

REFUGE NARRATIVE REPORT  
January through December 1972

REFUGE PERSONNEL

Robert G. Yoder, Refuge Manager 1  
Harold J. O'Connor, Refuge Manager 2  
Glen W. Bond, Jr., Asst. Refuge Manager  
James C. Bryant, Asst. Refuge Manager  
Robin H. Fields, Asst. Refuge Manager  
Larry D. West, Asst. Refuge Manager 3  
Dr. James L. Baker, Wildlife Biologist (Management)  
Seth L. Wineland, Biological Technician (Wildlife) (Pelican Island Refuge)  
Harvey A. Page, Citrus Grove Manager<sup>4</sup>  
Maxwell L. Blake, Jr., Student Trainee 5  
Alexander M. Parish, Conservation Aide 6  
Lois E. Brown, Clerk (Typing)  
Evelyn M. Flowe, Clerk-Typist 7  
Alfred J. Gensiejewski, Patrolman 8  
William B. Maxfield, Patrolman 9  
John R. Millett, Patrolman 10  
Elwood E. Hurte, Maintenance Worker  
Edward G. Duffy, Laborer 11  
Raymond J. Marek, Laborer 12  
William E. Tyson, Laborer 13

U. S. DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

MERRITT ISLAND NATIONAL WILDLIFE REFUGE  
Titusville, Florida

ST. JOHNS NATIONAL WILDLIFE REFUGE  
Titusville, Florida

PELICAN ISLAND NATIONAL WILDLIFE REFUGE  
Wabasso, Florida

1. EOD 10-19-72
2. Transferred 8-12-72
3. EOD 8-30-72
4. EOD 6-2-72
5. 6-5-72 through 8-18-72
6. 7-10-72 through 9-1-72
7. 7-17-72 through 9-1-72
8. EOD 9-8-72
9. EOD 9-8-72
10. EOD 9-8-72
11. EOD 7-12-72
12. EOD 7-11-72
13. EOD 7-6-72

MERRITT ISLAND NATIONAL WILDLIFE REFUGE

Titusville, Florida

## TABLE OF CONTENTS

I. GENERAL	1
A. Weather Conditions	1
B. Habitat Conditions	1
1. Water	1
2. Food and Cover	2
II. WILDLIFE	2
A. Migratory Birds	2
1. Waterfowl	2
2. Other Waterbirds	2
3. Shorebirds	3
4. Doves	3
B. Upland Game Birds	3
C. Big Game Animals	3
D. Fur Animals, Predators, Rodents, and Other Mammals	3
E. Hawks, Eagles, Owls and Crows	4
F. Other Birds	4
G. Fish	4
H. Reptiles	5
I. Disease	5
III. REFUGE DEVELOPMENT AND MAINTENANCE	6
A. Physical Development	6, 7
B. Plantings	8
C. Collections and Receipts	8
D. Control of Vegetation	8
E. Planned Burning	8
F. Fires	8

IV. RESOURCE MANAGEMENT	8
V. FIELD INVESTIGATIONS OR APPLIED RESEARCH	9, 10
VI. PUBLIC RELATIONS	11
A. Recreational Uses	11
1. Sport Fishing	11
2. Public Waterfowl Hunting	11
3. Birdwatching, Nature Study, and Photography	12
4. Swimming	13
5. Conservation-Oriented Youth Group Camping	13
B. Refuge Visitors	13, 14
C. Refuge Participation	15
D. Miscellaneous Public Relations Activities	15
E. Violations	16
F. Safety	16
VII. OTHER ITEMS	17
A. Items of Interest	17
B. Photographs	18

MERRITT ISLAND NATIONAL WILDLIFE REFUGE

REFUGE NARRATIVE REPORT

January through December 1972

I. GENERAL

A. Weather Conditions. This year's total precipitation of 46.9 inches was considerably more than last year's. Hurricane Agnes arrived in mid-June resulting in 5.85 inches of rain during the 24 hour period of June 19th. The month of September was the driest September (1.30 inches) ever recorded in Brevard County. April was a dry month as expected (.66 inches). During November, which is usually very dry also, an unusually large amount of rainfall occurred, specifically 7.06 inches.

During the year, temperatures ranged from a low of 36° on December 27th to a high of 93° on June 21st and July 27th. The greatest temperature range within a month occurred during January and December with a range of 50°.

Weather data were provided by the National Weather Service at the Kennedy Space Center.

	Precipitation (Inches)			Temperature 1972	
	1970	1971	1972	Maximum	Minimum
Jan.	3.51	.11	1.03	83° (1/13-14)	53° (1/7-16)
Feb.	1.93	4.42	3.69	79° (2/3)	42° (2/4-20)
Mar.	4.37	1.25	4.28	82° (3/3-22)	53° (3/7-11-26-27)
Apr.	.95	1.53	.66	90° (4/16-22)	52° (4/3)
May	1.80	2.63	2.88	87° (5/3-9-25)	65° (5/1-19)
June	2.78	5.63	10.15	93° (6/21)	67° (6/6)
July	4.77	5.52	3.84	93° (7/27)	71° (7/7)
Aug.	5.00	3.49	7.25	92° (8/7)	71° (8/20)
Sep.	1.57	4.46	1.30	89° (9/18)	65° (9/9)
Oct.	2.99	5.38	2.44	88° (10/19)	62° (10/24)
Nov.	.22	1.83	7.06	84° (11/3-4-11)	50° (11/27)
Dec.	1.26	1.84	2.32	86° (12/14)	36° (12/27)
TOTAL	31.15	37.09	46.90	93° MAX.	36° MIN.

B. Habitat Conditions.

1. Water. Relatively high water conditions prevailed throughout the year. On several occasions after heavy rains, moderate flooding occurred. The mid flats, which are frequently exposed under normal conditions in the mosquito control impoundments, were seldom exposed this year.

2. Food and Cover. In the impoundments, widgeon grass and muskgrass growth was excellent. In Mosquito Lagoon, the Indian River and the Banana River, shoalgrass was abundant. These conditions were ideal for the wintering waterfowl population.

## II. WILDLIFE

### A. Migratory Birds.

1. Waterfowl. The peak population of waterfowl increased again this year over the previous year.

#### Peak Waterfowl Populations:

	<u>Ducks</u>	<u>Coots</u>
1970	33,000	60,000
1971	51,000	75,000
1972	52,000	100,000

The significant increase in coots may be attributed to the additional habitat which was added to the refuge in June. Large concentrations of coots have been observed there. Scaup were the most abundant ducks with a peak of about 15,000 in late December. Redheads peaked at about 12,000 and often huge flocks could be observed rafting in the open waters. American widgeon and ring-necked ducks were the next most abundant species. The number of ruddy ducks was noticeably higher than last year. Water was plentiful and, therefore, waterfowl were well dispersed throughout the refuge.

2. Other waterbirds. Herons, egrets, ibises, and other waterbirds are common year-round, but are most abundant during winter and spring. Crane Island in Mosquito Lagoon is the site of a very large brown pelican rookery with approximately 400 pelican nests. Another large rookery is located in Moore Creek inside the NASA Security Area. The Moore Creek rookery produces wood storks, white ibises, snowy egrets, little blue herons, common egrets, and anhingas.

A flock of white pelicans summered on the refuge. They are common during the winter, but it is interesting that what appear to be mostly immature birds are remaining during the summer.

Occasionally gannets could be observed off-shore feeding and sometimes in association with brown pelicans.

3. Shorebirds. The variety of habitat, including mudflats, shallow brackish marshes, and open shoreline offers excellent feeding and nesting areas for shorebirds. On the mudflats in the impoundments, black simmers, royal terns, Caspian terns, American avocets, yellowlegs and many species of sandpipers can be observed easily. At the ocean beach, especially during the winter, one can see ruddy turnstones, willets, black-bellied plovers, dowitchers and dunlins, as well as many different species of gulls. During the summer, black-necked stilts nest in the impoundments.

4. Doves. The ground dove and the mourning dove are both common throughout the year. Most often they may be observed around citrus groves. The ground doves, especially, are common on the dikes. The mourning dove population is not nearly large enough to allow for public hunting. Interestingly enough, during the summer, immature mourning doves were observed feeding at the headquarters bird feeder.

B. Upland Game Birds. The bobwhite is the only upland game bird found on the refuge. The population appears to be stable. The areas of primary use are around old house sites, power line rights-of-way, and old fields. At dusk, during the summer, coveys are often observed feeding along the roadsides. Most of the uplands have growths of saw palmetto too dense to support good populations of bobwhite.

C. Big Game Animals. Historically, Merritt Island was the home of white-tailed deer, black bear, and Florida panther. Today, only a very few white-tails may be found. These are restricted to the new north boundary of the refuge, in and adjacent to citrus groves. Occasionally, there are reports of Florida panthers and, particularly, black panthers, but so far no reports have been taken seriously. Bobcats are frequently seen and are probably being mistaken for panthers.

D. Fur Animals, Predators, Rodents, and Other Mammals. Florida Technological University's (FTU) study on the refuge has indicated 20 species of mammals present. Marsh rabbits are abundant, particularly along the mosquito control impoundment dikes. Cottontails are common along the barrier beach. Opossums, raccoons, and armadillos are abundant as indicated by the high incidence of road kills. Raccoon populations are high and cause depredations on Florida duck nests. On the barrier beach, the raccoon population is extremely high and as a result the sea turtles hardly get back to the sea after nesting before the raccoons dig up the nests.

The Florida round-tailed muskrat, Neofiber, is found on the Refuge. While the animals themselves are very difficult to observe, their feeding platforms may be commonly seen in several impoundments.

Feral hogs are also abundant, with the population estimated at 2500 animals. Annually the hogs do a great deal of damage to dikes, citrus groves, and refuge headquarters lawn. Special Use Permits are issued to trappers who remove a small portion of the population. One Special Use Permit is issued to a trapper who traps inside the Kennedy Space Center security area where the hog population creates a serious traffic hazard.

E. Hawks, Eagles, Owls, and Crows. Red-tailed hawks are the hawks most commonly observed year-round. During the fall and winter, marsh hawks are frequently seen hunting along the dikes and in the impoundments. In the fall, the sparrow hawks arrive at the refuge and it is a common sight to see sparrow hawks, kingfishers and boat-tailed grackles perched near each other on the telephone lines. Peregrine falcons use the refuge heavily during migration, but are not observed too often. A red-shouldered hawk can be observed regularly on the telephone cables near headquarters at dusk.

Both resident and migratory populations of bald eagles are found on Merritt Island. At least 20 nests are located on the refuge. During 1972, a total of four eaglets were fledged from the four active nests. One pair of adults started to nest, but nearby disturbance from heavy equipment is thought to have discouraged them.

Screech owls, great horned owls and barn owls are the most common species. Often great horned owls use eagle nests to raise their young. Barn owls occasionally are hit by automobiles at night.

While no osprey nests have been located on the refuge, ospreys are commonly seen particularly in the central portion of the refuge.

Along the Indian River in particular fish crows are abundant. During the winter, huge flocks of several hundred can be observed during the early evening flying toward their roosting site.

F. Other Birds. Frequently unusual sightings are made. This year a Mississippi kite, a common scoter, a white-winged scoter, and a monk parakeet were observed. On a few occasions gannets were observed feeding close enough to shore to be seen without binoculars. During the spring and fall warbler migrations, storm conditions often cause migrating birds to hit the 500+ foot high Vehicle Assembly Building on the Kennedy Space Center. As a result, several species have been collected which are not too frequently seen under normal conditions; these include the Virginia rail, yellow-billed cuckoo, black and white warbler, black-throated blue warbler, northern waterthrush, yellow-breasted chat, bobolink, and blackpoll warbler.

G. Fish. The study by Florida Technological University is indicating that there are 25 species of fish in the impounded waters. Largemouth

bass are the most popular freshwater sport fish. They do not seem to attain unusually large sizes. Spotted weakfish, redfish and mullet are the marine fish most frequently caught in the saltwater areas. And, at Playalinda Beach, bluefish, whiting and tarpon are among the many species caught.

One fish kill occurred during the summer in the display pond at the Kennedy Space Center Headquarters. The general cause was oxygen deficiency, but the actual, specific cause was not determined.

H. Reptiles. The alligator population in the refuge appears to be healthy. The August census showed a good number of young-of-the-year alligators. Occasionally alligators are hit by cars; refuge headquarters now has a stuffed specimen of a 5-foot alligator as a result. Since the small rodent population is high, the snake population is correspondingly high. Poisonous snakes are observed frequently; that is, the eastern diamond back rattlesnake, the pigmy rattlesnake and the cottonmouth moccasin. The coral snake is seldom seen, but is known to be present. For some reason, the only place young (3 feet long or less) eastern diamondbacks are observed is on the concrete back step of the headquarters building! Otherwise, the 5 foot plus diamondbacks are seen all over the refuge. Other snakes often seen are the common garter snake, red-bellied mud snake, black snake, indigo snake, and banded water snake.

Turtles are frequently seen too. The Florida box turtle, gopher turtle, soft shell turtle, and snapping turtles are all common. Sea turtles nest on the 20 miles of ocean beach. While the loggerhead is by far the most common species, the endangered green sea turtle, leatherback, and hawksbill turtle also nest on the beach.

The green anole is another common reptile.

I. Disease. From mid-September through mid-December, a rabies quarantine was in effect on the refuge. It only affected hog trapping; during that time, no hogs were to be removed from the refuge. The rabies was discovered in a raccoon. The quarantine was imposed by the Brevard County Department of Public Health. In reality, it is possible that in this climate, rabies could be found at any time during the year.

### III. REFUGE DEVELOPMENT AND MAINTENANCE

#### A. Physical Development.

One of the most expensive developments on the refuge concerned the beach concession. Extensive repairs were made to the snack bar building. These repairs included new decking on much of the roof, some new rafters, a new roof, a paint job, and renovation of the electrical and plumbing systems. Under the concession contract, the Government had to supply such equipment as an electric grill, a food freezer, an ice cream storage container, a beer cooler, meat cutter, hot dog warmer, tables, an ice machine and a deep fryer.

