and Exostema caribaeum. No forest management occurs on any refuge forests and none is expected.

5. Grasslands

Guinea grass, the preferred nesting habitat of the Sooty Terns, spreads over large areas of Peninsula Flamenco, Isla Culebrita and some of the small cayos. Mesquite and acacia encroachment due to overgrazing before 1975 has limited available nesting habitat on the peninsula. Mesquite and acacia removal are being proposed for 1989.

6. Other Habitats

a. Mangroves

Refuge lands include the 54 acre Puerto de Manglar unit consisting of a fringe of mangroves surrounding a bioluminescent bay popular

with boaters. Buttonwood or gray mangrove, black mangrove, white mangrove, and red mangrove all occur in the unit with large areas of stilt-rooted red mangrove being dominant. Turtle grass in the bay provides an excellent foraging ground for green sea turtles.

Although the Navy transferred the Puerto de Manglar unit to the Fish and Wildlife Service in 1975, boundary problems have made it difficult to manage. The original Spanish survey inaccurately measured the water's edge and a more recent and accurate 1985 survey found that our boundary line crosses a neighbor's homestead on higher ground away from the wetlands and leaves out whole sections of the mangroves. A 1987 proposal between the local landowners and the Fish and Wildlife Service suggested a land transfer resulting in a 120,000 square meter gain of mangrove wetlands for the service and a 26,000 square meter gain of high ground for the neighbor. The proposal is still under consideration.

The Ensenada Honda unit is the most extensive coastal mangrove habitat on Culebra. A series of small canals wind around two small mangrove islands and provide a scenic area for boating and a safe harbor during hurricane season. During October, when Hurricanes Gilbert and Helen were expected to hit the Culebra/Virgin Islands area, 17 sailboats tied up in the mangrove canals of the Ensenada Honda unit for protection. The land is not currently signed because of a land ownership dispute between the Fish and Wildlife Service and the Miguel Gonzalez family. The Gonzalez family claims the upland areas of the unit and brought a civil suit against the FWS in order to maintain their claim. If the case is resolved in favor of the FWS, the land will be surveyed, posted and fenced. We badly need a survey of the area to help prevent encroachment by neighboring landowners. Another neighboring land owner submitted a proposal to put a pier through the mangroves in the unit. The Department of Natural Resources (DNR) approved the proposal after initially denying it.

b. Outlying Keys (cayos)

The 23 small islands and rocky points surrounding the island of Culebra vary from small rocky projections to vegetated, formerly inhabited islands with accessible, sandy beaches. Most of the islands in the chain provide nesting habitat for seabirds, doves, Caribbean Martins and even an occasional White-cheeked Pintail. The two larger units, the 276 acre Isla Culebrita and the 316 acre Cayo Luis Peña, are both heavily visited by boaters. Some habitat modification of several small cayos is being proposed for 1989.



Throughout the northern winter, Brown Boobies nest on both Cayo Geniqui West and Cayo Geniqui East. SKW-CUL-8806

c. Beaches

Refuge beaches on Cayo Luis Peña and Isla Culebrita attract our largest number of visitors. During the labor day weekend, one particular beach on the northern coast of Cayo Luis Peña had 35 boats anchored with an estimated 150 people using the beach and protected waters of the island. Visiting researchers and resident FWS employees consider all beaches in the area to be potential hawksbill turtle nesting sites.

7. Grazing

Illegal grazing intrusions on the Flamenco Peninsula continued through the first part of this year including illegal cutting of the fence line to permit cattle to enter. Although DNR has traditionally allowed grazing on lands next to ours, they asked cattle owners to take their animals out of the area in October, restricting public grazing in the area. We have had no more incursions since the cattle were taken out.

G. WILDLIFE

1. Wildlife Diversity

Although Culebra, like most oceanic islands, is limited in terrestrial wildlife diversity, it contains a surprisingly large number of species. An incomplete list of over 400 native plant species includes 132 trees and shrubs, 104 weedy species and 10 epiphytes, 3 of which are orchids, 3 bromeliads and 4 parasites. Compared to other islands of similar size, Culebra's flora is rich and diverse. Thirty-three rare or unique species occur only on Culebra or a few of the other small islands. Even small Culebrita is relatively diverse with over 90 reported species of plants.

Culebra and its coastal waters support an assortment of 25 reptilian and amphibian species, including four species of endangered and threatened sea turtles. Four species of introduced terrestrial mammals (black rat, Norway rat, house mouse, and white-tailed deer) compliment the four species of known native bats, (fisherman bat, big brown bat, Brazilian free-tailed bat, and velvety free-tailed bat). The greatest diversity occurs in the known avifauna, with over 100 species residing or visiting the island chain. Thirteen species of marine seabirds breed on Culebra or its outlying cays and peak populations have exceeded 180,000 individuals. More than 10 brackish and freshwater ponds and lagoons provide feeding habitat for a wide variety of shorebirds and wading birds. Culebra hosts more than 36 kinds of herons, plovers, sandpipers, grebes, ducks, rails, stilts, coots and allied species.



White-tailed Tropicbirds nest in rocky crevices on Cayo Luis Peña as well as on some of the smaller, outlying islands. JS-CUL-8807

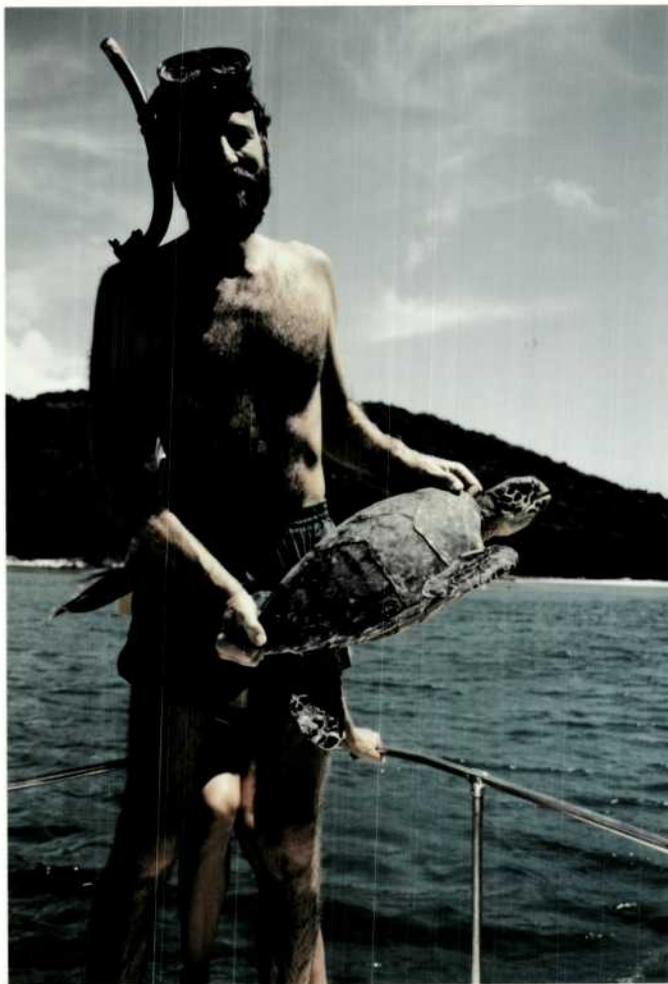
2. Endangered and Threatened Species

a. Sea Turtles

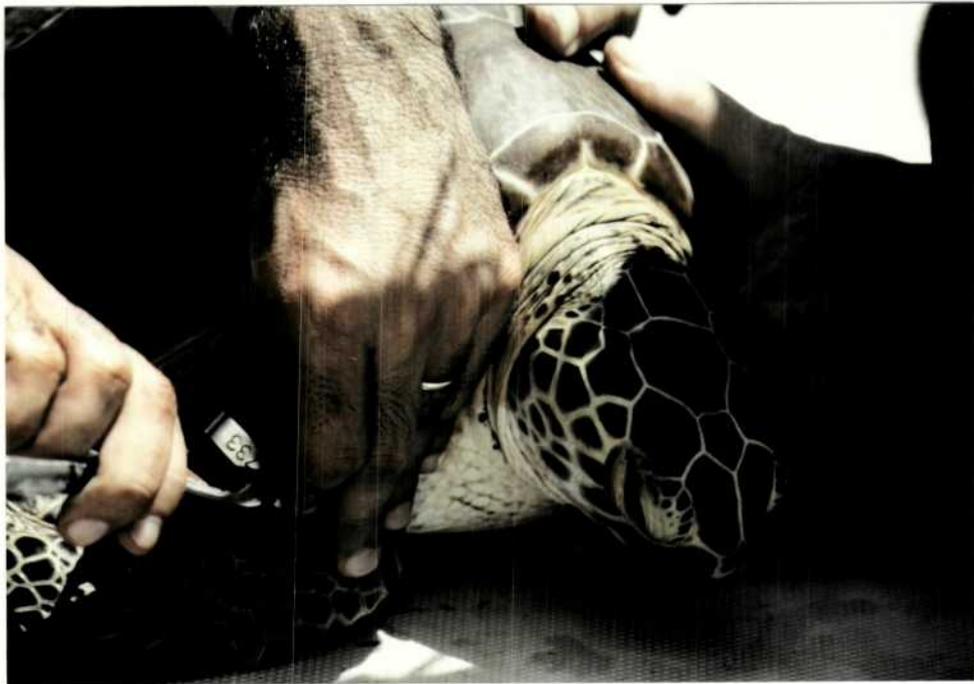
Four species of sea turtles occur in the area and two regularly nest in the Culebra archipelago. The leatherback turtle regularly nests on DNR protected beaches from March through June and the hawksbill turtle nests year-round in small numbers on Isla Culebrita and probably on some small beaches on the Flamenco Peninsula within the refuge, and on Cayo Norte, Playas Larga, Zoni and Tamarindo outside of the refuge. The green turtles are the most abundant within the water but rarely nest in the area. The last recorded nesting for a loggerhead turtle was before 1975 when the Navy turned over its lands to the FWS and DNR.

FWS Wildlife Biologist Jaime Collazo initiated an in-water capture and release study of the green and hawksbill turtles in 1986 in order to identify and describe important habitat areas, estimate abundance, determine size class distribution of the local population and to document the movement patterns in the Culebra archipelago. A team of up to 12 researchers and volunteers deploy a 600-foot by 30-foot monofilament net from the refuges 21-foot

Boston Whaler at 9 locations around the archipelago. A chase boat herds turtles into the net where free divers pick them from the net. Since 1986, a total of 112 green and 5 hawksbill turtles have been caught, double-tagged and released. Twenty green turtles have been recaptured.



FWS Endangered species coordinator Earl Possardt gets ready to release a tagged hawksbill turtle. SKW-CUL-8808



Ecological Services biologist Jaime Collazo and Ralf Boulon tag a green turtle before releasing it. SKW-CUL-8809



Virgin Islands Div. of Fish and Wildlife Endangered Species, Coordinator Ralf Boulon, Jr., drills a hole in a young green turtle's shell to mount a transmitter. SMR-CUL-8810

b. West Indies Brown Pelican

The Culebra archipelago is an important roosting and feeding site for the endangered Brown Pelican. Up to 60 individuals roost and feed in Puerto de Manglar and groups of 10 to 15 birds regularly feed near the beaches and rocky points.

c. Culebra Giant Anole

No documented sightings of this species have been made since 1932. A 1986 research project failed to find any specimens or document any recent sightings among island residents. A recent report from knowledgeable island residents however indicates there may still be a population of giant anoles on Cerro Balcon, a mountainous area of difficult access on private land east of the presumed habitat in Mt. Resaca.

A researcher working at the Harvard Museum of Comparative Anatomy was able to find several previously unknown specimens of the Culebra giant anole in European museums. His research extended the range of the species to include the islands of Vieques (Puerto Rico), St. John (U.S. Virgin Islands) and Anegada (British Virgin Islands).

d. Peregrine Falcon

Three or four individuals of the threatened tundra subspecies of the Peregrine Falcon regularly overwinter in the Culebra Island chain. They arrive in November and stay until March, preying on nesting booby chicks and an occasional tropicbird nestling.

3. Waterfowl

Despite low water conditions and poor water quality in the fall, major lagoons have supported concentrations of White-cheeked Pintail. Counts for most of the year are unavailable due to lack of personnel. The pintails began to arrive in late September and early October. One-hundred and twenty-four pintails were counted on Flamenco Lagoon on October 8th up from 44 which had been counted on October 1. Other freshwater and brackish ponds in the area support smaller numbers of waterfowl. White-cheeked Pintails nest in the guinea grass surrounding Laguna Zoni and the airport. Although there is some suitable nesting habitat around Laguna Flamenco, no nests have been found in that area. Most of the viable nests have been found on the outlying cays surrounding mainland Culebra.



White-cheeked Pintails at Flamenco Lagoon. File photo-CUL-8811

No Blue-winged Teal nor Ruddy Ducks have been recorded this year.

4. Marsh and Water Birds

Six species of heron and two egrets are relatively common on Culebra (Tri-colored, Green-backed, Great Blue, Little Blue, Yellow-crowned Night-Heron, Cattle Egret and Snowy Egret). Most lagoon habitats will support several of these. The salt marsh pond in the Ensenada Honda unit generally supports several of each and is a good place to see Tri-colored, Little Blues, and Green-backed Herons together. Snowy Egrets also commonly feed in the small pond. The Yellow-crowned Night Heron is probably the most common and thrives on all beach and marsh habitats. There is a Cattle Egret rookery in the mangroves at the east end of Ensenada Coronel containing from 200 to 300 nests.

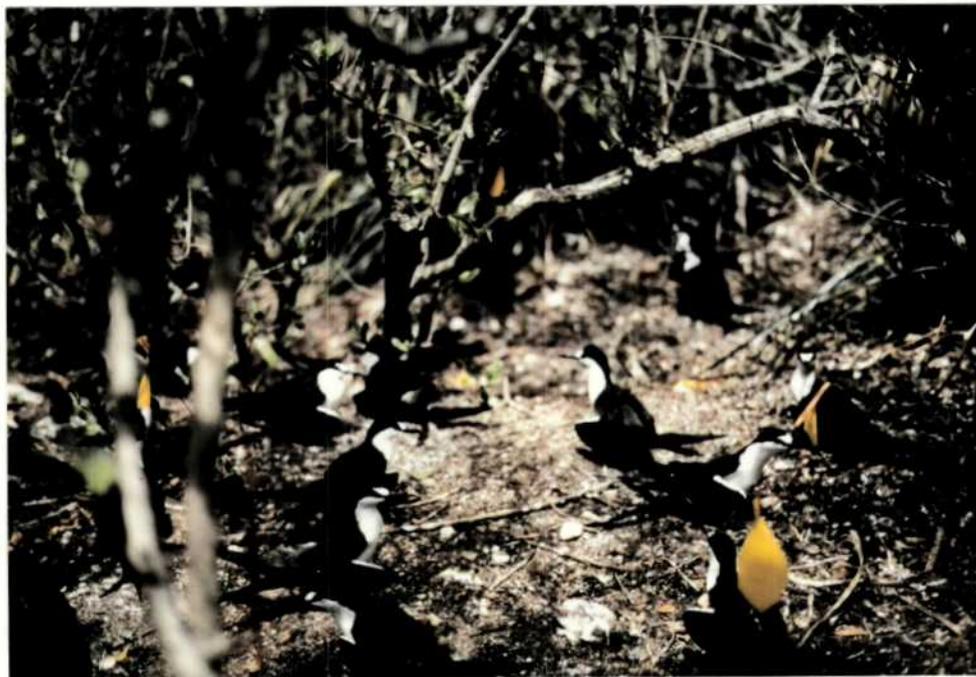
Three species of booby breed at Culebra. The Brown Booby is by far our most prolific breeder with 149 nest counted in late October on Geniqui Cays. Red-footed and Masked Boobies nest in smaller numbers (2 to 15 nests). Although nesting is continuous throughout the year, past researchers have reported a peak in late August and September.

Audubon's Shearwaters also nest in small numbers on Agua Cay and Matojo Cay. The return of banded birds to Matojo Cay indicates annual nesting by the species and high nest site fidelity.

Other common marshbirds found on Culebra include gulf-race Clapper Rails, Pied-billed Grebes, Least Grebes, Common Moorhens and Caribbean Coots.

5. Shorebirds, Gulls, Terns, and Allied Species

Shorebird populations have been monitored bimonthly when personnel have been available. Large numbers of Black-Necked Stilts and Greater and Lesser Yellowlegs begin to concentrate on the local lagoons with smaller numbers of the more unusual shorebirds in September. Early October saw larger numbers of Ruddy Turnstones, White-rumped Sandpipers, Pectoral Sandpipers, Semipalmated Sandpipers and Western Sandpipers. In late December, shorebird composition was similar to October's population with the addition of several Black-bellied, Wilson's and Snowy Plovers. The saltmarsh pond carried a population of previously unreported Stilt Sandpipers.



On the Flamenco Peninsula, Sooty Terns have the unusual habit of nesting under shrubby vegetation instead of in the open. JS-CUL-8812

Researchers Joanna Burger, Michael Gochfeld and Jorge Saliva completed the annual seabird survey in June.

6. Raptors

Kestrels are by far the most common raptor on the island, with Red-tailed Hawks also seen fairly commonly. Kestrels prey primarily on insects and lizards. Red-tails are known to prey on nesting seabirds. Ospreys, Peregrine Falcons and Merlins are usual winter visitors to Culebra and prefer the coastal areas and outlying cays.

7. Other Migratory Birds

Six winter plumage Chestnut-sided Warblers were seen in the forested southern coast of Culebrita during the last week of December.

8. Game Mammals

A resident, introduced population of white-tailed deer is moderately and illegally hunted on the island. Commonwealth biologist estimate the population to be between 90 and 100 animals, but very little is actually known about the stability, age-classes or hunting pressure on the island. Although there have been rumors suggesting that locals hunt on one portion of the refuge, we have found no positive signs indicating so. Most of the hunting seems to occur in other, more accessible areas of the island. No regulations nor attempts to control the illegal hunting on the island have been attempted by either the FWS or local Commonwealth agencies. Recently the African tick an introduced cattle pest has been found on a dead white-tail deer in the Puerto Manglar area. Commonwealth officials will be proposing a monitoring and control program to attempt to control the tick on the white-tail deer. As long as the deer act as a reserve host for the tick, current cattle treatment programs could be ineffective.

9. Marine Mammals

Visitors and residents occasionally report hump-backed whales between nearby islands in February, March and April during their migration period. Bottle-nosed dolphins are also common throughout the year with larger groups congregating in the area in April. Wolcott found a dead false killer-whaler (psuedorca crassidens) washed up on the east-facing northernmost beach of Cayo Luis Peña. The animal was a nine-foot female, eviscerated through the anal opening with no other obvious signs of injury.

14. Scientific Collections

A special use permit was given to Dr. Jim Anderson of the University of Puerto Rico for collections of plant specimens on Luis Peña Cay in October. Wolcott accompanied and provided transportation for Professor Anderson's graduate systematics class. Professor Anderson agreed to donate pressed and mounted specimens to the new refuge herbarium collection.

16. Marking and Banding

Researchers Ralph Morris and John Chardine banded 43 previously unbanded Brown Noddies on Cayo Noreste with color bands. Ten additional adult Noddies were banded on Cayo Yerba.

Researcher Jorge Saliva banded 112 Sooty Terns during his field season.

H. PUBLIC USE

1. General

With the coming of the new refuge manager, public contact and educational programs have become a priority. Continuing local poaching of seabird and turtle eggs has required a combined educational/law enforcement approach. A positive, educational presence helps counteract local resentment related to what is perceived as federal interference with resources the locals feel are theirs to use.

2. Outdoor Classrooms-Students

Researchers Teresa Tallevast and Jorge Saliva contributed a great deal to the positive public relations currently enjoyed by the refuge. They have consistently included local workers and volunteers in their project and have gone out of their way to present slide programs and presentations to visitors and locals. This year's leatherback project included more than 170 local volunteers through an intensive "recruitment" campaign in the main gathering places on the island. Jorge Saliva presented programs on seabirds in the local school and recruited volunteers there at the same time.

Numerous other presentations and programs were presented to groups as diverse as military cadets and special education groups.

Wolcott began a youth project in October in cooperation with two local teachers, Dulce de Rio and Juana Sanchez. Eight students will be learning how to take, develop and print black and white photos and color slides with the intention of developing a locally

produced slide show about the refuge and natural resources of Culebra. An accompanying show will focus on the oral history of the island, documenting the older fishing, ranching and hunting practices through interviews with older folks still living on the island.

5. Interpretative Tour Routes

During his three months of residence, Wolcott conducted 12 tours for small groups to various refuge units.

6. Interpretative Exhibits/Demonstrations

Culebra's Sport Festival ("Festival Deportivo") attracts hundreds of people from all over Puerto Rico and concentrates local residents in one area where they come to watch sporting events, dances and listen to music. Wolcott and Morales set up an information booth with the help of local youth and volunteers Teresa Tallevast and Laurie Smelter. During three days, volunteers and staff spoke with over 800 people about sea turtles, nesting seabirds, conservation on the island and the depletion of local fishing resources.

10. Trapping

Illegal trapping of land hermit crabs and edible great land crab (Cardisoma guanhumi) continues in refuge units. Local residents and visitors regularly trap hermit crabs to be used as bait and the land crab for soups and stews. Trapping on refuge property is so common that when the local head of the Culebra Conservation and Development Authority was found taking crabs on Culebrita he not only didn't attempt to hide it but was surprised that we considered crabs a protected species. Enforcement of trapping is difficult not only because of the widespread units but also because of continuing boundary disputes on many units of the refuge.

11. Wildlife Observation

An unusually large number of birdwatchers visited the refuge during December. During the last week of December, over 20 visitors came to ask about the local bird life and request bird lists from the refuge. Informal conversations with other visitors to the island indicate that a large number come to enjoy the wildlife resources of the area.

13. Camping

Overnight camping is prohibited on the refuge. Most areas are adequately signed and there have been no significant problems during 1988.

16. Other Non-wildlife Oriented Recreation

Weekends draw as many as 500 visitors to the beaches and sheltered bays of the refuge. Regulatory signs have helped prevent problems in those areas, but some vandalism has made it difficult to maintain the north beach sign on Luis Peña. Most visitors come to enjoy the beaches and beauty of the offshore islands.

17. Law Enforcement

Wolcott completed nine weeks of law enforcement training at the Federal Law Enforcement Training Center in Brunswick, Georgia on December 22, 1988. Although warnings are sufficient for most law enforcement contacts on Culebra (trespassing, crab trapping etc.) a number of violations are serious enough to require notices of violation (egg stealing, turtle poaching and mangrove destruction).

Several leads took us out looking for turtle poachers during the fall, none gave us enough information to develop a case. Consistent rumors and information sources point out a low level continuing turtle poaching problem in the waters around Culebra.



Isolated Playa Resaca, surrounded on the south east by refuge lands, can be reached through several areas and is difficult to adequately patrol against turtle nest poachers. SKW-CUL-8813

Many of the suspected poachers are fisherman from Vieques and the Puerto Rico mainland and are sufficiently outside the local community so that local fishermen will inform on them. There is

enough resentment of "outside" fishermen depleting the catch of certain animals and robbing from local traps that we may be able to convince local fishermen to start a cooperative monitoring system. Active cooperation with the U.S. Coast Guard, U.S. FWS Special Agents, the National Marine Fisheries Service and Department of Natural Resources agents may help improve our coverage of the 300 square miles of Culebran waters.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

Morales supervised the YCC crew while they replaced the plywood deck panels from the headquarters deck with planks. They also prepared and painted both the residence and office trailers.

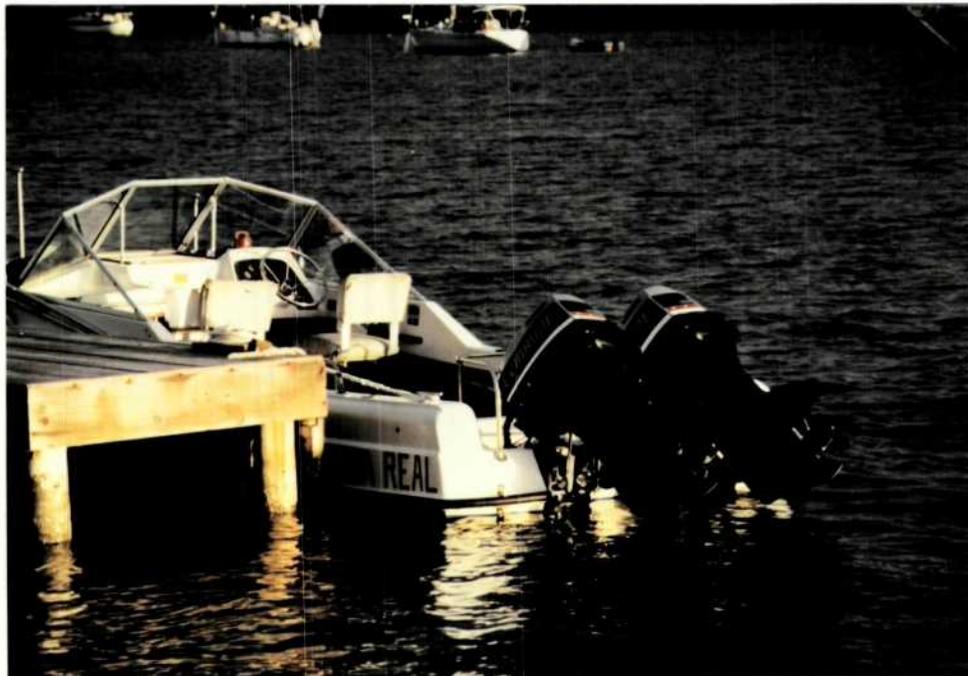


Morales completed the renovation of the headquarters deck, replacing plywood sheets with more attractive and practical planks. SKW-CUL-8814

4. Equipment Utilization and Replacement

Two new 100 hp commercial Evinrude motors make the Boston Whaler more secure for open ocean patrols around the refuge. Morales also painted and patched the hull while the boat was out of the water.