The restroom building received a paint job along with some minor repairs to the roof and interior. All the plumbing fixtures were replaced, and two electric hand dryers were installed. One of the biggest problems involved with the concession was getting good water. Three wells were drilled, but none were any good. One well went to two hundred feet, but the water was near sea strength in salt content. Another well of 40 feet was almost as salty, and the third well, 12 feet deep, produced water the color of coffee. The water situation was solved by hauling water to the snack bar in a trailer-mounted 500 gallon fiberglass tank and taking water from the nearby impoundment for the restrooms. The water going into the snack bar had to meet County Health standards, since it was to be used in the ice machine.

When the refuge took over the operation of Playalinda Beach from NASA, lifeguard equipment was purchased and three patrolmen and three laborers were added to the staff. As the staff grew with the increased duties, more vehicles and equipment were required to perform these duties. Of course, the increase in equipment brought on an increase in maintenance. Some old or unneeded equipment was transferred or surveyed. Equipment acquired includes a 3/4 ton Army truck, two military jeeps, a crawler tractor, a 3 ton truck, a utility trailer, an air compressor, and an upright freezer. Equipment transferred or surveyed include an airboat, a military jeep and a welder. Maintenance needs of equipment and buildings to Bureau standards exceeded our funds, and thus some are in poor condition. However, we were able to keep most of the equipment functioning. The two airboats were equipped with an additional seat and gas tank.

Maintenance of the buildings includes some painting and minor repairs. The vehicle storage building was equipped with a concrete ramp to aid the entry of vehicles into it. Three metal gates were constructed and placed at headquarters.

More than 50 miles of dike roads were mowed at least once during the year. Those dikes that received heavy public use were mowed three times during the year. These dike roads greatly facilitate law enforcement, wildlife censusing and public use.

Old information signs, the entrance sign at Titusville Causeway and signs at Headquarters were refinished.

A concrete block building which at one time housed the North Brevard Chamber of Commerce, was renovated and made into a laboratory. With \$27,500.00 turned over to the refuge by NASA and much refuge personnel time, the building was renovated and outfitted with equipment for use by Florida Technological University and to some extent by the Florida Institute of Technology.

With assistance from the Soil Conservation Service, levels were run on several of the refuge impoundments and 17 water gauges were installed with a few more to go. In the past, readings were taken from gauges arbitrarily placed with regard to depth.

Brevard County Mosquito Control did extensive repairs to the stop-log water control structure on the south side of Banana Creek, west of Kennedy Parkway. They also performed bank stabilization work at two other control structures along the south bank of Banana Creek and did approximately four miles of ditching and diking in the marsh areas around Launch Complex 39. This was done through an Agreement between the refuge, NASA, and Mosquito Control.

Through an Agreement between NASA and the Department of Interior, the refuge was expanded by about 40,000 acres. This brings the total refuge acreage to 140,393. Signing the Agreement at ceremonies held at the Kennedy Space Center auditorium were Nat Reed, Assistant Secretary of the Interior and Willis Shapeley of NASA. All persons attending the signing ceremony were treated to the premier showing of the film, "NASA's Wildlife Neighbors", which concerns the wildlife on the Kennedy Space Center/Merritt Island National Wildlife Refuge.

Besides bringing 40,000 acres of land and water north of Haulover Canal under control of the refuge, the Agreement gave the Bureau control of 2,500 acres of citrus groves, house leases, leases on two fish camps, and licenses on 25 bee keepers involving about 1,250 hives. These leases were previously administered by the U. S. Army Corps of Engineers for NASA. With the signing of the Agreement, the refuge hired the Corps administrator of these leases, Harvey Page. Mr. Page promptly moved his office from a building near Haulover Canal to a building near refuge headquarters. The Corps' former office is now used for storage purposes.

The lease on Allenhurst Fish Camp expired in October and with many repairs needed and the buildings being in poor condition, the decision was made to close the camp. The other fish camp, Beacon 42, is being operated on a short term lease and has water problems which limits carrying capacity.

At the request of the U. S. Coast Guard and in cooperation with NASA, refuge personnel, along with the excellent assistance of other refuges, assisted in the securing of water areas during the launches of Apollos 16 and 17.

With help from NASA in the form of \$4,000.00, the refuge north boundary was surveyed and most of it cleared for posting. So dense was the brush and palmettos, a crawler tractor was used for breaking a survey trail and later to clear the surveyed boundary. All the clearing, a lane about 12 feet wide, was done between State Road 3 and Mosquito Lagoon. The boundary was posted across Mosquito Lagoon and the barrier dune to the ocean. Rain delayed work and thus the job was not completed by the end of 1972.

For a nominal fee, Brevard County Mosquito Control removed a cross-dike from Impoundment T-10-K which is the prime area on the refuge for the dusky seaside sparrow.

B. Plantings. None.

C. Collections and Receipts. None.

D. Control of Vegetation. None.

E. Planned Burning. In connection with the management investigation on the dusky seaside sparrow, approximately 300 acres in the east half of Impoundment T-10-K was burned in late February. Most of the vegetation consisted of dense cordgrass (Spartina bakeri) and a fairly good burn resulted. More burning is planned in this impoundment next year.

F. Fires. "Unplanned burns" occurred four times on the refuge. Three of these were of unknown origin and one was started by a flare dropped from an Air Force jet while doing tests for NASA. The fires, which covered approximately 1500 acres, probably did more good than harm, since most occurred in dense palmetto and brush.

#### IV. RESOURCE MANAGEMENT

During the past year, the refuge returned to the U. S. Treasury from various sources a considerable amount of money. Citrus groves gave the largest return - \$125,000.00 with house leases returning \$5,383.00, fish camp leases - \$630.00, bee hives \$780.00, and hog trapping permits - \$920.00.

During 1972 and in prior years, the 2500 acres of citrus were leased by 37 individuals or companies including 57 leases. Near the end of 1972,

the citrus acreage was combined into nine groups and advertised for bids involving only nine leases. This new grouping should mean better management.

At NASA's request, a permit was issued to an individual for removal of feral hogs from the security area. The hogs had caused several vehicle accidents. During the 90 days of the permit, the trapper, with the aid of two dogs, removed 380 head.

#### V. FIELD INVESTIGATIONS OR APPLIED RESEARCH

A. The Dusky Seaside Sparrow study, titled "Effects of Experimental Marsh Management on the Dusky Seaside Sparrow (*Ammodramus nigrescens*)" was continued through 1972 with one amendment.

The study is showing that continuous or near continuous fresh water inundation of salt marshes on the refuge is excellent for mosquito control, and is favorable to waterfowl, wading birds, and shorebirds, but has been detrimental to the Dusky Seaside Sparrow. Die-offs of the emergent salt marsh vegetation have been noted in most impoundments. The decline of salt marsh cordgrass (*Spartina bakeri*), saltgrass (*Distichlis spicata*), and several obligate halophytes has been accompanied by a corresponding decline in the refuge Dusky population.

In 1969, a census showed a total of 30 singing males in the three impoundments under study - T-24-C, T-10-J, and T-10-K. In 1972, a total of 9 were recorded which is a marked decrease from 1969, but is an increase of one over the 1971 total. In accordance with the amendment, impoundment T-24-C was deleted from the study, since no Diskys were found there in 1972.

In mid-September 1972, seven Diskys were banded and one other recaptured in T-10-K. The recaptured bird had been banded as an adult in 1970, thus making it at least four years old. The study will continue next year.

B. In a study titled, "Southern Bald Eagle (*Haliaeetus leucocephalus leucocephalus*) Nesting on the Merritt Island National Wildlife Refuge", efforts are being made to determine what proportions of the eagle nests are producing young and the number of young produced per nest; and to gain information on the reasons for nest failures.

In 1972, 18 eagle nests were checked at least once each month during the nesting season. Observations revealed that only four of the nests were occupied by eagles. Four nests were occupied by great horned owls. The four eagle nests fledged one young each. Even though a bit surprising, one pair of the eagles constructed a new nest only 80 yards from a well-used paved road.

C. Florida Technological University and Florida Institute of Technology are doing environmental studies on the refuge with supporting funds coming from NASA. The study covers both land and water (salt and fresh) and has the intent of finding out what species of plants and animals exist on the refuge and what quality of environment is here for their existence. The refuge manager and biologist act as advisors and coordinators on the study.

## VI. PUBLIC RELATIONS

### A. Recreational Uses.

1. Sport Fishing. Fresh water fishing occurs mostly at Impoundment T-24-D, a 2,569 acre mosquito control impoundment. While cattails are becoming more abundant, large bass can still be taken there. Borrow pits, located throughout the refuge, are fished for small bass and bream as are miles of canals. This year, the entire refuge remained open for fresh-water fishing during the waterfowl hunting season. As expected, there appeared to be no conflict between the hunters and the fishermen.

Surf fishing continues to be a very popular sport with many of the avid surf fishermen coming from the Orlando - Sanford area. Access to Playalinda Beach was prohibited for several periods during the year for NASA's security purposes when Apollo rockets were on the pad.

2. Public Waterfowl Hunting. Waterfowl hunting was permitted on the refuge for the ninth year. Since NASA turned management responsibilities for an additional 40,000 acres over to the Bureau, two new hunting areas were administered by the refuge. The two new areas never before were controlled in any way, so when the refuge proposed a permit system for these areas, a great deal of opposition surfaced. As a result of intense political pressures the refuge had to abandon its proposed permit system in the two new areas. The two original hunting areas were open as they had been the previous year. In one area, 25 blinds were provided at the impoundments adjacent to the Indian River. The other area was located at the south end of Mosquito Lagoon and hunters made their own temporary blinds. A postcard permit system, part of the complicated hunting regulations, was used to insure that no more than 25 parties of 3 or less people used the refuge blinds in the blind area at a cost of \$3.00 per blind per day. The permit system also limited the number of hunters in south Mosquito Lagoon to 250. In reality, however, there were never as many as 250 hunters in Mosquito Lagoon; 175 to 200 seemed to be the maximum.

Hunting was allowed on the four hunting areas only on Tuesdays, Thursdays, Saturdays and Sundays. For NASA security purposes, south Mosquito Lagoon was closed during the beginning and the end of the season.

A hunter survey program, using questionnaires, was used for the second year. Data collected from the questionnaires, field checks, and check stations were used, with a little E.S.P., to determine the year's hunting statistics. This season's figures, as compared to those of previous seasons, are as follows:

<u>Season</u>	<u>No. Hunters</u>	<u>Total Duck Kill</u>	<u>Total Coot Kill</u>
1968-69	2,581	4,104	1,985
1969-70	3,140	5,831	1,000
1970-71	4,482	10,342	1,000
1971-72	3,538	7,687	714
1972-73	3,480	5,264	1,878

This season, the point system was used again. With the season on canvasbacks and redheads closed, there were many unhappy hunters. Eight redhead cases and one canvasback case were taken to court. Crippled redheads were observed many times; there were fewer sightings of crippled canvasbacks, however.

3. Birdwatching, Nature Study, and Photography. Nature observation in general is becoming more and more popular. Birdwatching seems to be one of the most enjoyed pastimes. During vacation periods and especially during the winter months, out-of-town birders spend hours on the refuge. While most of them stay on the main roads, many more adventurous birders drive on the dikes.

General nature study was the activity in which most of the observers participated. The water in many of the impoundments and canals is often clear enough for observers to spot fish, especially gar. The dead cabbage palm trunks located in some impoundments are always interesting because of the variety of woodpeckers which nest in them. Especially during the cool months, alligators of all sizes can be seen basking during the afternoons. One active southern bald eagle nest is close enough to a roadway for visitors to get a good view of the birds and the nest without disturbing the birds. Organized groups from local schools, scout troops, garden clubs and others frequently visit the refuge for nature tours.

Photographers both amateur and professional take advantage of Merritt Island Refuge. Dr. Christine Haycock, a surgeon from New Jersey, used photographs taken at the refuge to complement an article on the refuge published in the Photography Society of America Journal. Mr. Robert Northshield, Executive Director of NBC News, visited the refuge several times to photograph birds. Many of his photographs of American avocets and black skimmers, among others, were included in his recently-published book, "The Peoples' Birds". Two photographers from Atlanta visited the refuge to film bald eagles in flight. The film is to be used as part of a Smokey the Bear fire prevention sequence. During the time of the launch of Apollo 17, NBC cameramen spent a full day filming the birdlife in particular. The day's filming was boiled down to five minutes and used on the "NBC Nightly News" the day after the launch in December.

NASA's photographers spent months making a film titled, "NASA's Wildlife Neighbors". It is about Merritt Island Refuge, the wildlife, and the management of the refuge on the Kennedy Space Center.

Many youth groups used the refuge as a site for nature study. While there are no specific facilities such as outdoor classrooms at Merritt Island, students and youth groups take advantage of the many roads on the refuge to gain easy access to the different types of plant communities. The Florida Audubon Society is a very active organization. This year several chapters took field trips to the refuge. Garden clubs and civic organizations requested presentations throughout the year.

4. Swimming. Playalinda Beach, approximately 5 miles in length, was heavily used by swimmers, surfers, sunbathers and surf-fishermen. Playalinda was the topic of heated controversy in the spring when the public learned of the Bureau's proposed \$1.00 per car service fee to be charged at the beach entrance. The service fees were to be used to pay lifeguard salaries. Upset citizens circulated a petition to eliminate the fee and there were eventually more than 3,000 signatures on it. As a result, the Bureau and the Brevard County Commission came to an agreement whereby there would be no service fee, the County would pay the lifeguard salaries and the Bureau would pay for lifeguard equipment, for beach and restroom clean-up, and for patrolmen. Also, under the proposed service fee system, the Bureau already had a contract with a local organization which was to operate the food concession, pay the lifeguards, and collect the service fees. The public uproar over the fee resulted in a contract amendment under which the Bureau provided all of the equipment for the food concession and the concessionaire only ran the food concession. The concessionaire exercised his right to terminate the contract on December 31st. No plans for 1973 have been considered yet.