The refuge bought a new 4 hp lawnmower to replace the old 4 hp mower that had finally succumbed to the salt air.



The installation of dual 100 hp outboard motors provides an added degree of safety necessary in the ocean waters around Culebra. SKW-CUL-8815

5. Communications Systems

An older marine VHF radio was sent to Standard Communications for repair while an antenna and facilities were prepared to mount a 24-hour base station at the refuge.

8. Other

During the 1988 season the YCC crew cleared and repaired the boundary fences of all the units in Culebra. The growth rate of tropical vegetation and the damage caused by humid, seacoast air requires a complete overhaul every year.

The refuge bought a herbarium cabinet and supplies to begin collections for a herbarium of refuge plants.

The refuge also bought a small Noreaster rubber dinghy small enough to fit into the Boston Whaler to use as a landing craft on the rockier cays.

J. OTHER ITEMS

1. Cooperative Program

The cooperative agreement between the Culebra Conservation and Development Authority and the Culebra National Wildlife Refuge provides a large measure of our local support facilities. Not only do we lease our refuge headquarters and residence site, but they also provide gasoline at cost and full use of a copy machine. We hope to cooperate on field management and patrols more in the future.

2. Other Economic Uses

J.C. Colon, the owner/operator of the local radio station and a special use permit holder, expanded his small equipment storage building on the Mt. Resaca unit next to his radio tower. Oland had given prior permission.

Culebra is currently going through a visible growth spurt and interest in tourism development is growing apace. We have received a series of proposals for use of the observation point area (even though we are not the current owners) and there is an increase of interest in the natural resources of Culebra. Several groups have proposed a combination visitor center and economic center (guest house in one, research center in another). No action has been taken on any proposal.

K. FEEDBACK

We need to move as quickly as possible on resolving land ownership issues in the Puerto de Manglar, Ensenada Honda, Observation Point and Laguna Flamenco areas. A clear ownership of the important lagoon areas is essential to the future management of the White-cheeked Pintail, a candidate species for listing as threatened. Culebra's past record of successful squatting does not allow for any doubt as to ownership and control. If we do not claim the lands, it will be too easy to lose their value.

The refuge is an important community resource and needs to contribute to the community's development in a compatible manner. A Visitor Center could improve the focal point that would allow us to improve our public education and contact programs, protecting the outlying resource, while at the same time providing an attraction for Culebra's future. We hope that FWS budgetary plans will be able to consider this in the near future.

S.K. Wolcott



A lack of site specific planning has led to extensive development pressures on Culebra. File photo-CUL-8816



Confusion concerning FWS boundaries in some areas has permitted this pier to be illegally build then approved after the fact on what may be FWS property. SKW-CUL-8817

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE

SANDY POINT NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

Calendar Year 1988

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

Sandy Point NWR

INTRODUCTION

The Sandy Point National Wildlife Refuge was established for the protection of nesting leatherback sea turtles on August 30, 1984 when the West Indies Investment Company agreed to sell 398 acres of land and beach front in southwestern St. Croix to the Fish and Wildlife Service for \$2,500,000.00. The Sandy Point rookery was "discovered" in the mid-1970's and is the largest known nesting population of the leatherback sea turtle under United States jurisdiction. In September 1978, the Fish and Wildlife Service designated a strip of land on Sandy Point as Critical Habitat and in March 1979 the National Marine Fisheries Service determined the surrounding waters to be Critical Habitat for the leatherback sea turtle.

Sandy Point is the longest beach area in the U.S. Virgin Islands. The geological formation of the point is unique in the Virgin Islands. The peninsula probably grew from oscillating north and south shore currents which formed spits that gradually closed to form Westend Salt Pond. Westend Salt Pond may have been formed as far back as the Pleistocene epoch (about one million years ago). Sand deposition and erosion occur continually, and the width of the beach at any one point is variable. The trend in the past four to five years has been toward more erosion than deposition; however, the basic geologic feature is quite stable. Maps dating back to 1667 show Sandy Point essentially as it is today. Sandy Point is a flat area and virtually all of it is below 10 feet in elevation.

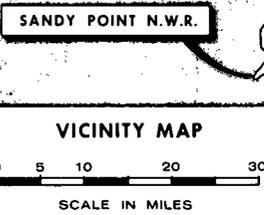
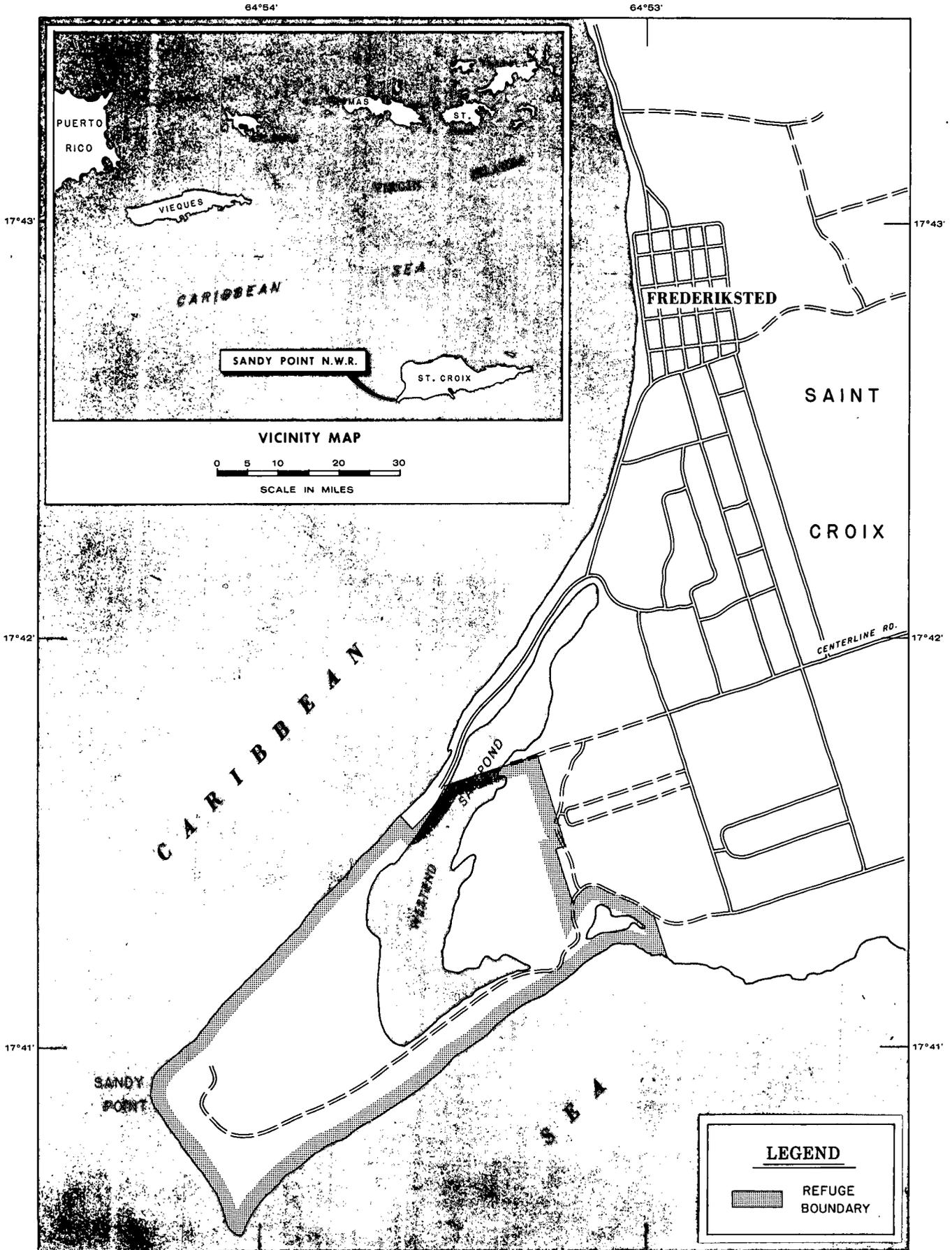
The littoral woodland vegetation type occurs on the flat sand inland of the beach areas. Plant species diversity is low because of salt stress. The shore of Westend Salt Pond is characterized by small patches of mangroves. The animal diversity on Sandy Point is low, as is typical of oceanic islands, because of the relatively harsh beach environment. Birds are the dominant vertebrate life form.

SANDY POINT NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

SAINT CROIX, VIRGIN ISLANDS

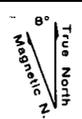
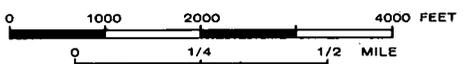
UNITED STATES
FISH AND WILDLIFE SERVICE



LEGEND

 REFUGE BOUNDARY

COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY U.S.G.S.



MEAN DECLINATION
1958

ATLANTA, GEORGIA AUGUST, 1980

4R V.L1035 403

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D. PLANNING

2. Management Plan

A management proposal for Sandy Point was sent to Regional Office (RO) in October. The purpose of this proposal was to enumerate necessary management activities that are needed on the refuge including: boundary definition and posting, designing and installing an entrance sign, coordinating the installation of posts to eliminate vehicles on the beach, and coordination of special use permittees, Least Tern habitat management and leatherback sea turtle research. A request for a temporary NTE one year appointment was suggested as the most efficient and cost effective means of accomplishing these tasks.



Aerial view of Sandy Point NWR. SPD-8801

4. Compliance with Environmental and Cultural Resource Mandates

A Coastal Zone Management Plan for Saint Croix was received in June. The document, prepared by the Virgin Islands Department of Planning and Natural Resources, had incorrectly designated Sandy Point as residential - medium density.

5. Research and Investigations

Since 1982, the most extensive research in the world on the leatherback sea turtle has ensued on Sandy Point NWR. The research has been accomplished under the auspices of the U.S. Virgin Islands

Department of Planning and Natural Resources. Funding has been provided through Section 6 of the Endangered Species Act and through The Center for Field Research (EARTHWATCH).

Sandy Point NWR supports the major concentration of nesting leatherbacks in U.S. waters, 20-50 individuals per year. The estimated world population of adult females is 115,000 individuals.

Bob Brandner and Susan Basford were the principal investigators for the research again this year. There were eight Earthwatch teams from April 6 through July 4. Each team came for 10 days totaling 65 Earthwatch volunteers. The volunteers contributed an average of \$1,180 each and a total of 5200 hours of their time to this research.

There were 332 recorded leatherback activities for the season, 252 nests and 84 dry runs. Of the nests, 147 (59.2%) were relocated to prevent inundation or loss due to erosion. A total of 10 green turtle activities were recorded, 6 nests and 4 dry runs.

From the 161 nests excavated after hatching, 6,711 hatchlings had emerged for a success rate of 54.15%. Relocated nests accounted for 3,699 of those hatchlings. Only 2 green sea turtle nests hatched producing in 173 hatchlings.

Egg counts were made for 212 nests with a mean clutch size of 113.3 eggs and 79.7 yolked eggs per clutch. All turtles were measured with a mean carapace length of 153.3 cm (range 137-167 cm). Twenty-four individuals were weighed. Mean weight of the turtles was 322.7 kg (711 pounds), (range 259-409 kg). The average incubation period is 61.2 days. Hatch success has been somewhat lower than in previous years at 51.2% (51.9% for relocated nests and 49.5% for in situ nests). It is believed that dry habitat conditions contributed to this reduction. Temperatures were also monitored in 9 nests.

Sandy Point NR86- "Breeding ecology and habitat management of Least Terns at St. Croix, U.S. Virgin Islands" (41520-01).

The efforts of this research project were far reduced this year because of the resignation of the Virgin Island Fish and Wildlife Service biologist who had been coordinating the efforts. The nesting area was prepared in March by the Virgin Islands government. It was scraped with a bulldozer to remove the vegetation in the target area. Since there was no one on site to follow-up, by the time the Least Terns arrived (late April) the regrowth of vegetation stymied most attempts at nesting, and all terns abandoned the nest sites after initial attempts. There was also no follow-up on the nearby Hess property to determine nesting success to compare with previous years. This was the third year of a five year study. Let's hope we can get a better handle on

things in 1989.

E. ADMINISTRATION

A temporary, NTE one year, Range Technician position was advertised in November. The purpose of this position is to provide continuity and necessary support for this important refuge area. Logistics make it difficult to accomplish many of the needed projects from the Cabo Rojo headquarters.

By year's end, Fred Sladen, long-time St. Croix resident, previous Virgin Islands FWS biologist and past-president of the local environmental association had been selected and approved for the position. Sladen will begin work shortly after the new year.

4. Volunteer Program

A total of 65 Earthwatch volunteers contributed 5,200 hours to turtle research. Additionally, 96 hours were contributed by local volunteers. Without the contributions and dedication of Earthwatch volunteers it would be impossible to accomplish as much as we do toward turtle research. This has been a very successful program for the refuge, with the able coordination and work from the principal investigators who are paid by VI Fish and Wildlife with Endangered Species section 6 funds.

F. HABITAT MANAGEMENT

6. Other Habitats

The U.S. Navy asked for Corps of Engineers approval to fill a wetland area adjacent to the proposed theodolite station on Sandy Point Refuge. The refuge found out about this through the ES Office. We have been negotiating with the Navy regarding the use of refuge lands for the construction of the theodolite facility but we had never heard of a proposal to fill wetlands. An inspection was made of the proposed fill area. No wetlands were found in the adjacent area, however a refuge boundary marker was found in the parking area of the Stony Ground Resort Picnic Area. The pin was found imbedded 15 feet from the edge of the parking lot. It appears that the city of Frederiksted is using part of the refuge property for parking and recreational purposes. This use has been occurring since before the refuge was established. A follow-up boundary review is planned for next year.

On March 16, Oland met with Toby Tobias of the Virgin Islands Fish and Wildlife and Frederiksted Administrator Archilles Flores to discuss a request by the town of Frederiksted to remove some vegetation on the edge of Sandy Point NWR. The refuge is being used as a staging area for thieves who steal from visitors on the adjacent Stony Ground Picnic Area. A special use permit was issued contingent on the city removing trash, maintaining a boundary fence

and limiting any brush removal to specified areas.

G. WILDLIFE

The leatherback sea turtle was listed as an endangered species in 1970. In 1978, after extensive study, FWS designated an area 0.32 km wide and 3.06 km long on Sandy Point as critical habitat for the leatherback turtle. Sandy Point was purchased in 1984 by FWS in an attempt to provide protection for this endangered species. Today, the leatherback sea turtle is the most significant species on the refuge. The leatherback is the largest and most morphologically divergent of the sea turtles. Being an open ocean, long-distance migrator, it only enters shallow coastal waters to nest. For more information on the leatherback at Sandy Point refer to Section D.5.

The Christmas Bird Count was held in late December. The seven counters worked from 6am to 6pm. No unusual species were documented for this count.

For information concerning the Least Tern refer to Section D.5.

H. PUBLIC USE

7. Other Interpretive Programs

An article concerning Sandy Point NWR was published in the National Wildlife magazine. Additionally, a two part series was published in the "St. Croix Avis" a local newspaper, informing the public of regulations and activities on the refuge.

11. Wildlife Observation

Over 650 visitors joined the researchers this summer during their nightly walks to observe adult turtles and hatchlings. Nightly tours were conducted from April 15 to July 3 on a first come-first served reservation basis for a limit of 10 people on any night. These regulations provided a manageable group for the researchers and a rewarding experience for all parties (along with limiting impacts on the turtles). During July there were no provisions for tours because of the reduced number of turtles. However, in August tours were again conducted on Friday and Saturday nights to observe hatchlings.

15. Off-Road Vehicling

In an attempt to protect the nesting and hatchling turtles, off-road vehicling is not permitted on the refuge. However, many vacationing tourists rent 4-wheel drive jeeps and consider any and all beaches to be a part of their vacationing playground. The refuge staff assumed that a percentage of these people would not drive on Sandy Point if they knew the detrimental affects they were

causing the turtles. Therefore, Oland sent a letter to the jeep rental agencies on St. Croix (approximately 20) asking them to post the letter which requests that 4-wheelers avoid the refuge for protection of the sea turtles.

Along these same lines Brandner and Basford contacted the Virgin Islands Telephone Company (VITELCO) to request materials and assistance in installing short posts at vehicle access points to the beach. Initial indications were favorable for assistance from VITELCO. We hope to complete this task prior to next year's nesting season.

J. OTHER ITEMS

1. Cooperative Programs

Two special use permits were issued to photographers this year (still and movie). Following stringent regulations to protect the turtles, the filming went off as scheduled.

The U.S. Coast Guard also has a special use permit to maintain a 20 foot x 20 foot area for a light station on the southwest side of the the refuge. This permit is a five year agreement ending in 1990. The Navy is completing the permitting process to establish a new theodolite station on the northern end of the refuge. This would be a 25-year agreement with provisions for 25-year renewals. We are cooperating with the Navy on this project and hope to enlist their cooperation for sonar tracking of leatherback sea turtles.

3. Items of Interest

A gas spill was reported along the southern coast of St. Croix on May 22. The spill of approximately 400 gallons of diesel fuel occurred at the Texaco terminal. This relatively light fuel was not discernible in the waters surrounding the refuge. However, a strong diesel smell was in the air for a few days.

Developer Emerson Ussery contacted the regional director concerning the possibility of obtaining a Special Use Permit to build a golf course on the refuge. Persuing conversations with him let us in on his grand scheme. Along with the golf course he wanted to build a zoo, aquarium and park that would encompass the entire 380 acres of refuge land (see detailed map next page). Adjacent to the refuge a first class hotel would be built and part of the Westend Salt Pond would be filled to build a new road to provide access to the resort.

Mr. Ussery assured us that there would be no adverse affect to the sea turtles. However, our response pointed out doubts that his project would be compatible with the refuge purpose. (But what a sand trap he would have for his golf course!) The Ecological Services' response to his proposal was also less than favorable.

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE
DESECHEO NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

Calendar Year 1988

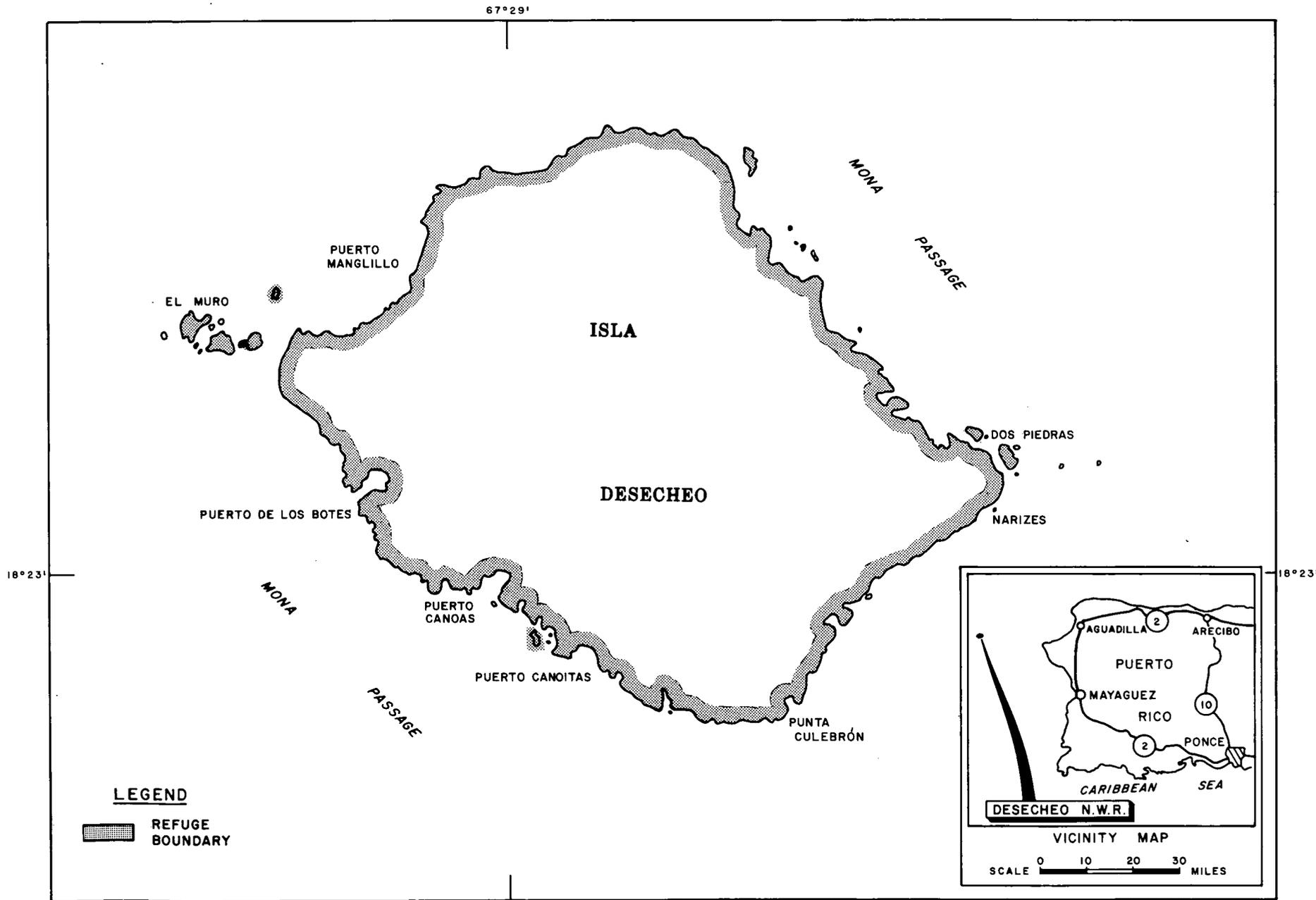
U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

DESECHEO NATIONAL WILDLIFE REFUGE

PUERTO RICO

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE

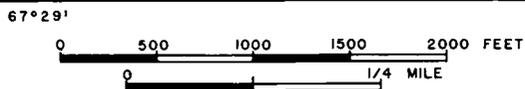


LEGEND

 REFUGE BOUNDARY

COMPILED IN THE DIVISION OF REALTY
FROM A BASE MAP BY M. MANNELLO
AND R.P. BRIGGS, U.S.G.S. 1966

ATLANTA, GEORGIA JULY, 1977



6°30'
TRUE NORTH
MAGNETIC N.
MEAN DECLINATION
1966

4R PR 920 403

Desecheo NWR

INTRODUCTION

The refuge is located in the Mona Passage, about 15 miles west of the northwest corner of Puerto Rico. The name for the island is thought to have originated from the Indian word Sikeo, which means "high mountainous land; derived from Si for high, ke for land, and o for mountain. On the early maps (from 1500 to 1600) the island was known as la Isla de Zecheo, then became known as Desecheo probably as a result of the merging of the last two words of Isla de Zecheo.

The island is bounded on the north by the Atlantic and on the south by the Caribbean. Desecheo NWR encompasses the entire 360 acres of Desecheo Island. The island is extremely rugged and rocky. Its highest peak is 676 feet according to photogrametric calculations. Geologically, the island is underlain chiefly by deformed fragmental volcanic rocks of the early Tertiary Period.

The early explorer Christopher Columbus passed by the island (seeing his third National Wildlife Refuge of the trip) on November 22, 1493 on his way to the Island of Hispaniola. In 1798, the early Puerto Rican historian Fray Iñigo Abbad y Lasiera wrote that Desecheo was "uninhabited, although covered by trees, has many wild goats which are hunted by smugglers..." The island was not visited by naturalists until B.S. Bowdish visited the area to collect bird specimens on June 24, 1900 and again from July 6 to 10, 1901. Dr. A. Wetmore stayed on the island June 13-16, 1912 and recorded his avian observations in a series of publications. The first botanical exploration was conducted by W.E. Hess and F. L. Stevens in May 1913. Dr. N. L. Britton made a botanical exploration of the area February 17-20, 1914 and was accompanied by a group of American entomologists. The geologist B. Hubbard visited Desecheo in the summer of 1916, where he was the first to recognize the two marine benches which he labeled the Upper Desecheo Stage and the Lower Stage. P.H. Struthers visited the island to make ornithological observations in January 1922 and in 1926. Dr. S. Taylor and some of his students spent three days (May 7-9, 1927) on the island making further ornithological observations. No records of any visits to the island for scientific purposes appear to have been made between 1927 and 1965. The most significant recent scientific work on the native plant and animal life were the visits of botanist Dr. R. Woodbury to the island April 5, 1967, July 12-14, 1968, and in November 1974.

Desecheo Island was part of the original Crown Lands that came to the United States at the end of the Spanish-American War. It was reserved by Executive Order of President Taft in December 1912 for use as a forest and bird preserve. At that time it was the site of the world's largest Brown Booby colony as well as a breeding area for Laughing Gull, Brown Noddy, Bridled Tern, Magnificent Frigatebird and Red-footed Booby. The island was transferred, by

the Presidential Proclamation of President F.D. Roosevelt, to the insular government of Puerto Rico on June 16, 1937, for use as a forest and bird preserve. In April 1940, Desecheo was transferred to the U.S. War Department for use as a bombing and gunnery range. The island was used from 1940 to 1952 as a practice target for aerial bombardment. From 1952 until 1960 Desecheo was used as a survival area for the U.S. Air Force. (It still is a survival area for all forms of life on the island). In July 1966, NIH introduced 56 rhesus monkeys to the island to establish a free ranging monkey colony to be cropped for medical research. In December 1976, Desecheo Island and its monkeys became part of the National Wildlife Refuge System.