5. Conservation-oriented Youth Group Camping. Dummitt Cove Campground is a primitive campground with 6 main areas. Boy Scouts, Girl Scouts, and Y-groups as well as other youth groups, use it throughout the year. A total of 1170 campers spent mostly weekends at Dummitt Cove. A permit, acquired two weeks in advance, is required.

B. Refuge Visitors.

Mr. & Mrs. Charles E. Bennett	Pelican Isl. Audubon Soc.	Vero Beach, Fla.
Frieda Gielow	"	"
Miriam Goff	"	"
Mr. and Mrs. Frank Wolcott	"	Sebastian, Fla.
Mrs. Frank Baisden	"	Roseland, Fla.
Edith Stewart	"	Shaftsbury, Vt.
Mr. & Mrs. S. E. Burr	"	Vero Beach, Fla.
Irma D. Freneau	"	Poultney, Vt.
Mr. & Mrs. N. Roller	"	Vero Beach, Fla.

Mr. & Mrs. Robert Elacker	Pelican Isl. Audubon Soc.	Chappaqua, N.Y.
Mary Louise Wellman	"	Poultney, Vt.
Alfred S. Bartleson	"	Vero Beach, Fla.
Mr. & Mrs. Tom Myers	"	Vero Beach, Fla.
Dolly W. Ansell	"	Vero Beach, Fla.
Mabel Michael	"	Vero Beach, Fla.
Phyllis Stockberger	"	E. Hampton, Conn.
Shad Northshield	NBC News	New York, N.Y.
Mr. & Mrs. Sidney Bagma		Wyckoff, N.J.
Ira Weigley	Fla. Audubon Society	Maitland, Fla.
Earl & Gertrude Johnson	Azalea Audubon Society	Palatka, Fla.
Jilys Breese	British Broadcasting Co.	London, England
P. Momb	University of London	London, England
Mr. & Mrs. F. A. Njiri	E. African Natl. Parks	Nairobi, E. Africa
Phil & Jean DuMont		Washington, D.C.
Paul Sykes, Jr.	Endangered Species Bio.	Delray Beach, Fla.
C. Edward Carlson	R.O., Atlanta, Ga.	Atlanta, Ga.
Conley Moffett	"	Atlanta, Ga.
Philip L. Shoemaker	Fla. Marine Patrol	New Smyrna Beach, Fla.
Byron Carlsson	Swedish Birding Tour	Stockholm, Sweden
Richard Biel	"	"
Jorton Hemer	"	"
L. Lindholm	"	"
Rolf Serlachius	"	Helsingfors, Finland
Elizabeth Phelps (of Ivory-billed Woodpecker fame)		Skyland, N.C.
Annette Duchain		Spartanburg, S.C.
John Doebel	For Apollo 17 launch	Loxahatchee NWR
Pres Lane	"	Savannah NWR
L. H. Hutchinson	"	Harris Neck NWR
Denny Holland	"	Back Bay NWR
Charlie Noble	"	St. Vincent NWR
Marvin Hurdle	"	Lake Woodruff NWR
John Eadie	"	Okefenokee NWR
Travis McDaniel	"	Noxubee NWR
Ray Simons	Fernbank Science Center	Atlanta, Ga.
Max R. Carey	Fla. Institute of Tech.	Melbourne, Fla.
Jack Salmela	Brevard Co. Mosquito Cont.	Titusville, Fla.
Steve Fickett	Fla. Game & FWF Comm.	Brooksville, Fla.
David Clapp	Mass. Audubon Society	Sharon, Mass.
R. L. Durrell	The Nature Conservancy	Arlington, Va.
Ronald Ogden	BSFW	Columbus, Ohio

C. Refuge Participation.

<u>Date</u>	<u>Organization</u>	<u>Purpose</u>	<u>Attendance</u>
1/7	Cornell University students	Tour	12
2/1	Boy Scouts	Movie	30
2/12	Girl Scouts	Tour	19
2/22	Boy Scouts	Talk	30
3/21	Madison Jr. High Vocational Fair	Talk	80
5/25	Cub Scouts	Movie	73
6/3	Cub Scouts	Tour	22
6/11	Boy Scouts - Illinois	Tour	15
7/1,2,3	Local public	Turtle Watch	3000
7/13	Rotary	Movie	15
7/15	Pasco Audubon Society	Tour	25
7/25	Citrus Council GS Day Camp	Hike	40
8/2	Boy Scouts	Tour	11
8/10	Bible School	Talk	30
8/14	N. Brevard Environmental Act. Comm.	Talk	12
9/19	Indian River Methodist Church Men's Cl.	Movie	10
9/21	American Quality Controllers	Movie	45
9/23	Public - Natl. Hunting & Fishing Day	Open House	175
11/7	Cub Scouts	Movie	12
11/11	Indian River Audubon Soc. Youth Gp.	Tour	17
11/12	Indian River Jr. College	Tour	18
11/13	Merritt Isl. Hi Sch. - Ecology Classes	Tour	60
11/14	" "	Movie - Talk	150
11/14	Boy Scouts	Talk	25
11/21	Boy Scouts	Talk	25
11/24	Swedish Birding Tour	Talk	16
		TOTAL	4027

D. Miscellaneous Public Relations Activities.

1. On the nights of July 1,2 and 3, the entire refuge staff held the Annual Turtle Watch in cooperation with the Titusville Division of the Florida Marine Patrol. A total of 3,000 people were led to the beach to see sea turtles nesting. As expected, it was a tremendous success.

2. Throughout the year, Mr. Chuck Hardin, Administrative Assistant; Mr. Walt Stieglitz, Asst. Regional Supervisor; Mr. Royston Rudolph, Acting Associate Regional Supervisor; Mr. Larry Givens, Regional Supervisor; and Mr. C. Edward Carlson, Regional Director, made numerous trips from Atlanta to Merritt Island Refuge to deal with the problems presented by the Beach concession, the fish camp leases, and the citrus grove leases.

3. National Hunting and Fishing Day, September 23rd, was observed by an Open House at Refuge Headquarters. One hundred and seventy-five people saw wildlife films and 100 people participated in the auto-caravan which took a 2-hour guided trip through the refuge.

4. In October, Conley L. Moffett, Regional Visual Information Specialist, visited Merritt Island National Wildlife Refuge and the Kennedy Space Center to make plans for the Refuge display which will be placed in the Kennedy Space Center Visitor Information Center when funding permits.

E. Violations. Several different kinds of violations occurred on the refuge during the year. During the waterfowl season alone, more than 80 cases were made. Violations included possession of redheads and canvasbacks, over the limit, hunting without a permit, hunting in a closed area, hunting on a non-hunting day, and taking of a protected species (marbled godwit).

Otter poachers were active until caught last winter. Possession of firearms on the refuge was a common violation; weapons ranged from a double-barrelled BB gun used to harass coots, to an M-1 used to shoot tin cans.

The first case dealing with vehicle use of the closed sand road west of the dunes went before U.S. Magistrate Hughes in Daytona Beach and the violator was fined \$50.00 for trespassing in a closed area.

F. Safety. Merritt Island Refuge had another good year safety-wise. Laborer Marek bruised his lower back while riding in the weapons carrier over rough ground but no time was lost as a result of it, and he has recovered. The fast-moving traffic in front of headquarters continues to be a potential hazard. The speed limit signs are ignored. For a few weeks, a Sheriff's Deputy used the headquarters driveway as his observation post for detecting speeders. He wrote several tickets but was eventually transferred to an area where he was more needed.

Safety meetings were held regularly. Familiarization with safety equipment was achieved. With the additional use of the dragline and bulldozer, heavy equipment safety was often stressed.

## VII. OTHER ITEMS

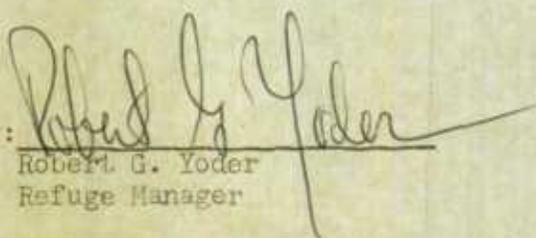
### A. Items of Interest.

1. Refuge Manager Robert Yoder was transferred to Merritt Island from Sherburne Refuge in October.
2. Assistant Refuge Manager Glen Bond attended the Supervisors' Course in Atlanta in May and the Marsh Symposium at Louisiana State University in July.
3. Citrus Grove Manager Harvey Page spent two days in Washington with Mr. Larry Givens, Regional Supervisor, to brief U. S. Senators Gurney and Chiles and U. S. Representative Frey on the citrus grove lease consolidations. Harvey had managed the groves on the Space Center for the Corps of Engineers and transferred to the Bureau with the signing of the Agreement between NASA and Interior. The Agreement gave 40,000 additional acres to the refuge as well as citrus groves and other responsibilities.
4. Assistant Refuge Manager Robin Fields attended the Association of Interpretive Naturalists Meeting and Workshop at Okefenokee National Wildlife Refuge in October.
5. In August, Refuge Manager Harold O'Connor was transferred to the Regional Office in Albuquerque as Associate Regional Director.
6. In August, Larry D. West joined the staff at Merritt Island as an Assistant Manager. Larry graduated from the University of Tennessee in June.
7. Maxwell (Lawson) Blake, Jr. spent the summer at Merritt Island as a Student Trainee. At the end of the summer, he returned to North Carolina State University to complete his senior year.
8. The refuge staff grew considerably with the addition of three patrolmen in September. Alfred J. Gensiejewski, William B. Maxfield, and John R. Millett were welcome additions.  
  
In addition, three new laborers joined the staff. They are: Edward G. Duffy, Raymond J. Marek, and William E. Tyson.
9. Elwood Hurte was promoted from Laborer to Maintenance Worker and is doing a fine job.
10. Lois E. Brown was promoted from Clerk-Stenographer to Clerk-(Typing).
11. The following NR forms are not applicable at this station: NR-7, Non-agricultural Collections, Receipts and Plantings; NR-8a, Refuge Grain Report; and NR-11, Timber Removal.

12. Sections I, II, VI and VII were prepared by Asst. Refuge Manager Fields. Sections III, IV and V were prepared by Asst. Refuge Mgr. Bond.

B. Photographs. The photographs used in this report were taken by Asst. Refuge Mgr. Fields and Wildlife Biologist Baker.

Submitted by:

  
Robert G. Yoder  
Refuge Manager

Assistant Regional Refuge Supervisor  
Regional Office Approval

APR 1 9 1973

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

December

Refuge Merritt Island For 12-month period ending ~~XXXXXX~~ 31, 19 72

Reported by Robert G. Yoder Title Refuge Manager

(1) Area or Unit Designation	(2) Habitat Type	Acreage	(3) Use-days	(4) Breeding Population	(5) Production
Uplands, E.& W. of S.R. 3, N. Boundary to Haulover Canal	Crops	800	Ducks		
	Upland	6202	Geese		
	Marsh		Swans		
	Water		Coots		
	Total	7002	Total		
Barrier Beach, N. Boundary to Playa- linda Beach	Crops		Ducks		
	Upland	3854	Geese		
	Marsh		Swans		
	Water		Coots		
	Total	3854	Total		
Mosquito Lagoon and Mangrove Islands	Crops		Ducks	734,843	
	Upland		Geese		
	Marsh		Swans		
	Water	24,990	Coots	1,802,250	
	Total	24,990	Total	2,537,093	
Shiloh Marsh and Indian River, Turn- bull Cr., to T-10-L incl. Dummitt Creek	Crops		Ducks	710,045	70
	Upland		Geese		70
	Marsh	2361	Swans		
	Water	7002	Coots	1,002,000	
	Total	9363	Total	1,712,045	70
S. Mosquito Lagoon Marsh to SR 402	Crops		Ducks	734,843	80
	Upland		Geese		90
	Marsh	2642	Swans		
	Water		Coots	1,802,250	
	Total	2642	Total	2,537,093	80
Indian River Impound- ments T-10-9 to other side including adj. to Banana & Moore Creeks	Crops		Ducks	734,843	155
	Upland		Geese	300	180
	Marsh	14,126	Swans		
	Water		Coots	1,802,250	
	Total	14,126	Total	2,537,393	155
Banana, Gator, Catfish, Marsh Bay, Black Point Creeks	Crops		Ducks	734,843	
	Upland		Geese		
	Marsh		Swans		
	Water	7,574	Coots	1,802,250	
	Total	7,574	Total	2,537,093	

(over)

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
WATERFOWL UTILIZATION OF REFUGE HABITAT

Refuge Merritt Island For 12-month period ending ~~August~~ December 31, 1972  
Reported by Robert G. Yoder Title Refuge Manager

(1) Area or Unit Designation	(2) Habitat			(3) Use-days	(4) (5) Breeding Population Production	
	Type	Acreage				
Between Indian River & Mosq. Lagoon, Haulover Canal to Banana Creek	Crops	85	Ducks	24,800		
	Upland	16,706	Geese			
	Marsh	340	Swans			
	Water		Coots	800,250		
	Total	17,131	Total	825,050		
Dunes, N.E. of Banana River to Playalinda Beach	Crops		Ducks			
	Upland	1,364	Geese			
	Marsh		Swans			
	Water		Coots			
	Total	1,364	Total			
S. of Banana Creek to NASA Causeway	Crops	1,615	Ducks			
	Upland	17,470	Geese			
	Marsh		Swans			
	Industrial	<del>XXXXX</del> 939	Coots			
	Total	20,024	Total			
Banana River and N. Marsh & Pads A & B	Crops		Ducks	734,843		
	Upland		Geese			
	Marsh	14,758	Swans			
	Water	17,575	Coots	1,802,250		
	Total	32,333	Total	2,537,093		
TOTALS 140,393 A.	Crops	2,500	Ducks	4,409,060	305	340
	Upland	15,586	Geese			
	Marsh	31,227	Swans			
	Water	57,141	Coots	10,813,500		
	Industrial	<del>XXXXX</del> 939	Total	15,222,560	305	340
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			

(over)

3-1750c

Form NR-1C  
(Sept. 1960)WATERFOWL HUNTER KILL SURVEYRefuge Merritt IslandYear 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Total Kill
Nov. 23 -			Scaup	210				
Nov. 29			Blue-winged teal	142		343	413	1246
			American widgeon	74				
			Ring-necked duck	43				
			Green-winged teal	37				
			Ruddy duck	34				
			Shoveler	28				
			Pintail	21				
			Mottled duck (Florida duck)	12				
			Gadwall	4				
			Red-breasted merganser	3				
			Hooded merganser	3				
			Black duck	2				
			Fulvous tree duck	2				
			Bufflehead	1				
			Wood duck	1				
			Mallard	1				
			Coot	285				

#### INSTRUCTIONS

- (1) The first week of hunting begins with opening day and ends at the close of hunting 6 days later. Successive weeks follow the same pattern.
- (2) The goal is to survey a minimum of 25 percent of refuge hunters each week and to record data only from those who have completed their day's hunting. This information should be collected during each day of the week and in each area hunted in relative proportion to the hunter effort expended. When the 25 percent goal cannot be achieved, particular care should be taken to collect representative data.
- (3) Record the total number of hours the hunters spent hunting on the refuge.
- (4) List waterfowl species in decreasing order of numbers bagged. Sample entry: Mallard (61), Pintail (36), Redhead (16), Gadwall (11), Widgeon (6), Coot (4), Canada Goose (3), Green-winged Teal (1).
- (5) Record total numbers of waterfowl bagged.
- (6) Record total numbers of waterfowl reported knocked down but not recovered.
- (7) Total of Columns 5 and 6.
- (8) Estimate the total number of hunters who hunted on the refuge during the week, including hunters checked (Column 2).
- (9) Kill sample projected to 100 percent.  $\text{Column 9} = \frac{\text{Column 8}}{\text{Column 2}} \times \text{Column 7}$ .

3-1750c  
 Form NR-1C  
 (Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1961 72

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est. Total Kill
Nov. 30			Scaup	200				
Dec. 6			Blue-winged teal	135	263	1037	366	1037
			American widgeon	70				
			Ring-necked duck	41				
			Green-winged teal	35				
			Ruddy duck	32				
			Shoveler	26				
			Pintail	20				
			Mottled duck (Florida duck)	12				
			Mallard	3				
			Gadwall	3				
			Red-breasted merganser	3				
			Hooded merganser	3				
			Black duck	2				
			Fulvous tree duck	2				
			Bufflehead	1				
			Coots	186				

3-1750c  
 Form NR-1C  
 (Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est. Total Kill
Dec. 7 - Dec. 13			Scaup	267	219	1270	490	1270
			Blue-winged teal	179				
			American widgeon	94				
			Ring-necked duck	55				
			Green-winged teal	47				
			Ruddy duck	43				
			Shoveler	35				
			Pintail	27				
			Mottled duck (Florida duck)	16				
			Gadwall	5				
			Red-breasted merganser	4				
			Hooded merganser	4				
			Black duck	3				
			Fulvous tree duck	2				
			Mallard	1				
			Coot	260				

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Total Kill
Dec. 14			Scaup	235				
Dec. 20			Blue-winged teal	158	326	1285	432	1285
			American widgeon	83				
			Ring-necked duck	48				
			Green-winged teal	41				
			Ruddy duck	38				
			Shoveler	31				
			Pintail	23				
			Mottled duck (Florida duck)	15				
			Gadwall	4				
			Red-breasted merganser	3				
			Hooded merganser	3				
			Black duck	2				
			Fulvous tree duck	2				
			Bufflehead	1				
			Wood duck	1				
			Mallard	1				
			Coots	270				

3-1750c  
Form NR-1C  
(Sept. 1960)

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Total Kill
Dec. 21 - Dec. 27			Scaup 163	648	233	881	300	881
			Blue-winged teal 114					
			American widgeon 57					
			Ring-necked duck 34					
			Green-winged teal 30					
			Ruddy duck 26					
			Shoveler 22					
			Pintail 16					
			Mottled duck (Florida duck) 10					
			Gadwall 3					
			Red-breasted merganser 3					
			Hooded merganser 2					
			Black duck 1					
			Fulvous tree duck 1					
			Mallard 1					
			Coots 165					

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Total Kill
Dec. 28 - Jan. 3			Scaup 216	842	284	1125	396	1125
			Blue-winged teal 145					
			American widgeon 76					
			Ring-necked duck 44					
			Green-winged teal 38					
			Ruddy duck 35					
			Shoveler 28					
			Pintail 21					
			Mottled duck (Florida duck) 13					
			Gadwall 4					
			Red-breasted merganser 3					
			Hooded merganser 3					
			Black duck 2					
			Fulvous tree duck 1					
			Bufflehead 1					
			Wood duck 1					
			Mallard 1					
			Coot 210					

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Total Kill
Jan. 4 - Jan. 10			Scaup 180	739	316	1055	331	1055
			Blue-winged teal 123					
			American widgeon 64					
			Ring-necked duck 37					
			Green-winged teal 32					
			Ruddy duck 29					
			Shoveler 24					
			Pintail 18					
			Mottled duck (Florida duck) 11					
			Gadwall 3					
			Red-breasted merganser 2					
			Hooded merganser 2					
			Bufflehead 2					
			Fulvous tree duck 1					
			Black duck 1					
			Mallard 1					
			Coot 209					

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1967

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Tot. Kill
Jan. 11 - Jan. 17			Scaup 199	753	242	995	366	995
			Blue-winged teal 135					
			American widgeon 70					
			Ring-necked duck 41					
			Green-winged teal 35					
			Ruddy 32					
			Gadwall 26					
			Shoveler 19					
			Pintail 14					
			Mottled duck (Florida duck) 8					
			Mallard 3					
			Red-breasted merganser 3					
			Hooded merganser 3					
			Black duck 2					
			Fulvous tree duck 1					
			Bufflehead 1					
			Wood duck 1					
			Coot 160					

WATERFOWL HUNTER KILL SURVEY

Refuge Merritt Island

Year 1963

(1) Weeks of Hunting	(2) No. Hunters Checked	(3) Hunter Hours	(4) Waterfowl Species and Nos. of Each Bagged	(5) Total Bagged	(6) Crippling Loss	(7) Total Kill	(8) Est. No. of Hunters	(9) Est Total Kill	
Jan. 18			Scaup	119	485	191	676	386	676
Jan. 20			Blue-winged teal	83					
			American widgeon	42					
			Ring-necked duck	25					
			Green-winged teal	21					
			Ruddy	19					
			Shoveler	16					
			Pintail	12					
			Mottled duck (Florida duck)	7					
			Gadwall	2					
			Red-breasted merganser	2					
			Hooded merganser	2					
			Black duck	1					
			Mallard	1					
			Coot	133					

DISEASE

Refuge Merritt Island Year 1972

Botulism

Lead Poisoning or other Disease

Period of outbreak \_\_\_\_\_

Period of heaviest losses \_\_\_\_\_

Losses:

	Actual Count	Estimated
(a) Waterfowl	_____	_____
(b) Shorebirds	_____	_____
(c) Other	_____	_____

Number Hospitalized      No. Recovered      % Recovered

(a) Waterfowl	_____	_____
(b) Shorebirds	_____	_____
(c) Other	_____	_____

Areas affected (location and approximate acreage) \_\_\_\_\_

Water conditions (average depth of water in sickness areas, reflooding of exposed flats, etc.) \_\_\_\_\_

Condition of vegetation and invertebrate life \_\_\_\_\_

Remarks \_\_\_\_\_

Kind of disease Rabies

Species affected Raccoons

Number Affected Species	Actual Count	Estimated
<u>1</u>	<u>1</u>	<u>500+</u>
_____	_____	_____
_____	_____	_____

Number Recovered N/A

Number lost N/A

Source of infection Unknown

Water conditions N/A

Food conditions N/A

**Remarks** A raccoon was taken to the Brevard County Dept. of public Health for examination. The animal was determined to be rabid. As a result, the County Dept. of Public Health imposed a 90 day quarantine on the Refuge; specifically, no feral hogs were to be removed by trappers, as a precautionary measure.

-1758  
 Form NR-8  
 Rev. Jan. 1956)

Fish and Wildlife Service Branch of Wildlife Refuges

CULTIVATED CROPS - HAYING - GRAZING

Refuge Merritt Island County Brevard State Florida

Cultivated Crops Grown	Permittee's Share Harvested		Government's Share or Return				Total Acreage Planted	Green Manure, Cover and Water-fowl Browsing Crops Type and Kind	Total Acreage
	Acres	Bu./Tons	Harvested		Unharvested				
			Acres	Bu./Tons	Acres	Bu./Tons			
Citrus fruits		70% of net profit (approx.)		30% of net profit (approx.)				N/A	2551
								Fallow Ag. Land	

No. of Permittees: Agricultural Operations 37 citrus les- Haying Operations \_\_\_\_\_ Grazing Operations \_\_\_\_\_  
 sees. 25 Api ary licenses (approx. 1250 hives).

Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Revenue	GRAZING	Number Animals	AUM'S	Cash Revenue	ACREAGE
				1. Cattle				
				2. Other				
				1. Total Refuge Acreage Under Cultivation				
Hay - Wild				2. Acreage Cultivated as Service Operation				

## ANNUAL REPORT OF PESTICIDE APPLICATION

Proposal Number

Reporting Year

1972

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. July - Dec.	Glover, purple, chaff, yellow, Florida red, black brown snow & soft scales; rust mite; citrus red mite; six spotted mite; Texas citrus mite; and greasy spot fungus	Mature citrus groves	2551 A.	Spray oil and ethion; sulfur; ethion	Information not available	Oil: approx. 10 gal/A; Ethion w/oil: app. 4 lbs. active ingred. per A. Sulfur: approx. 50 lbs./A. Ethion alone: approx. 8 lbs. active ingred. per A.	Water: 500 - 1000 gal./A.	Tractor-drawn air blast sprayer
2. Jan. - Dec.	Mosquitoes: <u>Aedes taeniorhynchus</u> <u>Aedes Sollicitans</u>	Impoundments T-24-C, T-10-K, and G-15-C; North Moore Creek; Playalinda Beach, Pads 39A and 39B, S. Banana Creek; Spoil Islands	9436 A.	Diesel and Triton X-207 spreader  Richfield larvacide	20,000 gal.  630 gal.	11 gal/A.  6 gal/A.	None  None	Aerial  Aerial

## 10. Summary of results (continue on reverse side, if necessary)

1. This report is our estimate of what probably was used by the 37 lessees during the period 2 June through 31 December 1972. Prior to 2 June, the groves were not under the control of the Bureau. All costs were born by the lessees as part of normal cost of production. Fruit quality is generally high but quantity produced is somewhat low.

3-1979 (NR-12)  
(9/63)

Bureau of Sport Fisheries and Wildlife

Refuge

Merritt Island

ANNUAL REPORT OF PESTICIDE APPLICATION

Proposal Number

Reporting Year

1972

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2.		Banana River and Mosquito Lagoon		Paris Green dust	17,500 lbs.	15 lbs/A.	Vermiculite	Aerial
3. Jan. -Dec.	NASA's pesticide applications are recorded on the following forms.							

10. Summary of results (continue on reverse side, if necessary)

2. Pesticides applications are kept to a minimum by Brevard County Mosquito Control Director Jack Salmela. No obvious adverse effects have been noted.

WORKING GROUP ON PESTICIDES  
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY

John F. Kennedy Space Center, NASA

DATE SUBMITTED

DIVISION

Installation Support

PERSON TO CONTACT/TELEPHONE NO.

H. Cunningham/867-4321

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION				SENSITIVE AREAS <sup>1</sup>	REMARKS
(1) PROJECT NO. (2) TARGET PEST (3) PURPOSE	(4) COMMON NAME (5) % AI OR LB/GAL (6) REGISTERED USE AND REGISTRATION NO. (if available)	(7) FORM APPLIED (Dust, Emulsion, Solution, Salt, etc.) (8) PESTS, WEEDS, etc. (9) USE STRENGTH (5) OR MIX	(10) LBS AI PER ACRE OR OTHER RATE	(11) METHOD (Sprayer, Ground, Aerial, U.V., E.P., other)	(12) ACRES OR OTHER UNIT TO BE TREATED (13) NUMBER AND DESCRIPTION OF SITES	(14) SEASON OF YEAR (15) STATE OR REGION  <sup>1</sup> Croplands, lakes, streams, rivers, estuaries, etc.	(16) PRECAUTIONS TO BE TAKEN (17) USE OF APPLICATIONS (18) USE OF TRAINED/CERTIFIED PERSONNEL (19) MONITORING (20) OTHER
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
WGP-1 Vegetation Cattails Phragmites Weed Abatement	Dowpon 2,2 Dichloropropionic Acid Sodium Salt 85% Dalapon (2,2 Dichloropropionic Acid 15% Inert Ingredient) USDA Reg. #464-164	Solution	10 lbs. per acre	Ground Power Sprayer	120 acres drainage ditches 8' wide	Spring Summer Florida	b) Drainage and Outfall Ditches Near Orange Groves  a) No spraying when winds exceed 8 m.p.h.. b) Spot treatment on monthly inspections c) Spraying accomplished by trained personnel d) Supervised by Graduate Horticulturist, reviewed by NASA Agronomist See Form #2
WGP-2 All Vegetation Soil Sterilization	Pramitol 2,4 bis (isopropylomino)-6-methoxy-3-triazine 25% inert ingredient 75% 1.97 lbs. per gallon prometone	Emulsifiable	25 gals. per acre 49.25 #/acre actual	Ground Power Sprayer	11 acres, 6 parking lots	Fall with summer spot treatments Florida	None  a) Avoid slopes to prevent erosion b) Fall with summer spot treatment on quarterly inspections c) Same as WGP-1 d) Same as WGP-1

WORKING GROUP ON PESTICIDES  
PEST CONTROL PROGRAM REPORT

DEPARTMENT/AGENCY

John F. Kennedy Space Center, NASA

DATE SUBMITTED

DIVISION

Installation Support

PERSON TO CONTACT/TELEPHONE NO.