Although formerly containing a colony of 15,000 Brown Boobies, no current successful Brown Booby breeding is known to occur on the island. However, Red-footed Boobies are known to be on the island and an estimated 12 pairs are believed to be successfully breeding. As early as 1969, studies of the rhesus monkeys released by NIH indicated extensive predation on the boobies by these free ranging animals. Efforts were made to remove the monkey population in 1977, 1979 and 1981. None of these early efforts resulted in more than partial removal of the animals. Calendar year 1985 marked the first time that an intensive and adequately funded monkey removal program was attempted. (This program continued into 1988).

Other noteworthy fauna of the island are the feral goats that became established in the 1700's. Feral cats and rats are resident at Desecheo Island as well. Peregrine Falcons are often seen as they stop off to harvest a Red-footed Booby or two during their winter visits to Puerto Rico. Three endemic species and subspecies of lizards and one species of snake are also found on the island.

The island's distance from Puerto Rico (14 mi.), rough seas and rugged coastline combine to make management difficult. Boat travel to the island is slow and once you get to the island you might not be able to land; or once landed you might not get off. Helicopters are faster but at \$600 and hour they can suck the budget dry in a hurry. Therefore, we do not often set foot on the island.

A. HIGHLIGHTS

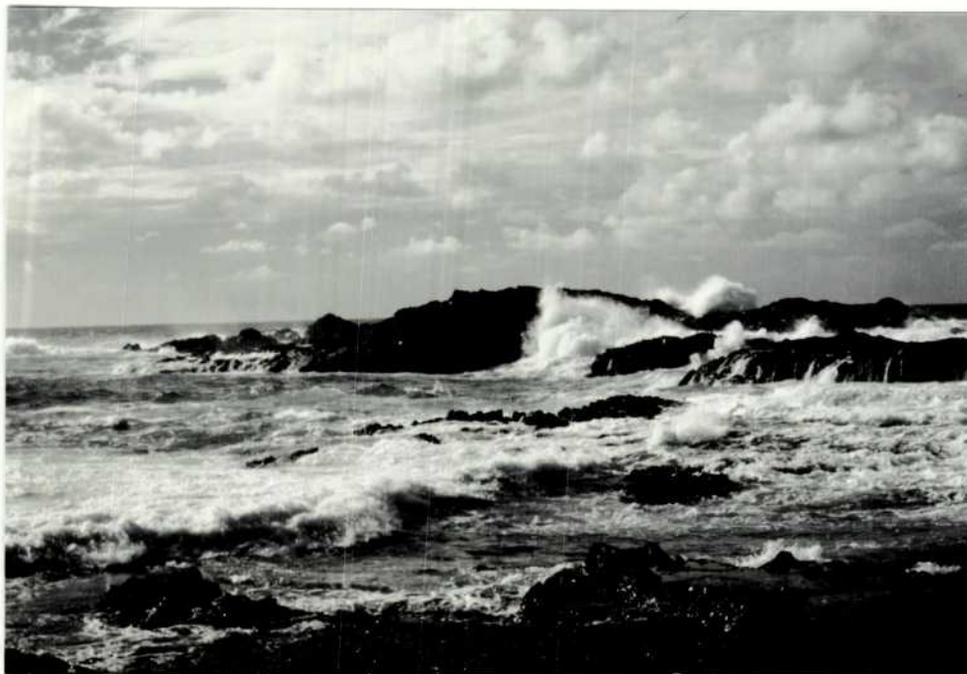
The monkey removal project continued with the assistance of USDA personnel. (G. 15)

G. WILDLIFE

15. Animal Control

After numerous attempts to remove the feral rhesus monkeys from Desecheo during the period from 1977 to the present, a contract with the U.S. Department of Agriculture was established to hopefully finish the job. The previous efforts had initially involved extensive trapping efforts. While everyone involved believed that live trapping was the most desirable means of removal it became evident that by exclusive use of live traps we could never attain our goal of removing all of the monkeys from Desecheo. Therefore, this latest effort employed a combination of live trapping and shooting (not the ones in the live traps).

The project began January 6th with the arrival of John Herbert who had worked on previous removal efforts and was very familiar with monkey habits and potential trap sites. John was joined by Doug Hall the project supervisor, and other USDA personnel and the first trip to the island was made on January 22nd after a weather delay due to rough seas.



Access to Desecheo isn't always easy. This is the best site.
DH-DES-8801

Doug Hall's report on the removal effort is attached. It contains most of the factual information about the project. In his report, he referred to the proposed use of poisons and the administrative decision to redirect efforts. This "redirection" and cancellation of the request for EPA approval to use the poison resulted from the intervention of the International Primate Protection League (letter and response attached). While it might be argued that the poison may not be the most humane method of removal, it still seems like it is the most viable alternative to achieve total elimination of the monkeys. That is our management goal. Other vertebrates using the island that could be affected are rats, cats, goats and illegal aliens. By selecting the proper bait we would be able to avoid non-target species, or conversely... Oh well, poisons are no longer being considered. The bottom line for the project is that a total of 30 monkeys were removed this year and since the removals were first initiated in 1977 a total of 147 have been taken off the island. When the USDA personnel left Desecheo on February 23rd, they were aware of at least three remaining monkeys, two adult males and one juvenile. As much as we would like to believe the juvenile is a male and there are no others on the island, our past experience indicates this is extremely unlikely (i.e. the odds are better of winning the N.Y. Lottery without buying a ticket). Although no census of the island was conducted after the crew left, a follow-up trip is scheduled for early in CY 1989.



Major efforts were expended to reconstruct traps and move new ones to the sites used by the monkeys. DH-DES-8802



John Herbert, Doug Hall (right) and one of the two monkeys they were able to trap. DH-DES-03

H. PUBLIC USE

Although routine public use is not permitted on Desecheo there are occasional activities that occur there and should be documented somewhere, namely here. One such activity occurred during the monkey removal project. Members of the crew observed a light aircraft circling the island and one of them thought he saw something fall from the plane. Shortly afterwards a boat which had been in the vicinity arrived at the location and manoeuvred for about an hour before departing. Probably just an airborne litterbug and one of those crazy environmentalist trying to clean up the ocean. Before radio contact could be made and the activities reported to the Coast Guard both plane and boat had departed. The distances from the observer precluded a precise description of either.

During previous operations on Desecheo, activities by illegal aliens (Dominicans) had been observed. This year, the monkey crew observed a couple of boats, of the type and size that might carry illegals, approach the island but when their campsite was spotted the boats immediately departed. By the end of the year the Immigration and Naturalization Service (Border Patrol) office at Aguadilla had become fully operational and frequent patrols of the

Desecheo area were being conducted. Based on the reports of the INS people it appears that the use of Desecheo as a staging area has been greatly curtailed.

During September, we were contacted by a ham radio operator who requested a Special Use Permit to spend about two weeks on the island communicating with other "hams". It seems like there would be more hospitable areas to work from, but Desecheo has been designated as a "Country". Real political boundaries don't mean anything to a dedicated operator (I guess it's like a life list addition to transmit or receive from another "country" even if it isn't another country). Maybe radio operators like birders have lumpers and splitters. Desecheo must be a sub-species. Anyway, after discussions with the regional office and a thorough review of the files which were created when Desecheo first became a "Country", a permit was issued with numerous conditions and a provision for a report of all activities observed as well as those conducted. Bottom line-Bad Weather-No Trip-Yet.

RHESUS MONKEY PROJECT
DESECHED ISLAND, PUERTO RICO

FINAL REPORT

INTRODUCTION

On September 30, 1987, a cooperative agreement was initiated between the U.S. Fish and Wildlife Service (FWS) and U.S. Department of Agriculture - Animal Damage Control Program to eliminate a small, non-native population of rhesus monkeys (Mucaca mulatta) from Desecheo Island, Commonwealth of Puerto Rico. The monkeys have been reported to be a major limiting factor to the welfare of two nesting colonies of protected seabirds found on the island. The birds are brown boobies (Sula leucogaster) and red-footed boobies (S. sula).

Historical records indicate populations of 15,000 brown booby birds on this island and there are currently less than 100 breeding pairs remaining. Recommendations were made as early as 1969 to evaluate the heavy bird predation from this introduced, exotic primate. The National Wildlife Federation passed a resolution in 1977 requesting the FWS to take immediate steps to eliminate the monkeys, and a similar resolution was passed in 1983 by the American Ornithologists Union.

Past control efforts officially began in 1977 and have continued sporadically until January 1987. A total of 111 monkeys were removed utilizing live trapping and shooting.

ADC OPERATIONS

A select team of six wildlife biologists with a diversified background in control methodologies was selected to participate in the operation. In an effort to fully utilize manpower under the time and fiscal constraints, the decision was made to stagger the work force to extend field operations. On 6 January 1988 the first team member arrived on the mainland and began the coordination of transportation and securing of supplies and materials. On 17 January two more members arrived in Puerto Rico with plans for the three-member team to begin field operations on Desecheo the following day. Due to inclement weather and high seas, the trip was postponed until 22 January. Two additional biologists arrived on Desecheo 10 February.

Results of past control projects indicated the necessity for new, innovative techniques. Because of this, a diversified removal approach was initially planned involving the use of live trapping, snaring, toxicants, tranquilizers, radio telemetry, pyrotechnics and shooting. A concerted research effort was conducted at the Denver Wildlife Research Center to identify a candidate toxicant. From this work, a federally registered pesticide product, Technical Sodium Diphacinone (EPA Registration

Number 3240-22) was identified. A registration application package was prepared for Fish and Wildlife Service submission to the EPA for a Section 18 (40 CFR 166.20) Emergency Specific Exemption Permit to control the monkeys. - Administrative decisions necessitated redirection of optimal control methodologies with live trapping being the technique of choice.

Telemetry equipment was secured and a monkey originally from Desecheo Island was loaned to the operation to assist in locating other monkeys on the island. Pyrotechnics were obtained to help locate and dislodge monkeys from remote inaccessible portions of the island. Previously used live traps remaining on the island were retrieved from cliffs from which they had been thrown and rebuilt from parts to construct two usable traps. Two new live traps were also provided through the FWS. Trapping proved to be extremely difficult because the few monkeys remaining on the island after the previous control operations had become trap shy and would not enter live traps.

Two adult male monkeys were captured with the expenditure of 23 days trapping (54 trap-nights and 86 man-days trapping), which includes pre-baiting efforts. Both monkeys were treated with 1 cc of Ketamine Hydrochloride and transferred to a temporary holding pen to minimize trauma of handling. Contact was made with the Mayaguez Zoo, Puerto Rico, and the monkeys were transferred to the primate facility at the zoo.

Upon cessation of trapping efforts, field observations indicated that only three monkeys remained on the island. Of these, one monkey is less than 1 year old and the other two appear to be males. Because of intense human activity and the species' ability to successfully utilize 340 acres of rugged island terrain as a home range, it is possible that some monkeys escaped our detection. This cannot be substantiated without a follow-up reconnaissance of the island.

During our trapping operation, we captured and removed three male, domestic black cats. Apparently these cats were released on the island by Puerto Ricans as some part of a superstitious belief.

With the current monkey population apparently lower than it has probably ever been since the introduction on Desecheo, control should continue in an effort to save the booby birds from continued predation. It is recommended that several, short follow-up field operations be conducted within the next few months to effectively observe and monitor the remaining monkeys' activities.

Support services, equipment and coordination provided by the Fish and Wildlife staff were excellent and made the operation function efficiently. Refuge Manager Jim Oland is to be commended for his positive, professional role in the project, especially since he had only been at his new position a few short months.

Doug Hall

Douglas I. Hall
State Director

International Primate Protection League
PO DRAWER 766, SUMMERVILLE, SC 29484, U.S.A.



16 January 1988

The Secretary of Agriculture
Washington DC

03 R 91871
AGENCY *SPHS*
SEC. *AGRS*
Animals

SUBJECT; ALLEGED MONKEY POISONING PLANS

Dear Mr. Secretary:

87 JAN 25 AIO: 14

The International Primate Protection League has received a report from a concerned individual about reported plans by the Department of Agriculture to poison about 30 monkeys now living free on Desecheo Island off the West Coast of Puerto Rico.

These animals were reportedly part of a breeding colony on the island which was disbanded. They proved impossible to catch.

We should appreciate your letting us know whether, in fact, the Department is making such plans. If so, what poison would be used?

The International Primate Protection League would be totally opposed to any poisoning of monkeys. It would be cruel and inhumane. Further, any animal eating the poisoned food would die a painful death.

We feel that, if the monkeys are smart enough to escape trapping, they deserve to live free on what must be a lovely home.

Yours sincerely:

Shirley McGreal

Shirley McGreal
Chairwoman, IPPL
803-871-2280

80 : 6 v 92 JAN 25 88

1-26
LPA:SW

U.S.D.A.
SEC. *AGRS*
OFFICE

SINCE 1973: WORKING TO PROTECT GORILLAS AND ALL LIVING PRIMATES

Ms. Shirley McGreal
Chairwoman
International Primate Protection
League
P.O. Drawer 766
Summerville, South Carolina 29484

5 FEB 1988

Dear Ms. McGreal:

Thank you for your letter of January 16, 1988, concerning monkeys living on an island off the coast of Puerto Rico.

In enforcing the Animal Welfare Act, the U.S. Department of Agriculture (USDA) is committed to ensuring the humane care and treatment of animals and shares your concern for their welfare. Desecheo Island is a Caribbean wildlife refuge, and the U.S. Department of the Interior's Fish and Wildlife Service (FWS) has jurisdiction over the monkeys living there. The FWS has requested that the USDA's Animal Damage Control Program provide technical expertise in removing the monkeys from the island to prevent further depredation of the bird population. Poison will not be used. Because the FWS has the authority for overseeing any action taken with respect to these monkeys, a copy of your letter has been referred to that Agency for further consideration.

Thank you for the opportunity to address your concerns.

Sincerely,

/s/ James W. Glosser

James W. Glosser
Acting Administrator

cc:

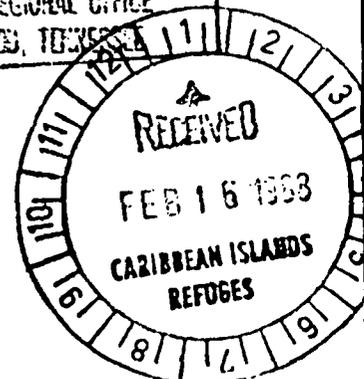
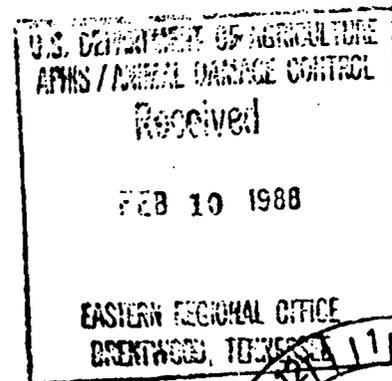
U.S. Dept of the Interior, Wash., DC w/cy of inc.
G. J. Fichtner, ADC, Wash., DC w/cy of inc.
N. F. Williamson, ADC, Columbia, SC w/cy of inc.
G. Abraham, ADC, Baton Rouge, LA w/cy of inc.
J. C. Waigand, LPAS, Hyatts., MD w/cy of inc.

APHIS:LPAS:Progers:gd:436-7776:2/3/88
SOURCE: JWood, GFichtner, ADC

Clearances:

CI _____
ADC _____
AM _____
OA _____

03-R91871 FINAL CD95



CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE

BUCK ISLAND NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

Calendar Year 1988

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

BUCK ISLAND NATIONAL WILDLIFE REFUGE VIRGIN ISLANDS

UNITED STATES
DEPARTMENT OF THE INTERIOR
64°54'00"

64°53'40"

64°53'20"

UNITED STATES
FISH AND WILDLIFE SERVICE
64°53'00"

18°17'00"

18°17'00"

18°16'40"

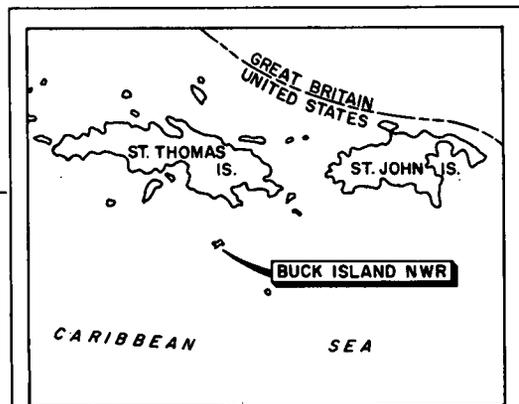
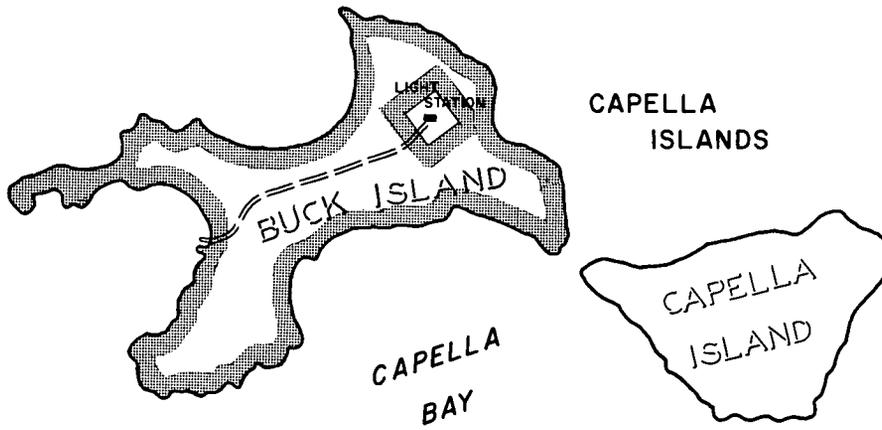
18°16'40"

18°16'20"

18°16'20"

18°16'00"

18°16'00"



VICINITY MAP

Scale 5 0 5 Miles

LEGEND

REFUGE BOUNDARY

64°54'00"

64°53'40"

64°53'20"

64°53'00"

COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY U.S.G.S.

ATLANTA, GEORGIA

REVISED 5/84
APRIL, 1969

Scale 0 500 1000 1500 2000 FEET
0 1/8 1/4 MILE

9°
True N.
Magnetic N.

MEAN
DECLINATION
1969

4R V.I. 800 403

Buck Island NWR

INTRODUCTION

Buck Island is one of the two Capella islands located approximately two miles south of St. Thomas in the U.S. Virgin Islands. The refuge consists of the entire 45 acre, cactus and grassland covered island. The U.S. Fish and Wildlife Service obtained about 35.5 acres of the island from the U.S. Navy in 1969 and the remaining 9.5 acres from the U.S. Coast Guard in 1981. The Coast Guard still maintains the lighthouse located on the north shore of the island.

The Island was transferred to the U.S. Fish and Wildlife Service because of "it's value for migratory birds". Virgin Islands Division of Fish and Wildlife employees and FWS staff surveyed the island and found very limited bird use. Three pairs of Red-billed Tropicbirds have been known to nest on the island despite the overwhelming abundance of black rats. Virgin Islands feral rat researchers have commented that Buck Island contains one of the largest rat populations on the outer islands.

Although the rocky coastline offers little recreation potential, the surrounding waters and bays contain well-developed reefs and a shipwreck that attracts large numbers of boaters, snorkelers and divers.

G. Wildlife

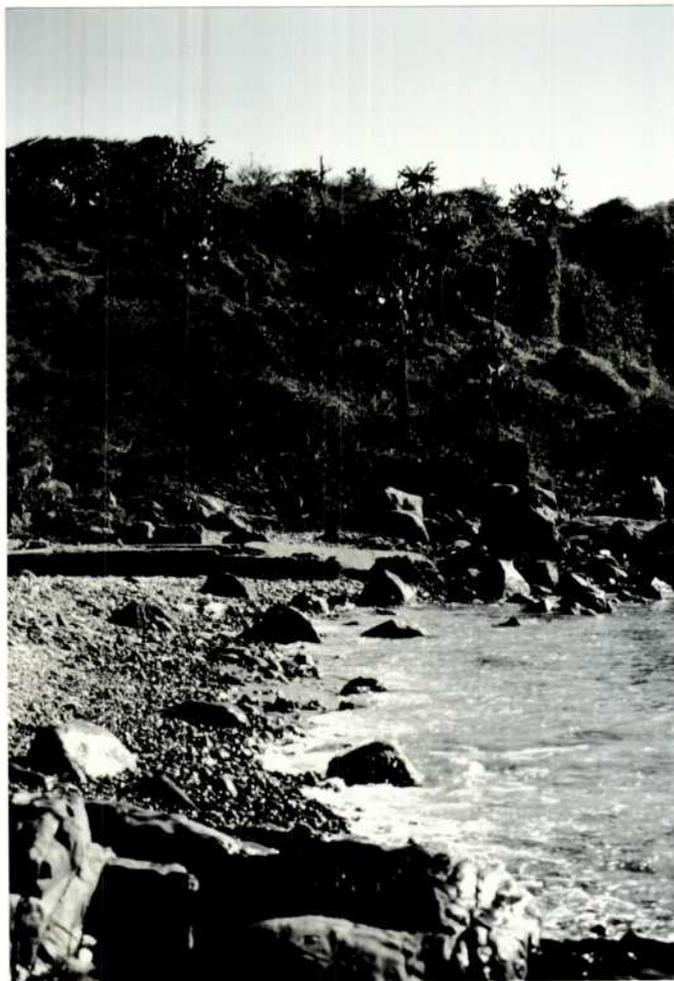
During a meeting between the Virgin Islands Division of Fish and Wildlife and Ecological Services staff, David Nellis of the Virgin Islands Div. of F&W proposed a cooperative rat removal project on Buck and neighboring Capella Islands. He mentioned at the time that rat eradication may permit the reestablishment of the Virgin Islands booby or nesting seabirds such as the Sooty Terns which nest on a nearby island. A rat control program has been proposed for FY 89 and may be conducted in conjunction with a study being conducted by a PhD candidate from Ohio.



Buck Island is signed both in English and Spanish along the coast and at the main entrance to the island. SKW-BIS-8801



Rocky Buck Island has an old Navy/Coast Guard dock still usable on it's south side. SKW-BIS-8802



Buck Island's rocky shoreline provides little in the way of recreation, but may one day provide nesting habitat for cavity nesting seabirds. SKW-BIS-8803

CARIBBEAN ISLANDS NATIONAL WILDLIFE REFUGE

GREEN CAY NATIONAL WILDLIFE REFUGE

ANNUAL NARRATIVE REPORT

Calendar Year 1988

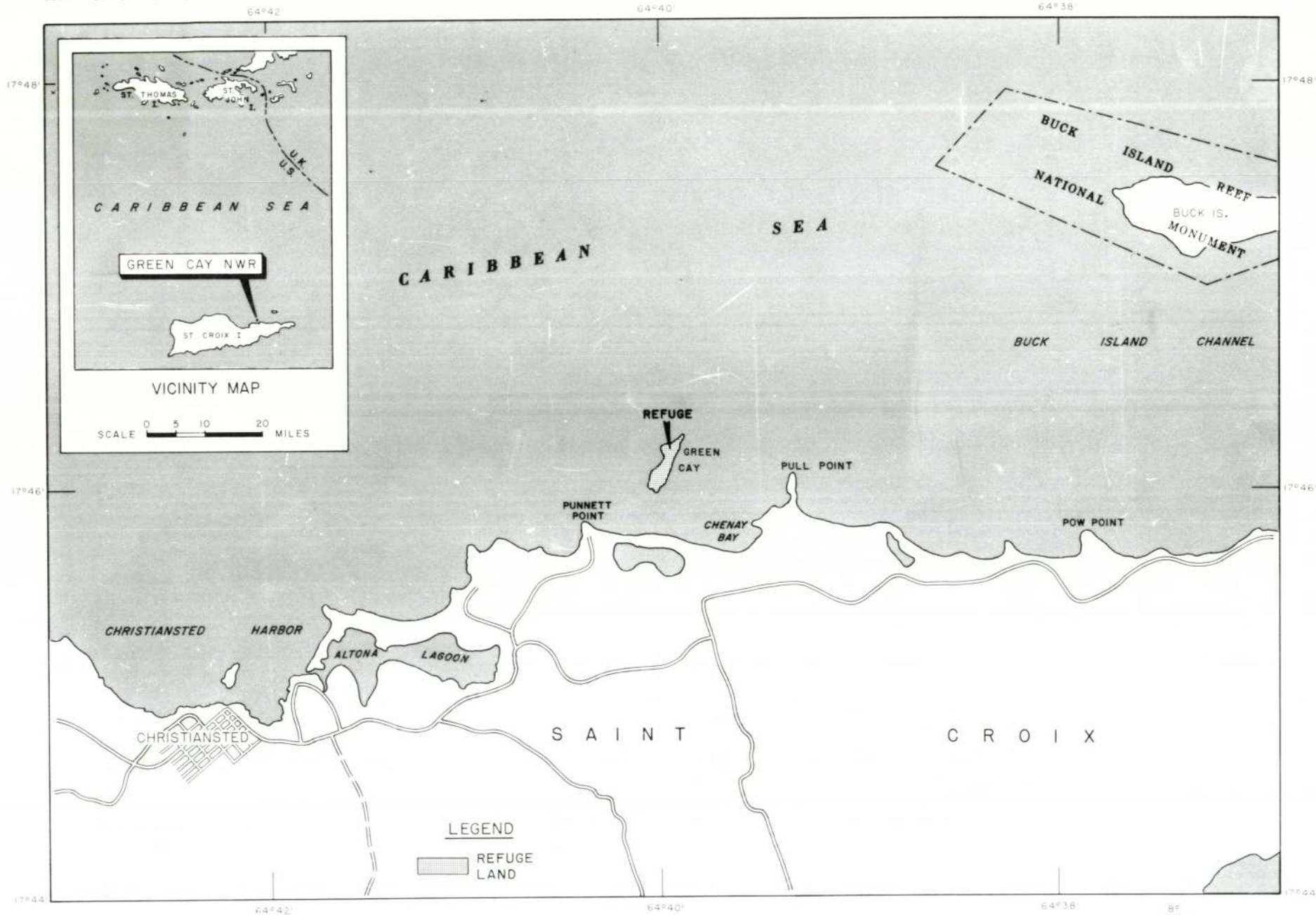
U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

GREEN CAY NATIONAL WILDLIFE REFUGE

VIRGIN ISLANDS

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY
FROM SURVEYS BY U.S.G.S.