H. Cunningham/867-4321

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION					SENSITIVE AREAS <sup>1</sup>	REMARKS
		(1) FORM APPLIED (DUST, GRANULE, EMULSION, SOL, FOLIAR, STEM, ETC., ETC.)	(2) USE STRENGTH (%) OR MIX	(3) LBS. AI PER ACRE OR OTHER RATE	(4) METHOD (AERIAL, GROUND, BACKLASH, ULV, E.P., OTHER)	(5) ACRES OR OTHER UNIT TO BE TREATED		
(10) PROJECT NO. (11) TARIFF PEST (12) PURPOSE	(13) COMMON NAME (14) A.I. OR L.B. / G.A.L. (15) REGISTERED USE AND REGISTRATION NO. (IF AVAILABLE)	(16) PRECAUTIONS TO BE TAKEN (17) NO. OF APPLICATIONS (18) USE OF TRAINED/CERTIFIED PERSONNEL (19) MONITORING (20) OTHER	(21)	(22)	(23)	(24)	(25)	(26)
WPG-3 General Vegetation Soil Steriliza- tion	Diuron- 80% Karmex	Suspension	40 lbs.	Power Sprayer	30 acres	Spring Florida	b) High volt- age sub- station	a) Same as WGP-1 b) Annual c) Same as WGP-1 d) Same as WGP-1
WGP-4 All Vege- tation Soil Steriliza- tion	Pramitol 5 PS, USDA Reg. #100-479	Granular, Active In- gredients 95.75%, 2- methoxy-4, 6-bis(iso- propylamin- ol-s-tria- zine 5.00%, Sodium Chlorate (NACLO) 40.00%, Sod- ium Metabor- ate $Na_2B_2O_4 \cdot 5H_2O$ 50.00%, In- ert Ingred- ients 4.25%	2 lbs. per 100 sq.ft.	Ground	Sub-Station above ground steamlines, 8 acres, 12 sites	Spring Florida	a) Trees and Ornamental Plantings	a) Same as WGP-1 b) Annual c) Same as WGP-1 d) Same as WGP-1

WORKING GROUP ON PESTICIDES  
PEST CONTROL PROGRAM REPORT

DEPARTMENT AGENCY

John F. Kennedy Space Center, NASA

DATE SUBMITTED

DIVISION

Installation Support

PERSON TO CONTACT, TELEPHONE NO.

H. Cunningham/867-4321

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE		PEST/DISEASE	APPLICATION			SENSITIVE AREAS	REMARKS	
(1) PROJECT NO.	(2) COMMON NAME (3) S. A. OR LB. GAL. (4) REG. STENO USE (5) REGISTRATION NO. (6) TRADE NAME	(7) FORM APPLIED (SOL., SPR., P. POW., GR., etc.) (8) CONC. OR PERCENTAGE (9) USE STRENGTH (S) OR MIX	(10) LBS. AI PER ACRE OR OTHER RATE	(11) METHOD (GROUND, AERIAL, etc.) (12) DEF. LF. WHEN	(13) NUMBER OR OTHER UNIT TO BE TREATED (14) NUMBER AND DESIGNA- TION OF SITES	(15) SEASON OF YEAR (16) STATE OR REGION	(17) AREAS TO BE AVOIDED (18) AREAS TO BE TREATED WITH CAUTION (19) (Climates, lakes, streams, human exposure, other)	(20) PRECAUTIONS TO BE TAKEN (21) USE OF APP. CAPSULE (22) USE OF PROTECTIVE EQUIPMENT (23) SPECIAL INSTRUCTIONS (24) OTHER
WGP-5 Broad Leaf Plants and Water Hyacinth	2,4D 4 lbs. per gal. USDA Reg. #524-78	Solution Active In- gredients Dimethylam- ine Salt of 2,4D Dich- lorophenoxy- acetic Acid 49.5%, Inert Ingredients 50.5% equiv- alent to 41.1% 2,4D or 4.0 lbs. per gallon	2 lb. per acre	Ground	Ditches, slopes a) 140 acres b) 10 sites water hya- cinth	Spring and Summer Florida	b) Drainage ditches, and outfall ditches, near orange groves	a) Same as WGP-1 b) Annual c) Same as WGP-1 d) Same as WGP-1 See Form #2
WGP-6 b) Woody plants and bushes c) To main- tain pow- erline and road right-of- ways	a) Ammate b) 95% Ammonium Sulfate 5% Inert Ingredients c) E.P.A. Reg #352- 206AA	a) Solution b) 60 lbs. mixed with 100 gal. water 6.8%	Wet fol- iage and stems	Ground Power Sprayer	a) 100 acres b) Spot treatment 46 miles of power lines 25 miles of roadway	a) Summer b) Florida	a) Orange groves b) Streams, Ditches	a) Avoid pro- longed contact of skin with strong solution In case of con- tact, wash with water. b) As needed c) Supervised by Grad Horticul- turist. d) Monitored by NASA Agronomist See Form #2

WORKING GROUP ON PESTICIDES  
PEST CONTROL PROGRAM REPORT

DEPARTMENT AGENCY

John F. Kennedy Space Center, NASA

DATE SUBMITTED

DIVISION

Installation Support

PERSON TO CONTACT (TITLE, PHONE NO.)

H. Cunningham/867-4321

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OPERATOR	PEST CODE	APPLICATION				SEASON AND REGION		REMARKS
		FORM APPLIED (CONC. FROM REG. #11)	USE PER ACRE OR OTHER RATE	METHOD (THERMAL, GROUND, ULV, E.V. SPRAY)	ACRES OR OTHER UNIT TO BE TREATED	SEASON OF YEAR	STATE OR REGION	
(1) PROJECT NO. (2) TARGET PEST (3) PURPOSE	(4) COMMON NAME (5) % A.C. OR LB. GAL. (6) REG. NO. AND DATE (7) REG. STATE USE (8) REG. STRENGTH (1) OR (2)	(9) FORM APPLIED (CONC. FROM REG. #11) (10) USE PER ACRE OR OTHER RATE	(11) USE PER ACRE OR OTHER RATE	(12) METHOD (THERMAL, GROUND, ULV, E.V. SPRAY)	(13) ACRES OR OTHER UNIT TO BE TREATED	(14) SEASON OF YEAR (15) STATE OR REGION	(16) AREAS TO BE TREATED (17) NO. OF AREAS TO BE TREATED (18) DATE OF TREATMENT (19) COMMENTS (e.g., crops, plants, animals, etc.)	(20) PRECAUTIONS TO BE TAKEN (21) NO. OF APPL. CAT. #S (22) DATE OF TREATMENT (23) PERSONNEL (24) OTHER
WGP-7 Aphids, Scale In- sects on Ornament- al Plant Protection	Malathion 57%, 5 lb. per gal. USDA Reg. #241-47	Emulsion 2 pints 100 gal. H <sub>2</sub> O Spray to point of run-off.	1 1/4 lbs. per acre	Ground	5 acres ornamental plant beds 50 sites	Spring Summer Fall Florida	None	a) Same as WGP-1 b) As required c) Same as WGP-1 d) Same as WGP-1
WGP-8 Mosquitos Health and Morale	Malathion 95%, 9.7 lbs. per gal. USDA Reg. #241-110	Solution 5 gallon per 100 gal #2 Fuel oil	.1 lbs per acre	Ground Thermal Fogger	1,800 acres	Summer Florida	a) Liquid Oxygen, pro- pellant storage areas	a) No fogging when winds ex- ceed 8 m.p.h. b) As required c) Same as WGP-1 d) Same as WGP-1
OR								
WGP-9 Roaches, Silverfish Ants Health Morale	Diazinon 4 lbs per gallons household pest con- trol	Emulsion 0.5%	1.25 oz. per gal of H <sub>2</sub> O/1000 sq. ft.	Ground Hand Pressure Sprayer	Buildings 4,204,000 sq. ft. office buildings, warehouses, snack bars, cafeterias	On Call Basis As Required Florida	a) Contamin- ation of food con- tainers Floor cover- ings with plastic, rubber and asphalt tile	a) Treatment made after clos- ing - food and utensils covered b) As required c) Same as WGP-1 d) Same as WGP-1

WORKING GROUP ON PESTICIDES  
PEST CONTROL PROGRAM REPORT

DEPARTMENT AGENCY

John F. Kennedy Space Center

DATE SUBMITTED

DIVISION

Installation Support

PERSON TO CONTACT TELEPHONE NO.

H. Cunningham/867-4321

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

PROJECT NO. (IN TARGET PEST) (IN PURPOSE)	PEST CODE (1) COMMON NAME (2) IN TRADE OR LOCAL USE (3) REGISTERED USE (4) REGISTRATION NO. (5) NUMBER	FORM APPLIED (1) (2) (3) TYPE OF PESTICIDE (4) STRENGTH (5) (6) (7) (8)	LBS. PER ACRE OR OTHER RATE	APPLICATION			SENSITIVE AREAS (1) AREAS TO BE AVOIDED (2) AREAS TO BE TREATED WITH CAUTION (3) CRIPPLED, DRAIN, STRENGTH, NUMBER, REPAIRS, OTHER	REMARKS (1) PRECAUTIONS TO BE TAKEN (2) NO. OF APPLICATIONS (3) USE OF "HARVESTING" PERSONNEL (4) MONITORING (5) OTHER
				METHOD (1) (2) (3) (4) (5) (6) (7) (8)	ACRES OR OTHER UNIT TO BE TREATED (1) NUMBER AND DELIMITATION OF SITES	SEASON OF YEAR (1) STATE IN REGION		
WGP-10 Roaches, Silverfish Ants Health Morale	Baygon 1 1/2 lbs. per gal. USDA Reg. #3125-214 Active Ingredients O-Isopropoxyphenyl Methylcarbamate - 13.9% Inert Ingredients 86.1%	Emulsion 0.5% to 1.0% 8 oz. per gal. water	8 oz. per gallon per m/ sq. ft.	Ground Hand Pressure Sprayer	Buildings 4,204,000 Sq. Ft. Office build- ings, ware- houses, snackbars, cafeterias	On Call Basis As required Florida	a) Contamina- tion of food con- tainers Floor cov- erings with plastic, rubber and asphalt tile	a) Treatment made after closing - food and utensils covered. b) As required c) Same as WGP d) Same as WGP
WGP-11 Flies Health Morale	Pyrethrin Pyrethrio 0.6%, Pip- eronyl, Butoxidell 4% USDA Reg. #1783-40	Aerosol Dispenser	7 sec. 1000 cu. ft. buildings	Ground Aerosol	Buildings Warehouses Offices	Spring Summer Fall Florida	b) Spray when offices and buildings are empty.	a) Extinguish open flame, pilot lights, etc. b) As required c) Same as WGP d) Same as WGP
WGP-12 Roof Rat Health	Warfarin .5% USDA Reg. #100-463	Bait, Corn Meal and Oatmeal .025% War- farin	1/2 lb. per bait station	Ground Hand Placed	Buildings, Warehouses Storage Lots	Continuous Florida	None	a) Bait boxes locked b) As required c) Same as WGP d) Same as WGP

WORKING GROUP ON PESTICIDES  
PEST CONTROL PROGRAM REPORT

DEPARTMENT AGENCY  
John F. Kennedy Space Center, NASA

DATE SUBMITTED

DIVISION  
Installation Support

PERSON TO CONTACT (NAME, TITLE AND NO)  
H. Cunningham/867-4321

Refer to attached instructions before completing form. Be sure that entries are correctly aligned horizontally.

OBJECTIVE	PESTICIDE	APPLICATION				SENSITIVE AREAS		REMARKS
		FORM APPLIED (DUST, GRANULE, EMULSION, SOL. SPRAY, FUMIGANT, GEL, PASTE, etc.)	LBS PER ACRE OR OTHER RATE	METHOD (EQUIPMENT, GROUND, AERIAL, etc.)	ACRES OR OTHER UNIT TO BE TREATED	SEASON OF YEAR OR STATE OR REGION	AREAS TO BE AVOIDED	
(1) PROJECT NO. (2) TARGET PEST (3) PURPOSE	(4) COMMON NAME (5) REG. NO. (6) DAL (7) REG. LISTED USE AND REGISTRATION NO. (8) COMMENTS	(9) FORM APPLIED (DUST, GRANULE, EMULSION, SOL. SPRAY, FUMIGANT, GEL, PASTE, etc.) (10) USE STRENGTH (11) OR MIX	(12) LBS PER ACRE OR OTHER RATE	(13) METHOD (EQUIPMENT, GROUND, AERIAL, etc.) (14) USE STRENGTH	(15) ACRES OR OTHER UNIT TO BE TREATED (16) NUMBER AND DESCRIP- TION OF SITES	(17) SEASON OF YEAR (18) STATE OR REGION	(19) AREAS TO BE AVOIDED (20) AREAS TO BE TREATED WITH CAUTION (21) COMMENTS, TOXICITY, STORAGE, NUMBER, EXPOSURE, etc.	(22) PRECAUTIONS TO BE TAKEN (23) NO. OF APPLICATIONS (24) USE OF TRADE IDENTIFIED PERSONNEL (25) MONITORING (26) OTHER
WGP-13 Sod Web Worms Oleander Catepil- lars, Army Worms	Sevin, 2 lbs. per gal. Car- baryl 1 (1-nep- thyl-N- methyl carbamate 23.3%, In- ert Ingre- dients 76.7%	Solution 14 oz. to 20 gallon H <sub>2</sub> O	5 lbs. per acre	Ground Power Sprayer	As Required Lawns, Turf Grasses	Spring Summer Fall Florida	a) Drainage ditches and outfall ditches, lakes and streams	Same as WGP-14
WGP-14 Ants Morale	Chlordane 5% Stock No. 6840-543- 7825	Dust 5%	.5 lbs. 100 sq. ft.	Ground	Spot treat- ment of buildings as required	All Florida	None	a) Apply direct- ly to mounds. b) As required. c) Same as WGP-1 d) Same as WGP-1
WGP-15 Termites	Chlordane 8 lbs./ gallon	Emulsion 1.0%	4 gals. 10 sq. ft.	Ground Power Sprayer	As Required Slab Type Structures	All Florida	None	Same as WGP-14 as detailed by USDA Home and Garden Bulletin #64.

1. (a) AGENCY - NASA                      (b) PROJECT NO. WGP-1                      (c) TARGET PEST - Cattails
2. IMPORTANCE - Cattails lush growth in the shallow waters of lateral drainage ditches impedes the free movement of water and detracts from the appearance of the area.
3. AREA TO BE TREATED - Approximately 110 acres of water drainage ditches must be kept free of cattails to permit the free flow of water and to maintain the appearance of the area. Shallow lateral ditches create the greatest weed problems. The ditches vary from 4 ft. to 8 ft. in width and flow into 30 ft. main canals.
4. METHOD - Dowpon is applied to the cattails at the rate of 15 lbs. of actual ingredients to the acre. Power sprayers are used in the application. The cattails are sprayed early in the growing season while plants are young and green. Spot treatment follows throughout the growing season as required.
5. SPECIAL PRECAUTIONS - Pest control personnel are trained and thoroughly familiar with Dowpon and application equipment. KSC Occupational Health Unit monitors drainage canals on monthly schedules.
6. ALTERNATIVE MATERIALS OR METHODS - The use of slope mowers was tried, but found ineffective on fast growing cattails.
7. COOPERATORS - None
8. MONITORING - All work is under the direct review of the NASA/KSC Agronomist.

1. AGENCY - NASA (b) PROJECT NO. WGP-5 (c) TARGET PEST - Water Hyacinth
2. IMPORTANCE - The hyacinths lush growth impedes the flow of water in drainage ditches causing flooding during the rain and hurricane season.
3. AREA TO BE TREATED - Approximately 140 acres of drainage ditches must be spot treated to prevent severe hyacinth problems. The bottom of lateral drainage ditches vary in width from 4 ft. to 6 ft. The hyacinth infest areas that are shallow with the combined growth of cattails.
4. METHOD - The 2,4D is applied directly to the floating hyacinth by experienced personnel using power sprayers. Good results have been obtained by spraying during the warm weather period. The diluted spray is applied at the rate of 200 gallons to the acre and the foliage is wet thoroughly. The area is inspected periodically; as small patches of hyacinth appear they are spot treated to prevent the problem from becoming severe.
5. SPECIAL PRECAUTIONS - Control personnel are thoroughly trained and familiar with 2,4D and application equipment. No spraying is permitted when winds exceed 8 m.p.h.
6. ALTERNATIVE MATERIALS OR METHODS - None
7. COOPERATORS - None
8. MONITORING - All work is under the direct review of the NASA/KSC Agronomist.

1. (a) AGENCY - NASA                      (b) PROJECT NO. WGP-6                      (c) TARGET PEST - Woody Plants
2. IMPORTANCE - Prevents possible damage to power lines by forest fires and improves visibility. Reduces hazards to driving on road right-of-way.
3. AREA TO BE TREATED - Includes spot treatment of brush such as myrtle and scrub oak along power line and road right-of-ways.
4. METHOD - Applied with John Beam power sprayer directly to foliage and stems of plants.
5. SPECIAL PRECAUTIONS - Personnel applying chemicals wear coveralls, respirators and gloves. Supervised by Graduate Horticulturist.
6. ALTERNATIVE MATERIALS OR METHODS - Clearing with equipment - dozers and bush hog mowers. Cost.
7. COOPERATORS - None
8. MONITORING - All work is under the direct review of the NASA/KSC Agronomist.

1. (a) AGENCY - NASA (b) PROJECT NO. WGP-14 (c) TARGET PEST - Ants
2. IMPORTANCE - Ants are primarily nuisance pests which invade the various buildings on Kennedy Space Center.
3. AREA TO BE TREATED - The dust is used around the outside perimeters of buildings and on ant beds.
4. METHOD - 5% Chlordane dust is applied in a narrow band around the base of the perimeter of the building. Chlordane is used at the rate of .5 lbs. per 100 sq. ft. and is applied by hand. Ant nests near buildings are treated by applying the Chlordane dust directly to the nest at the rate of 2 oz. per mound.
5. SPECIAL PRECAUTIONS - All materials are applied by trained personnel.
6. ALTERNATIVE MATERIALS OR METHODS - None
7. COOPERATORS - None
8. MONITORING - All work is under the direct review of the NASA/KSC Agronomist.

## birds join spectators at launch site



Apollo launch pad at Cape Kennedy lies adjacent to the 83,000-acre Meritt Island Wildlife Refuge, home of over 224 species of birds.

By Christine Haycock, M.D.

Photographs by the author

ANYONE who has photographed one of the Apollo missions is surprised by the number of birds in the area of the rocket before, during, and after the launch of the vehicle. This is particularly evident during early morning launches. As the sun comes up, one soon sees flocks or groups of migratory birds passing over the swampland waters between his point of observation and the expectantly waiting Apollo "bird." As the rocket ascends majestically, disturbed birds flap frantically up in the air outlined against the billowing clouds of steam, only to settle down following the launch.

Examination after launch has shown that very few birds or animals have ever been injured in any fashion by the launch itself. The venting of the rocket creates a little pall of steam for some hours prior to launch, and the activity in the immediate launch area is such that most birds do not venture too close. Not only are birds seen in the immediate vicinity of the rocket, but

in a four-hour period spent circling within one mile of the Apollo 15 vehicle, I saw several flocks of wild pigs, many armadillo, deer, various snakes, possums, alligators, and several aquatic animals.

As a result of this search, I became interested in the conjunction of Cape Kennedy with the Meritt Island Wildlife Refuge. It was only then that I became aware that the National Aeronautics and Space Administration was directly responsible for the formation of the Meritt Island National Wildlife Refuge. In 1962, when NASA was seeking out a location to establish what was to become its space center, it investigated many desolate areas that could be used along the seashore, and at the same time did not involve relocation of many people. The area eventually chosen was the then Cape Canaveral Area. In purchasing the large tract of land for use, NASA noted abundant wildlife of all types. NASA contacted the Secretary of the Interior regarding maintenance of the area as a Wildlife Refuge, and was in turn referred to the Bureau of Sport Fisheries and Wildlife to make arrangements.

In August of 1963 an agreement was reached between NASA and the Bureau establishing the Meritt Island Wildlife Refuge. The initial land NASA released was approximately 46,530 acres. Recently more acreage has been turned over and the refuge now occupies 83,000 acres, one half of this being within the security area of the John F. Kennedy Space Center. The 83,000 acres are composed mainly of shallow, fresh water impoundments, saltwater creeks and lagoons. In the higher elevations are found slash pine, palmetto, oak and cabbage palm.

In December of 1971, the Audubon Society of America conducted its annual bird count on the refuge with a team of 37 persons. In one day they identified 165 different species and saw over one million birds. This identified the Meritt Island National Wildlife Refuge as the highest concentrated area of birds in the United States. There have been sightings of over 255 different species of birds made in the refuge area since 1951; 224 of these are believed to be regular visitors to the refuge and an additional 31

are considered to be casual or accidental sightings.

One of the few non-migratory ducks in the United States, the so-called Florida "mottled" duck, is to be found in this area. It is resident in the area and nests in spring and summer. Thousands of other ducks of more than 20 different species winter in the refuge. They leave in April and come back again in August. Most common are the lesser scaup, followed by widgeons, pintails, and blue-winged teals. Occasional small flocks of blue and snow geese occur.

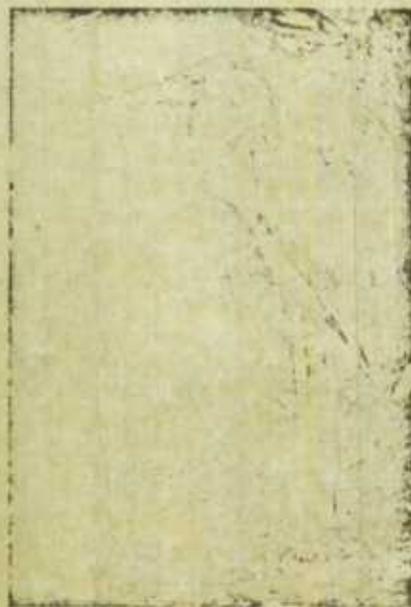
Many types of wading birds and fishing birds are seen. Most common are pie-billed grebe, anhinga, green heron, great blue heron, cattle egret, common egret, snowy egret, Louisiana heron, black-crowned night heron, least bittern, white ibis, turkey vulture, bob-white, common gallinule, killdeer, herring gull, laughing gull, and blackskimmer. Among other birds commonly seen are the morning dove, ground dove, scrub jay, fish crow, Carolina wren, mockingbird, starling, yellowthroat, house sparrow, redwing blackbird, bob-tailed grackle, common grackle, rufous-sided towhee, Savannah sparrow and others too numerous to mention.

In the winter months brown peli-

cans and the larger white pelican are in evidence, and this observer enjoyed a two-hour stretch watching several brown pelicans fishing in front of the rocket the evening before launch. The birds provided a great deal of amusement to the members of the press who were waiting to take sunset pictures of Apollo 16.

The Southern bald eagle nests on the refuge and is watched very carefully and counted periodically by the refuge managers because it is on the endangered species list. Several immature eagles have been seen recently and the Wildlife people are encouraged in believing that they are nesting and will reproduce. If unhatched or cracked eggs are found in the nest they will be retrieved and examined for any possible interference with normal hatching due to insecticides.

The present refuge manager is Harold J. O'Connor. Born in Kentucky and raised mainly in New York state, he came to the Wildlife Refuge from the Parker River Wildlife Refuge in Massachusetts. His assistant is Miss Robin Fields, who hails originally from Massachusetts and bubbles with enthusiasm over the Wildlife Refuge. Dr. James L. Baker is the Wildlife Biologist in charge of management, and he is a



Great Blue Heron was photographed in bright sunlight with an 800mm lens on author's 35mm camera.



Great Blue Heron on the wing, early morning.



Least Bittern along marsh edge.

Mississippian, having obtained his Ph.D. from Mississippi State University.

The Meritt Island Wildlife Refuge is a treasure island haven for photographers. Although during periods of the launches most areas are closed to the general public, and other parts are permanently restricted, there is still much acreage open and available for photography. Wildlife walks and classes for Boy and Girl Scouts are conducted in the refuge area by the assistant managers.

There are a number of camp grounds located in the refuge area for use by organized conservation or youth groups with adult leadership. Camping permits must be obtained in advance and written application should be addressed to the Refuge Manager, Meritt Island National Wildlife Refuge, P.O. Box 6956, Titusville, Florida 32780. A card to this address will bring all of the camping rules and regulations. In addition there are other areas where picnicking is permitted.

Immediately adjacent to the Wildlife Refuge are the towns of Cocoa Beach, Meritt Island, Titusville, and Cocoa. Camp grounds and motels are in long supply, particularly during the periods between the launches. These are reasonably priced and in general less expensive than those in places such as Miami. Fishing in the area is abundant and a very popular sport. There are public beaches available and the entire coastal region is a

good place to spend a vacation.

Sport fishing on the Meritt Island National Wildlife Refuge is only permitted in specified places, so that anyone wishing to fish there would again need permission; however, for ocean fishing and fishing outside the refuge, one is only subject to state regulations. There's no special refuge permit required.

During the past couple of years there have been some problems with lowering of water levels due to lack of rain in the wildlife area. The bird population thins out because during low water level periods the birds quickly eat the fish on which they feed and then move off to another location. Armadillos, which are usually seen abundantly, have been noticed to be somewhat scarce in recent months, probably also due to the dryness in the area.

The "wild" pigs which roam the Meritt Island Refuge are actually feral, pigs who originated from domestic animals that were brought in by early settlers. There are orange and grapefruit groves still present on the Cape and these are under lease by NASA to private companies for harvesting.

The early morning and late afternoon hours are best for the photographer in the refuge. During the heat of the late morning and early afternoon few birds are to be seen, as they confine themselves to the bushes and trees, but in the early morning hours wading and fishing birds are abundant along the shoreline. In the late hours, many ducks

and other birds can be seen flying against the setting sun, making for beautiful pictures.

One needs plenty of time, however, because for the best pictures the photographer should remain in the area for a week or so. The pictures for this article were snapped under far from the best circumstances since they were taken during Apollo launches when most parts of the Refuge were off bounds. Just to obtain the few pictures good enough to accompany this article, I had to spend four early mornings seeking out the birds, and at that was far from satisfied with the results. It is my intent in the future to go back when there is no launch scheduled and spend at least a week walking through the refuge area.

Long lenses are a must, as these birds are unaccustomed to human presence and will take off quickly upon sight or sound of humans. There is enough brush in the area, however, to conceal oneself and wait patiently. In this same brush, however, there lurk a number of various types of snakes including the Eastern diamondback rattlesnake, the cottonmouth and the coral snake; therefore one must be prudent about where one steps. Sitting on damp sand is also not advised, as vigorously biting sand fleas are prevalent. But for the avid amateur photographer, and the wildlife photographer in particular, the Meritt Island Wildlife Refuge is a must on any list of places to visit. ■



Downy anhingas at the Moore Creek rookery.



Twelve-hour old loggerhead sea turtles which hatched after being transplanted from Playalinda Beach to a protected compound.