ATLANTA, GEORGIA AUGUST 1977



TRUE NORTH
MAGNETIC N.

MEAN
DECLINATION
1958

4R V.I.928 403

Green Cay NWR

INTRODUCTION

Green Cay was the first National Wildlife Refuge seen by European man (i.e. Christopher Columbus, November 1493) and was used by Indians at least as early as 1020 A.D. Weiss and Gladfelter studied Green Cay in 1975 and found evidence showing that Neo-Indians used Green Cay as a site for the processing of conchs for food. It has been estimated that there were at least 33,000 discarded shells in the midden.

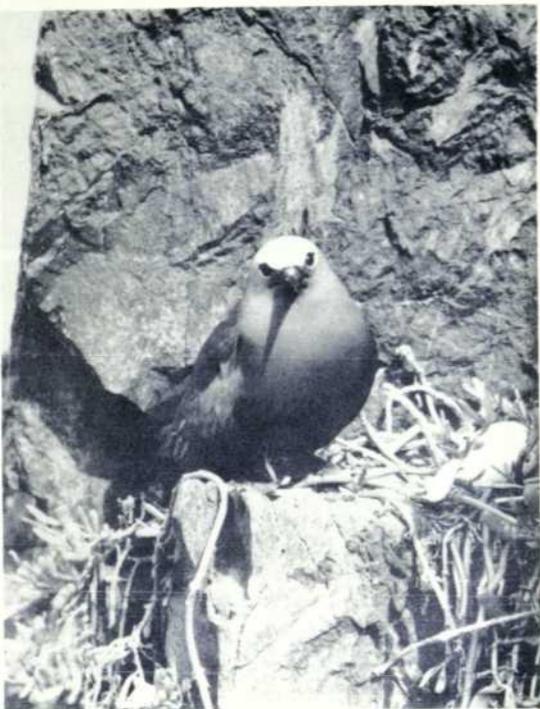
Green Cay, 14 acres, is of volcanic origin. Outcrops of lava, tuffs and breccias are the most common geologic features of the island. Three soil types have been recorded on the island. The flora of Green Cay is composed of 60 species distributed in four major vegetation types. All the vegetation is native except for one tree species and one grass. Species diversity is low at about 4.5 species per acre. Natural forest is poorly developed except for a mesic forest on the southwestern part of the island. More xeric forested areas are found scattered throughout the southern half of Green Cay.

SUMMARY OF CURRENT ACTIVITIES

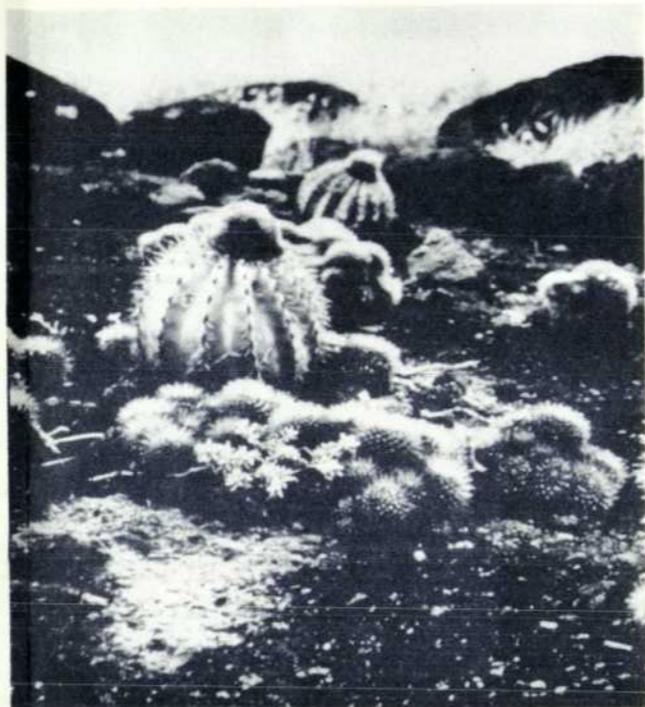
No personnel are assigned to Green Cay. The FWS has a Memorandum of Understanding with the National Park Service to provide daily patrols and surveys of the island. Since NPS makes routine trips to the Buck Island Reef National Monument, it is a relatively simple matter for them to check on the area. As a result of their surveys, it was estimated that about 100 visitor use days occur on the island each year.

In May of 1986, the Fish and Wildlife Cooperative Unit at Louisiana State University was awarded a research contract that included research at Green Cay NWR. The research, a study of the ecology and behavior of the endangered St. Croix ground lizard, began in early 1987. No research occurred in 1988, however the final report is not due until June, 1989. Therefore, we do not have an update on this research.

With the change of staff this year, no visits were made to Green Cay.



Rock ledges provide nesting sites for noddy terns.



All species of plants such as the snow and barrel cactus are protected on refuge lands.



The sooty tern is the most abundant seabird found nesting on the Culebra National Wildlife Refuge.

permits and other information are available from the refuge manager at Lower Camp, Culebra.

Flamenco Peninsula and several of the cays and reefs were sites of intensive bombardment by the military. Many unexploded bombs are present throughout these areas and could explode at any time. DO NOT TOUCH, APPROACH OR DISTURB ANY ORDNANCE SEEN. Visitors must stay on existing roads and trails.

Visitors entering the water from the refuge beaches do so at their own risk. There are many rocks, coral reefs and marine organisms which could cause injuries and visitors need to be careful in the water. The following public use regulations apply to the lands administered by Culebra National Wildlife Refuge in order to insure protection of the rich and diverse resources.

- The molestation, hunting and/or possession of birds, lizards, snakes, turtles and land crabs is prohibited.
- Coral collecting, both living and dead is prohibited.
- All plant material, both living and dead, is protected.
- Littering, fires, firearms and motorized vehicles are prohibited.
- No domestic or wild animals may be brought onto refuge lands.

Este Folleto esta también disponible en español.

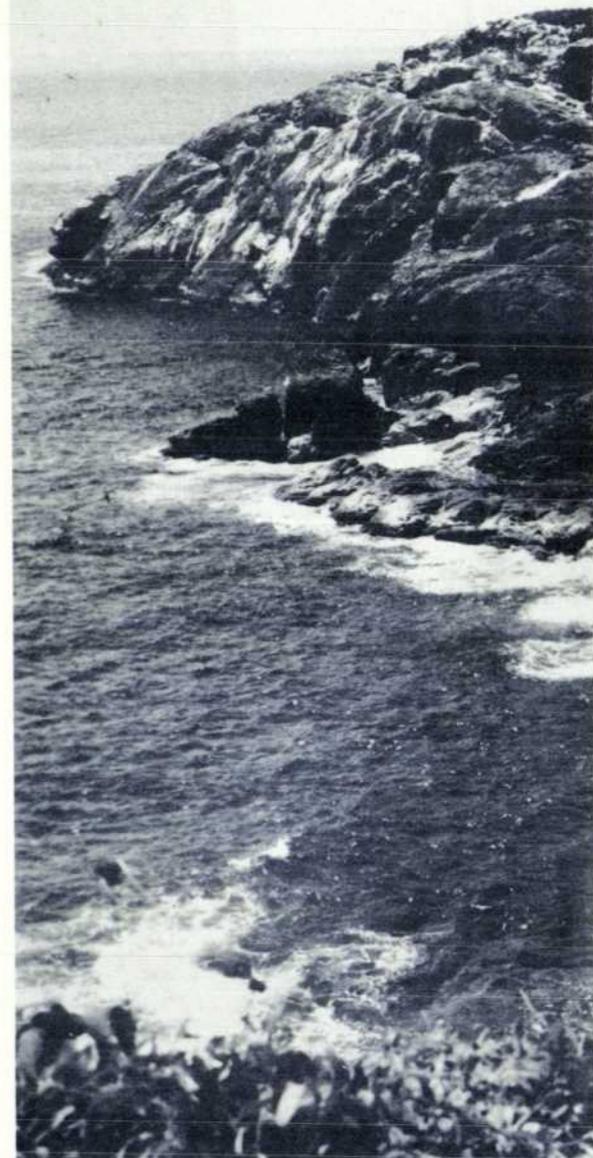
For additional information write to:

Refuge Manager
General Delivery - Lower Camp
Culebra, Puerto Rico 00645

DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service

RF-41522-1 - May 1988

Culebra National Wildlife Refuge



CULEBRA NATIONAL WILDLIFE REFUGE

Culebra National Wildlife Refuge is one of over 400 wildlife refuges administered by the U.S. Fish and Wildlife Service in the United States, Puerto Rico and U.S. territories. These refuges, managed principally for migratory birds and other unique wildlife values, are part of the National Wildlife Refuge System in the Department of the Interior. The Culebra Refuge, which comprises about 1,480 acres, includes 23 islands and rocks in addition to the four tracts on the main island of Culebra. The refuge is well known as a nesting site for a variety of seabirds and preserves important habitat for endangered sea turtles and the Culebra giant anole.

The mean temperature for Culebra is about 80 degrees Fahrenheit (27 degrees Celsius). A relatively dry period occurs from January to March - April. The heaviest rains generally are recorded from August to November. The average rainfall is approximately 25 - 30 inches (635 - 763mm).

Culebra and Culebrita were reportedly first discovered by Columbus on his second voyage in 1493. The first known inhabitants on the island were Taino Indians. Throughout the years of the rich Spanish trade with the new world, Culebra's protected harbor served as a base for pirates. When the first colonists arrived, in 1880, from neighboring Vieques and Puerto Rico, the Indians and pirates were gone and the chief obstacles to colonization were swarms of biting flies and mosquitos. In 1898 Puerto Rico was ceded to the U.S. by Spain at the end of the Spanish-American war and in 1901 the Culebra Naval Reservation was established. With the outbreak of WWII, the Culebra Archipelago became the primary gunnery and bombing practice site for the U.S. Navy and continued to be used for these purposes until 1975.

The Culebra National Wildlife Refuge was established on February 27, 1909 by Theodore Roosevelt, making it one of the oldest refuges in the system. Early ornithologists, including B.S. Bowdish, A. Wetmore and S.T. Danforth, described the birds in and around the Culebra Archipelago, but it wasn't until 1971 that new surveys by the Keplers revealed the wide variety of nesting seabirds and their numbers. The offshore islands (except Cayo Norte) totaling 702 acres came under Fish and Wildlife Service Administration in

1975 when the Navy left Culebra. In 1982 an additional 776 acres, of unique wildlife habitat, were transferred from the Navy into the Culebra National Wildlife Refuge.

THE CAYS

The cays surrounding Culebra support impressive numbers of breeding seabirds. From May to September nesting colonies of laughing gulls, bridled terns, sooty terns, brown noddys and roseate terns can be found. Several cays also support royal and sandwich tern colonies which have been reported to be on the decline in the Caribbean in recent years. Small colonies of white-tailed tropicbirds, red-billed tropicbirds, masked boobys, and red-footed boobys are found here, as well as a thriving brown booby colony. Seabird breeding activity can be found going on throughout the year.