A 250 lb. feral sow trapped inside the Kennedy Space Center Security Area.



An NBC News camera crew filming footage of the Refuge to be used after the Apollo 17 launch.



Impoundment T-10-K dusky seaside sparrow habitat.



Impoundment T-10-K; cattail invasion of permanent impoundment, looking south.



A Brevard County Mosquito Control dragline removing the dike in T-10-K to improve the dusky seaside sparrow habitat.



A redhead crippled during the 1972-73 waterfowl season.

PELICAN ISLAND NATIONAL WILDLIFE REFUGE

WABASSO, FLORIDA

## TABLE OF CONTENTS

I. GENERAL	1
A. Weather Conditions	1
B. Habitat Conditions	1
1. Water	2
2. Food and Cover	2
II. WILDLIFE	2
A. Migratory Birds	2
1. Waterfowl	2
2. Other Waterbirds	2
3. Shorebirds	2
4. Dove	2
B. Upland Game Birds	2
C. Big Game Animals	2
D. Fur Animals, Predators, Rodents, and Other Mammals	3
E. Hawks, Eagles, Owls and Crows	3
F. Fish	3
G. Reptiles	3
H. Disease	3
III. REFUGE DEVELOPMENT AND MAINTENANCE	3
A. Physical Development	3
B. Plantings	3
C. Collections and Receipts	3
D. Control of Vegetation	3
E. Planned Burning	3

F. Fires	4
IV. RESOURCE MANAGEMENT	4
V. FIELD INVESTIGATIONS OR APPLIED RESEARCH	4
VI. PUBLIC RELATIONS	4
A. Recreational Uses	4
1. Sport Fishing	4
2. Hunting	4
3. Nature Study, Birdwatching, and Photography	4
B. Refuge Visitors	4
C. Refuge Participation	5
D. Violations	6
E. Safety	6
VII. ITEMS OF INTEREST	6

PELICAN ISLAND NATIONAL WILDLIFE REFUGE

REFUGE NARRATIVE REPORT

January through December 1972

I. GENERAL

A. Weather Conditions. The weather for the year 1972 could be termed typical for Pelican Island National Wildlife Refuge with characteristic hot, humid summers made bearable by sea breezes, and a mild winter. The low temperature for the year was 40 degrees recorded in December. The hottest temperature, 92 degrees, was recorded in April, June and July.

The following climatology data was recorded at the Patrick Air Force Base Weather Station:

	<u>Total Precip.</u>	<u>Max. Temp.</u>	<u>Min. Temp.</u>
Jan.	2.37	86	47
Feb.	4.97	80	41
March	1.85	85	58
April	1.32	92	59
May	3.16	88	66
June	8.92	92	72
July	2.04	92	72
Aug.	5.63	90	71
Sept.	0.78	91	74
Oct.	2.37	85	67
Nov.	5.29	83	52
Dec.	<u>3.64</u>	<u>84</u>	<u>40</u>
	42.34	92° Max.	40° Min.

Yearly mean 74.4°.

Due to the distance between the refuge and the Patrick Air Force Base Weather Station, the readings are only approximate for Pelican Island. The refuge would probably record slightly higher temperatures and rainfall.

B. Habitat Conditions.

1. Water. Water levels in the lagoonal Indian River are subject to wind tides which may fluctuate water levels plus or minus eighteen inches or more. A few inundations of Pelican Island each year are

seemingly not harmful except to the ground nesting birds.

2. Food and Cover. Fish are extremely abundant in the fertile waters of the Indian River, and no food problem for the fish-eating birds has been noted.

The mangroves of Pelican Island are the primary nesting cover used by the brown pelican and other bird life of the refuge. Pelican Island National Wildlife Refuge represents the largest and most significant area of undisturbed mangrove habitat remaining on the east coast of Florida. Evidence indicates to Biological Technician Wineland and other State and local experts that the cycle of decline of the mangrove on Pelican Island is in progress. Factors which may contribute to this are increases in salinity in dry years, over-fertilization from fecal matter, and the thrashing down of the vegetation by the sheer number and weight of birds. The breakdown of the mangroves will probably bring about increased ground nesting and movement to surrounding refuge islands, as has occurred in the past. It is hoped that the brown pelican will demonstrate his resiliency again.

## II. WILDLIFE

### A. Migratory Birds.

1. Waterfowl. Lesser scaup and red-breasted merganser appeared this winter in very small numbers in the open waters of Indian River around the islands.

2. Other Waterbirds. The birds listed on Form NR-1A are generally present in large numbers during most of the year. The brown pelicans were nesting in all months of the year except November.

3. Shorebirds. Frequently observed shorebirds include black-bellied plovers, willets, black-necked stilts, killdeer, yellowlegs, and several species of gulls and terns.

4. Doves. Little dove habitat exists on the refuge, but both mourning and ground doves are occasionally seen on the refuge islands.

B. Upland Game Birds. The bobwhite quail is present in small numbers and has very little suitable habitat available.

C. Big Game Animals. None.

D. Fur Animals, Predators, Rodents, and Other Mammals. Marsh rabbits, raccoons, opossums, and otters frequent the refuge boundary around the mosquito control impoundments, but have not been noted on the mangrove islands where the pelicans nest.

E. Hawks, Eagles, Owls, and Crows. The osprey is the most seen raptor of Pelican Island. It is hoped that nesting will take place and offspring will be produced on the refuge this year. The red-tailed hawk is commonly sighted on the refuge, and fish crows are numerous.

F. Fish. The shallow waters of the Indian River harbor a variety of sport fish including spotted weakfish, snook, tarpon, snapper, bluefish, and channel bass. Forage fish such as mullet, spot, and menhaden abound and are voraciously fed upon by the birds.

G. Reptiles. The diamondback terrapin has been the only reptile sighted on Pelican Island itself. Most of the other reptiles common to this area are found on the other islands and impoundments of Pelican Island Refuge. There have been no recordings of alligators on the refuge.

H. Disease. A die-off of common loons occurred during the winter of 1971-72 which was suspected to be botulism-caused, but no word has been received as to verification of the suspected organism.

### III. REFUGE DEVELOPMENT AND MAINTENANCE

A. Physical Development. Due to the nature of this refuge, little development is necessary. Efforts should continue to be directed toward keeping the refuge as natural as possible in the wake of increased development pressure and sky-rocketing land prices of the surrounding lands. There is a desperate need for adequate storage facilities. As yet, there is no land belonging to the refuge on which to build such facilities. The salt air climate tells heavily on equipment, and repairs eat up refuge funds as quickly as the salt water eats up metal.

This roadless refuge is presently seeking a less expensive to operate and more practical boat for refuge tours. It is felt a large, shallow draft and stable boat could better serve this refuge.

B. Plantings. None.

C. Collections and Receipts. None.

D. Control of Vegetation. None.

E. Planned Burning. None.

F. Fires. None.

IV. RESOURCE MANAGEMENT

Negative Report.

V. FIELD INVESTIGATIONS OR APPLIED RESEARCH

Dr. Jim Baker, Refuge Biologist, and Mr. Wineland made an on-the-ground Pelican nest count in March; 452 nests were found. Mr. Wineland banded 90 Eastern Brown Pelican nestlings and 57 wood ibis this past year.

VI. PUBLIC RELATIONS

A. Recreational Uses.

1. Sport Fishing. Sport fishing is the most popular recreational endeavor, besides boating. Nearby Sebastian Inlet attracts the largest concentrations of fish and fishermen. The most sought-after fish are spotted weakfish, redfish, mangrove snapper, and snook.

2. Hunting. No hunting is permitted on the refuge.

3. Nature Study, Birdwatching, and Photography. Pelican Island serves increasing numbers of the public in the areas of nature study, birdwatching and photography, and these areas continue to be the most important recreational uses of Pelican Island National Wildlife Refuge.

The inaccessability of the island and its spectacular bird concentrations creates much demand for group tours. School groups, writers, garden clubs and Audubon groups are representative of the people who desire group tours. Greater demand by such conservation-oriented or interested groups is being anticipated in the form of a boat designed for tours of Pelican Island. We believe this unique experience can be provided while still protecting the resource if the Bureau keeps management responsibility.

B. Refuge Visitors.

Mrs. P. P. Fletcher  
Betty S. Norvir  
Phyllis A. Stockburger  
Jordan Michael  
Bonnie Fielding  
Cindy Westtholt  
Cameron Westthold  
Madeline Cochrane  
Craig Hunter  
Mrs. Mabel Michael

Northfield, Ill.  
Annapolis, Md.  
E. Hampton, Conn.  
Orchid, Fla.  
Arlington, Va.  
Kansas City, Mo.  
Wichita, Kansas  
Sweden  
Malibu, Calif.  
Winter Beach, Fla.

Mr. & Mrs. John Bowman	Clinto Corners, N.Y.
W. Wilson Baker	Tall Timber, Fla.
Don Pfitzer & Family	R.O., Atlanta, Ga.
R. R. Rudolph	R.O., Atlanta, Ga.
Lawrence S. Givens	R.O., Atlanta, Ga.
Henry & Barbara Burr	Rhode Island
Mrs. Glenn Eggleston	Roseland, Fla.
Barbara Groves	Melbourne, Fla.
Cara Byrd	Indialantic, Fla.
Margaret S. Hayes	Melbourne Beach, Fla.

The following are members of the Press, photographers and writers:

Jim Boyridier	Associated Press	Miami, Fla.
Eric Shayne	" "	" "
Garry Smith	Photographer	Denver, Colorado
Henry Briggs	Photographer	Skohegan, Maine
Shad Northshield	NBC	New York, N.Y.
Jim Hurt	"	" " "
Ira Mangolin	"	" " "
H. Wilson	"	" " "
David Rhemsteen	Writer	Los Angeles, Calif.
Dyllis Breeze	BBC	London, England
Group from Fla. Chapter Wildlife Society		
David Beatty	Writer	Melbourne Times
Edwin Way Teale	Writer	Los Angeles, Calif.
Mr. Smart	Photographer	Smart Studios, New York, N.Y.

#### C. REFUGE PARTICIPATION

Vero Beach Garden Club	Talk
Sebastian Lions Club	Talk
Cantweel School Group, Ft. Pierce, Fla.	Talks (2)
Sebastian School	Talk and furnished film
Douglas School, Vero Beach, Fla.	Talk and film
Clemens School, Vero Beach, Fla.	Talk and film
Sebastian Inlet Conservation Club	Talk and film
Indian River Audubon Soc. Youth Group	Boat trip
Pelican Island Audubon Society	Boat Trip
Hibiscus Circle Garden Club	Boat trip
Birds of Fla. class from Jr. College	Boat trip
Citrus School, Vero Beach	Boat trip

Group of 110 schoolteachers and County Leaders (Environmental study group)	Boat trip
Vero Beach Elementary School	Boat trip
Vero Beach Jr. High	Boat trip
Clemens School	Boat trip
Holy Trinity	Boat trip
Vero Beach Elementary School	Boat trip
Wabasso School	Boat trip
Exchange Group fr. F.I.T., Melbourne, Fla.	Boat trip
Douglas School	Boat trip

D. Violations.

There were no violations on the refuge in 1972.

E. Safety.

Mr. Wineland is to be commended for another accident-free year.

VII. ITEMS OF INTEREST

A. On June 10, 1972, the National Television Series "Survival" devoted one-half hour to Pelican Island National Wildlife Refuge. It used the film, "Monument in the Mangroves".

B. The following NR forms are not applicable at this station and will not appear in the forms section of this report:

NR-1C	Waterfowl Hunter Kill Survey
NR-5	Disease
NR-7	Non-Agricultural Collections, Receipts & Plantings
NR-8	Cultivated Crops - Haying - Grazing
NR-8a	Refuge Grain Report
NR-11	Timber Removal

C. This report was written by Asst. Mgr. Larry West.

Signatures:

Submitted by Robert G. Yoder  
Refuge Manager

Assistant Regional Refuge Supervisor  
Reg. Office Approval: \_\_\_\_\_

APR 12 1973

## ANNUAL REPORT OF PESTICIDE APPLICATION

Proposal Number

Reporting Year

1972

INSTRUCTIONS: Wildlife Refuges Manual, secs. 3252d, 3394b and 3395.

Date(s) of Application	List of Target Pest(s)	Location of Area Treated	Total Acres Treated	Chemical(s) Used	Total Amount of Chemical Applied	Application Rate	Carrier and Rate	Method of Application
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Jan.-Dec.	Mosquitoes: <u>Aedes taeniorhynchus</u> <u>Aedes sollicitans</u>	Horseshoe Isl. ) Preachers Isl. ) E. Pelican Isl. )	1080	5% Paris Green Pellets	4500 lbs. 800 lbs. 300 lbs.	15# acre	Vermiculate	Aerial

10. Summary of results (continue on reverse side, if necessary)

Spraying done by Indian River County Mosquito Control District.

3-1750b  
Form NR-1B  
(Rev. Nov. 1957)

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

December 31, 1972

Refuge Pelican Island For 12-month period ending ~~XXXXXXXXXX~~

Reported by Robert G. Yoder Title Refuge Manager

(1) Area or Unit Designation	(2) Habitat		(3) Use-days	(4) Breeding Population	(5) Production
	Type	Acreage			
Total Refuge	Crops	_____	Ducks	_____	_____
	Upland	_____	Geese	_____	_____
	Marsh	_____	Swans	_____	_____
	Water	<u>4359</u>	Coots	<u>No Waterfowl Present</u>	_____
	Total	<u>4359</u>	Total	_____	_____
-----					
	Crops	_____	Ducks	_____	_____
	Upland	_____	Geese	_____	_____
	Marsh	_____	Swans	_____	_____
	Water	_____	Coots	_____	_____
	Total	_____	Total	_____	_____
-----					
	Crops	_____	Ducks	_____	_____
	Upland	_____	Geese	_____	_____
	Marsh	_____	Swans	_____	_____
	Water	_____	Coots	_____	_____
	Total	_____	Total	_____	_____
-----					
	Crops	_____	Ducks	_____	_____
	Upland	_____	Geese	_____	_____
	Marsh	_____	Swans	_____	_____
	Water	_____	Coots	_____	_____
	Total	_____	Total	_____	_____
-----					
	Crops	_____	Ducks	_____	_____
	Upland	_____	Geese	_____	_____
	Marsh	_____	Swans	_____	_____
	Water	_____	Coots	_____	_____
	Total	_____	Total	_____	_____
-----					
	Crops	_____	Ducks	_____	_____
	Upland	_____	Geese	_____	_____
	Marsh	_____	Swans	_____	_____
	Water	_____	Coots	_____	_____
	Total	_____	Total	_____	_____

(over)



## Yes, Pelican Island Endures

Pelican Island is important not for its size; it's only three and a half acres when the tide is low and the wind is blowing in the right direction. Its mission also is not the result of rich soils or commercially valuable plant life; it's all sand and mangrove.