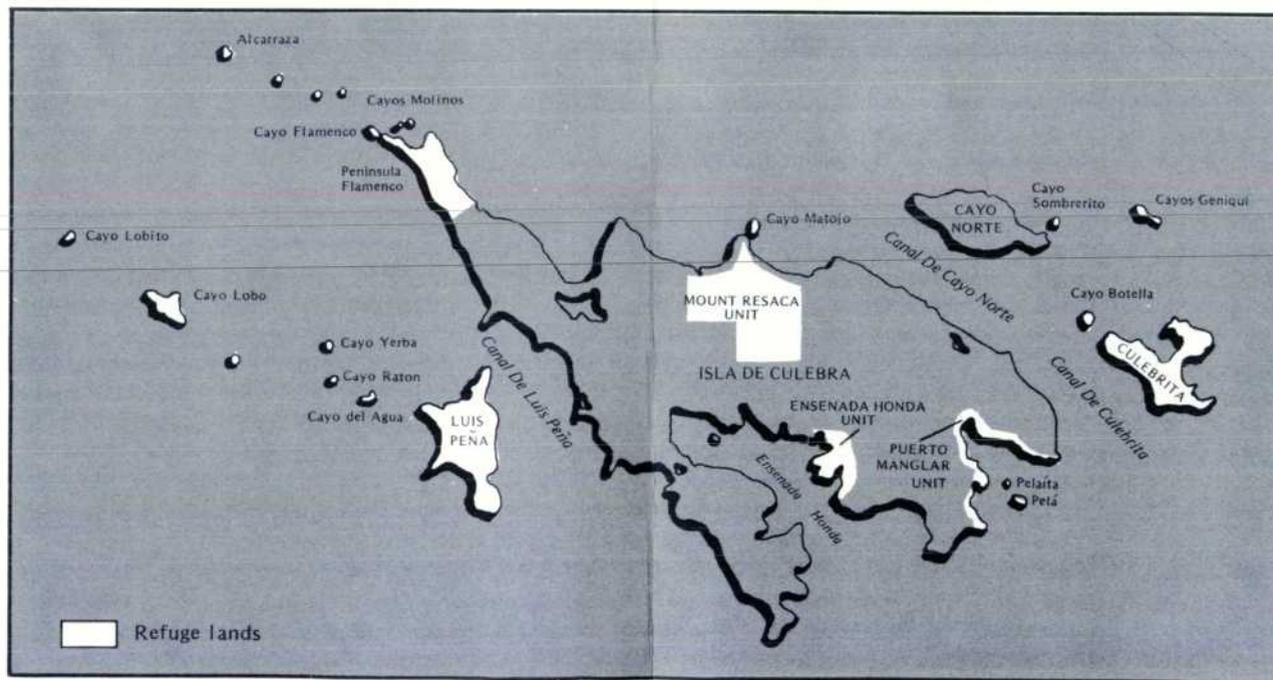
Culebrita and Cayo Luis Peña are the larger and more diverse islands. This diversity includes beach areas, extensive forests, lagoons and rocky precipices. As a result, a wider range of wildlife, including many passerine bird species, waterfowl and reptiles is present. The beaches of Culebrita are included as critical habitat for the endangered hawksbill turtle, as are

most beaches of the northern shore of Culebra. Three other endangered turtles species, the Atlantic green, the leatherback, and the Atlantic loggerhead also occur here. Extensive reef systems and grass flats in Culebra's waters are critical as development and foraging habitat for these turtles.

Coral reefs of the area are some of the most spectacular of the entire Caribbean region. These thriving reefs represent some of the best living healthy reef ecosystems of Puerto Rico due to the relative lack of development of the islands. The life cycles of many fish, amphibians, crustaceans and a wealth of other marine organisms are directly tied to the coral reef ecosystems.

FLAMENCO PENINSULA

The Flamenco Peninsula is an important site for sooty terns. The population had been estimated at as many as 160,000 birds in recent history, although this population had declined significantly during the late 1970's. Brush encroachment on the preferred breeding area of dense guinea grass, past overgrazing, and predation by introduced rats and feral cats were some causes for the decline.



MOUNT RESACA

The Mount Resaca Unit of the refuge insures preservation of one of the few remaining large blocks of dry subtropical forest on Culebra. Large boulder covered areas produce the park-like forest of Cupey and Jaguey with their impressive stilt roots. The boulders support beautiful orchids, bromeliads and the endemic peperomia. It is believed that the Culebra giant anole still survives in these forests. Other vegetative zones, including the thick natural thorn thickets, palm forest types and cactus scrub associations, support diverse numbers of bird and reptile species.

THE MANGROVES

The mangrove units of the refuge form a unique habitat which is vital for coastal wildlife. Here the protein rich waters provide ample food sources for crustaceans and small fish, and, in turn, these food sources attract larger predatory fish as the food chain continues. These mangroves form bountiful nurseries for marine life. Multitudes of fish and crustaceans arrive after spawning to mature in its protected waters. Bird life also abounds as the large fisheries attract numerous marine feeders. The mangroves surrounding Puerto de Manglar are a favorite roosting site for the endangered brown pelican. These same mangroves also protect this bay's phosphorescent qualities by serving as a filter and buffer from sediments carried by runoff from the surrounding sloping terrain.

MANAGEMENT PROGRAM

Active wildlife management efforts on the Culebra National Wildlife Refuge concentrate on maintaining and recreating the wide range of nesting habitats needed for colonial seabirds. Unique wildlife habitats such as the Mt. Resaca Unit and the mangrove areas will be maintained in their natural conditions. Human entry into the nesting colonies will be restricted in order to prevent disturbance to sensitive species who cannot tolerate human intrusion. Development of the existing Mt. Resaca trail, and trails on Cayo Luis Peña and Isla Culebrita may be planned for the refuge in the future.

VISITOR INFORMATION

The Mt. Resaca trail, Cayo Luis Peña and Isla Culebrita are all open daily from sunrise to sunset. Special Use Permits, signed by the refuge manager, are required for entry to other units of the Culebra Refuge. These



1.



2.

1. All species of plants, such as the snow and barrel cactus are protected on refuge lands.
2. Many species of reptiles, including the endangered *St. Croix ground lizard*, are found on the Caribbean refuges.
3. The sooty tern is the most abundant seabird found nesting on the Culebra National Wildlife Refuge.
4. Rock ledges provide nesting sites for noddy terns on the Culebra and Desecheo National Wildlife Refuges.



4.



3.

Desecheo Island is closed to public entry due to unexploded bombs. Special entry permits signed by the Refuge Manager are required for entry onto Desecheo Island.

Cabo Rojo National Wildlife Refuge is open during working hours (7:00 AM - 3:30 PM). Entry is permitted only on the paved road coming from Highway 301 at Kilometer 5.

Cayo Luis Pena and Isla Culebrita, in the Culebra National Wildlife Refuge, are open to public entry daily from sunrise to sunset. Special entry permits, signed by the refuge manager, are required for entry to other units of the Culebra Refuge.

Buck Island National Wildlife Refuge is open to public entry daily from sunrise to sunset.

Public entry at Green Cay National Wildlife Refuge is permitted only on the beach area of the southeastern side of the island. This beach area is open daily from sunrise to sunset.

Este folleto está también disponible en español.

For additional information write to:

Refuge Manager
 Caribbean Islands National Wildlife Refuges
 P.O. Box 510
 Boqueron, Puerto Rico 00622

DEPARTMENT OF THE INTERIOR
 U. S. Fish and Wildlife Service

RF-41520-1 March 1982

Caribbean Islands
 National Wildlife Refuges



Caribbean Islands National Wildlife Refuges

In the Caribbean area are some of the oldest and newest units of the National Wildlife Refuge System. The five Caribbean refuges administered by the U.S. Fish and Wildlife Service in Puerto Rico and the Virgin Islands are part of an unequalled collection of lands and waters dedicated to significant wildlife ecosystems.

Culebra National Wildlife Refuge, established in 1909 by President Roosevelt, and Desecheo National Wildlife Refuge, first established in 1912 by President Taft, have long been known for their large seabird colonies. Cabo Rojo National Wildlife Refuge, obtained in 1974, and Green Cay National Wildlife Refuge, purchased in 1977, are best known for their endangered species. Buck Island National Wildlife Refuge, established in 1969, provides habitat for a number of reptiles and migratory birds.

The five Caribbean refuges total roughly 2,280 acres and vary in size from 14 to 1,480 acres. They are the most eastern and southern refuges on the Atlantic seaboard. All are administered from the Cabo Rojo Refuge in southwestern Puerto Rico.

The climate for the five refuge areas are similar. The mean temperature is about 80 degrees Fahrenheit (27 degrees Celsius). A relatively dry period occurs in December and January. The heaviest rains generally are recorded from August to November. The average rainfall is approximately 25-30 inches (635-762 mm.)

The earliest record of man on one of the Caribbean refuges is from Green Cay. Examination of the Indian shell midden and radio-carbon dating of conch shells reveal that man

was there about 1,000 A.D. - almost 500 years before Columbus first arrived in the Virgin Islands and Puerto Rico.

Cabo Rojo National Wildlife Refuge has gently sloping topography that ranges from 60 feet above sea level to sea level. All the other refuge areas consist of rocky islands ranging from sea level to heights of 150 to 676 feet above sea level. Most areas are covered with representative drought-resistant plants, both native and introduced. All areas are classified as subtropical, dry forest.

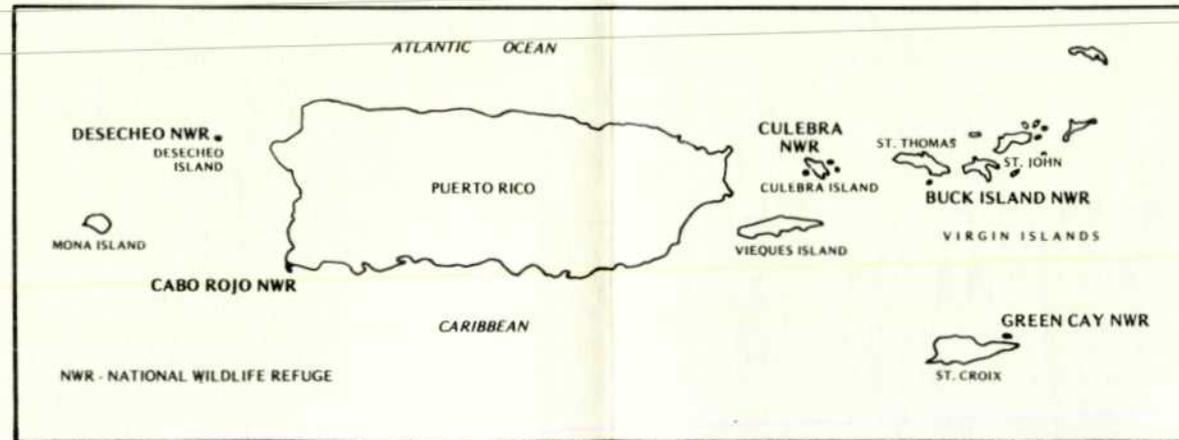
Native wildlife consists primarily of birds. The most conspicuous are the tern and booby colonies located at Desecheo and Culebra Islands. A variety of native land birds can be seen on all of the refuge areas. At Cabo Rojo National Wildlife Refuge are the endangered yellow-shouldered blackbird and several species of weaver finches from Africa that have been introduced into Puerto Rico.

Bats are the only native land mammals found in Puerto Rico and the U.S. Virgin Islands. Mongoose, rhesus monkeys, and feral goats are among the introduced mammals occasionally seen on refuge lands.

A variety of reptiles are found on the Caribbean refuges. At Desecheo National Wildlife Refuge there are three species of lizards unique to the island. The Green Cay National Wildlife Refuge protects 14 of the last 18 acres of habitat for the endangered St. Croix ground lizard. Culebrita Island in the Culebra National Wildlife Refuge is the only area in the Caribbean Refuges that provides nesting habitat for endangered marine turtles.

Reef systems adjoin all the refuge units except Cabo Rojo National Wildlife Refuge. They vary in size and depth from the shallow grass-covered reefs at Green Cay to the spectacular mile-long reef near Culebrita. A wide variety of tropical fish and other marine organisms can be seen in the clear tropical waters.

Current management plans call for the maintaining of all refuges in a natural condition. Limited habitat management to maintain tern nesting areas and to provide supplementary feeding areas for yellow-shouldered blackbirds will be undertaken as necessary. No public facilities are planned for any of the refuge areas.



There are unexploded bombs on the Desecheo and Culebra National Wildlife Refuges. The bombs could explode at any time. Do not touch, approach or disturb any ordinance seen. Visitors must stay on existing roads and trails.

Visitors entering the water from the refuge beaches do so at their own risk. There are many rocks, coral reefs and marine organisms which could cause injuries and visitors need to be careful in the water.

The following public use regulations apply to the Caribbean Island Refuges:

- The molestation, hunting and/or possession of birds, lizards, snakes, turtles, and land crabs is prohibited on all refuge lands.
- The possession of reef organisms, living or dead, and shells is prohibited at Green Cay National Wildlife Refuge.
- Coral collecting (living or dead) is prohibited at Culebra, Desecheo and Buck Island.
- All plant material, both living and dead, is protected on all refuge lands.
- Littering, camping, fires, and firearms are prohibited.
- Motorized vehicles are permitted only at Cabo Rojo National Wildlife Refuge and must stay on the paved road.

No domestic or wild animals may be brought onto or released on Green Cay, Culebra or Desecheo National Wildlife Refuges. Dogs are permitted at Cabo Rojo and Buck Island National Wildlife Refuges, if kept under restraint. Other domestic animals are prohibited on refuge lands.