But for a variety of birds, including the striking brown pelican, it's preferred as a choice nesting site, and a wise, humane United States set it aside permanently so that it could continue to serve this purpose.

The island acquired its fame at the turn of this century, when wealthy eccentrics shot pelicans while boating nearby and also when plume hunters were a scourge to much of Florida's bird life to satisfy a fashion

craze. The critical factor, however, was the murder of an Audubon warden by plume hunters. Clamor that then arose spread even to the White House, where no less than President Theodore Roosevelt was swept up by it.

With the National Audubon Society and the American Ornithologists' Union urging protective action, Teddy acted promptly and—as history has shown—wisely by a 1903 Executive order permanently setting aside the island as a wildlife sanctuary. It thus became the first of over 325 sanctuaries set aside in the National Wildlife Refuge System to serve as permanent havens for wild creatures.

GPO 910-873





Paul Kroegel and friend



Sharing with Others

The island is located in the shallow Indian River near Sebastian on Florida's east coast, just south of Cape Kennedy. Paul Kroegel, a German immigrant boat builder who lived nearby on the west shore of the Indian River at Sebastian became the first Federal wildlife manager, or warden, as he was then called. Through his affection for pelicans and the island, he had acquired respect in the area as a concerned voluntary protector of habitat. He cared for the sanctuary officially from 1903 to 1920. An Executive order of 1909 enlarged the refuge to include several other nearby islands.

October 1910 changes brought about in part by a hurricane caused the birds to abandon the island as a nesting site, but they came back in a few years.

The next crisis came in the spring of 1918 when commercial fishermen from Florida, Alabama, Mississippi, and Georgia claimed that pelicans were destroying millions of pounds of food fish and therefore should be stripped of protection. In support of this protest, Florida fishermen invaded the island's rookery and killed many young birds still in the nest. The Florida Audubon Society, however, launched a counterattack which included a report—"A Defense of the Pelicans"—showing that these birds were not feeding on commercially important fish. This battle also was won.

In 1924 the birds again deserted the refuge, this time shifting to an island about 40 miles to the north—but they returned.

In 1963 the island was designated a National Historical Landmark—the first time a national wildlife

refuge was so designated. Then in 1970 the island was designated part of the National Wilderness System.

Because of inclusion of surrounding areas in a larger sanctuary, Pelican Island is today a part of Merritt Island National Wildlife Refuge, but it receives as much protection now as it received in Paul Kroegel's time. Lawrence Wineland, present manager, along with many other duties, has collected pelican eggs for research on the effects of pesticides, assists visitors in getting a better view of the island, and in general helps give it protection.

About 1,000 nesting pelican pairs now use the island, which also is preferred for nesting by cormorants, anhingas, egrets, herons, and wood storks. Roseate spoonbills feed in the shallow water nearby, and manatees are sometimes seen sluggishly moving through the surrounding waters.

Having been eliminated along much of the gulf coast, severely reduced along the west coast, and experiencing difficulties along much of the east coast, the brown pelican is now considered endangered. It's a victim of a harmful breakdown product of DDT in the environment through the well-known soft eggshell effect. But fortunately for the bird, Pelican Island is one of the few areas in the country as yet exhibiting little of the bad effect of this pesticide.

And so the tiny island endures, its mission still what it was when Teddy Roosevelt almost 70 years ago gave it the protection of the Government—a nesting haven for pelicans and other striking creatures.



UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

BUREAU OF SPORT FISHERIES AND WILDLIFE

WASHINGTON • ISSUED MAY 1971 • RL 572



# Pelicans — Wonderful,

By Eric Sharp

Of the Associated Press

SEBASTIAN, Fla.

"A WONDERFUL bird is the pelican. His beak can hold more than his belly can."—Dixon Lanier Merritt, "The Pelican," 1910.

"There's one thing about the pelican: He ain't overly smart, but he's lovable." — Larry Wineland, U.S. Fish and Game Department, 1972.

Wineland, one of the world's authorities on the baggy-billed birds, made the observation on a boat off a small island where pelicans soared and swam by the hundreds.

For reasons as yet unclear to man — but apparently obvious to the birds — pelicans by the thousands have chosen a scrubby, three-acre islet 150 miles north of Miami as one of their few American nesting grounds.

Early settlers in the area noticed the abundance of birds on the little lump of sand and, with the originality so often shown by early settlers, promptly dubbed it Pelican Island.

The original nesting island now forms the heart of the 7000-acre Pelican Island Wildlife Refuge, established in 1903 by President Theodore Roosevelt as the first such refuge in the nation.

**WINELAND SAYS** the island is approaching the end of another 50-or 60-year cycle in which the island's mangrove trees are literally worn out by the sheer mass of birds.

"Look at the other islands around here," he said, pointing to lush pieces of real estate where the mangroves reared strong and green 20 feet into the subtropical sky.

"Now look at Pelican Island," he said. The point was obvious. Most trees on the island were ragged-looking specimens four or five feet high, and nearly every one had a full complement of fat and happy pelicans roosting on its scraggly branches.

"In a few more years, those trees will be worn right down to the nub," Wineland said.

"Most of the birds will leave, but a few will stay and nest on the bare ground. After a few years, when the mangroves grow back, the birds will return. We have no idea why."

Wineland brought the boat to a stop about 50 feet from the island and cut the motor. A mob of about 50 pelicans swimming near the shore paddled away quickly but reluctantly, throwing nasty looks over their shoulders.

"**THEY KNOW** nobody's going to hurt them out here," Wineland said. "I'd say we get total co-operation from 99 per cent of the people who come out there. They obey the signs that say stay off the island, and they don't bother the birds."

# Lovable, Dumb

Sun., Dec. 31, 1972 ST. LOUIS POST-DISPATCH

we can chase off the 10 per cent who cause trouble."

But while man may not overtly harm the birds, he is killing them by a means much more insidious and effective than a gun, said Wineland, who manages the Pelican Island refuge.

"It's the pesticides. They cause the birds to lay eggs with thin shells. Eventually, the shells get so thin that they crack when the birds sit on them," Wineland said. "We've even seen cases where birds laid eggs without shells, ready to fry."

**DURING THE** December to July nesting season, about 2500 pelicans lay their eggs and raise their young on the island.

The wood ibis, America's only stork, is one of perhaps a dozen species that share the island with the pelicans.

They started showing up a few years ago and at first they killed a lot of baby pelicans — speared them with the big ugly bill," Wineland said. "But the pelicans have gotten smarter and fight them off now."

Brooding buzzards, "the local sanitation department," also roost on the island, along with snake-necked cormorants and anhingas that take in the passing scene while allowing the sun to dry their widespread wings

Another newcomer in the last few years is the frigate bird, a skinny-beaked relative of the pelican, which is normally found soaring above tropical seas on a seven-foot wingspan.

Overhead, squadrons of pelicans soared and wheeled, watching the water for mullet and other small fish that might make the mistake of loafing too near the surface.

Whenever a bird spotted a potential meal, it folded its wings and turned into a dive bomber, plunging 100 feet into the water in a brain-rattling dive.

"People don't realize it, but a lot of pelicans die because they are injured in those wild dives," Wineland said. "Birds often break a wing when they misjudge a dive and hit the water at the wrong angle."

As Wineland poled the boat over the shallow grassflats, splashes and V-shaped wakes marked the paths of big channel bass and sea trout streaking to deeper water.

"The water around the island is just full of fish," Wineland said. "All these birds fertilize the plants, the plants feed the little critters and the little ones feed the big ones. It's nature's cycle in a nutshell."

ST. JOHNS NATIONAL WILDLIFE REFUGE

TITUSVILLE, FLORIDA

TABLE OF CONTENTS - St. Johns

I. GENERAL	1
A. Introduction	1
B. Weather Conditions	2
C. Habitat Conditions	2
1. Water	2
2. Food and Cover	2
II. WILDLIFE	2
A. Migratory Birds	2
1. Waterfowl	2
2. Other Waterbirds	3
3. Shorebirds	3
4. Doves	3
B. Upland Game Birds	3
C. Big Game Animals	3
D. Fur Animals, Predators, Rodents, and Other Mammals	3
E. Hawks, Eagles, Owls, and Crows	3
F. Other Birds	3
G. Fish	3
H. Reptiles	4
I. Disease	4
III. REFUGE DEVELOPMENT AND MAINTENANCE	4
A. Physical Development	4
B. Plantings	4
C. Collections and Receipts	4
D. Control of Vegetation	4
E. Planned Burning	4
F. Fires	4

IV. RESOURCE MANAGEMENT	
A. Grazing	5
B. Haying	5
C. Fur Harvest	5
D. Timber Removal	5
E. Commercial Fishing	5
F. Other Uses	5
V. FIELD INVESTIGATION OR APPLIED RESEARCH	5
VI. PUBLIC RELATIONS	6
A. Recreational Uses	6
1. Sport Fishing	6
2. Hunting	6
3. Nature Study, Birdwatching, and Photography	6
B. Refuge Visitors	6
C. Refuge Participation	6
D. Violations	6
E. Safety	6
VII. OTHER ITEMS	7

ST. JOHNS NATIONAL WILDLIFE REFUGE

REFUGE NARRATIVE REPORT

January through December 1972

I. GENERAL

A. Introduction.

Since this is the first narrative report for the St. Johns, a brief background of the area and the status of acquisition will be presented.

The Dusky Seaside Sparrow (*Ammodramus nigrescens*) was discovered by C. J. Maynard in 1872 near Salt Lake about 5 miles north of the St. Johns Refuge. Although it was generally known by naturalists in the area that Dusky's inhabited the St. Johns marshes, the range and numbers of the bird were unknown. This neglect was primarily due to the large numbers and easy accessibility of Dusky's on Merritt Island.

In the 1950's, the Brevard County Mosquito Control began construction of dikes to impound water on the marshes of Merritt Island, and Dusky habitat began to decline. In 1968, Brian Sharp searched Merritt Island and the St. Johns River marshes to attempt to determine the distribution and numbers of this endangered species. He found that a maximum of about 70 birds remained on Merritt Island and about 1800 birds existed on the east side of the St. Johns River in Brevard County.

Due to habitat destruction on the St. Johns flood plain from drainage, housing development, and highway construction, the Bureau decided to establish a refuge for the Dusky Seaside Sparrow. The site selected contained approximately 4500 acres and contained about 280 Dusky's. Funding was accomplished through the Land and Water Conservation Act.

The refuge is one mile west of Titusville and about 7 miles west of Merritt Island National Wildlife Refuge. Much of the area has old drainage ditches running along section lines. The majority of these ditches were constructed in the mid 1940's to drain the marsh for vegetable production, but this project was abandoned due to flooding of the St. Johns River. Cattle have grazed the area until the mid 1960's.

Land acquisition was begun in 1970 and the Bureau presently has title to 2026 acres. An additional 535 acres is to be acquired in F.Y. 1973. Further acquisition will be dependent on future funding.

## B. Weather Conditions.

The St. Johns Refuge is located about 15 miles from the Atlantic Ocean in east central Florida and has a humid subtropical climate. The average annual rainfall is 55 inches, most of which occurs from May through October.

The weather data was obtained from the Titusville weather station.

	<u>Precipitation (Inches)-1972</u>	<u>Temperature (°F.) - 1972</u>	
		<u>Max.</u>	<u>Min.</u>
Jan.	2.36	85	42
Feb.	4.50	85	37
Mar.	5.80	87	43
Apr.	1.46	92	46
May	7.14	92	54
June	7.44	97	62
July	5.24	98	66
Aug.	9.46	98	68
Sept.	2.26	95	62
Oct.	4.32	90	55
Nov.	6.56	90	43
Dec.	1.82	87	34
TOTAL	58.36	EXTREME 98	34

## C. Habitat Conditions.

### 1. Water.

Water is found in lower areas of the marsh throughout the year. During times of heavy rainfall most of the area is shallowly flooded with sheet water.

### 2. Food and Cover.

Dominant cover for the Dusky is Baker's Cordgrass (Spartina bakerii). The cover was substantially reduced by a wildfire on December 16th.

## II. WILDLIFE

### A. Migratory Birds

1. Waterfowl. Waterfowl habitat on the refuge is limited to scattered small ponds. Some mottled ducks nest on the area and are found throughout the year. Transient species include coot, mallard, blue-winged teal, green-winged teal, and pintail.

2. Other Waterbirds. Marsh and water birds sighted on the refuge include white ibis, common egret, snowy egret, cattle egret, little blue heron, great blue heron, Louisiana heron, green heron, and white pelican. None of these birds nest on the refuge. Areas which are flooded after being burned are particularly attractive to these as well as shore birds.

The rarely seen black rail is very common on the area and its call may be heard throughout the marsh in spring and summer. King rails are frequently seen.

3. Shorebirds. Killdeer, snipe, yellow legs, and several species of sandpipers frequent the more open areas, particularly when water levels are low and mudflats exposed.

4. Doves. Both mourning doves and ground doves frequent higher areas and roads in the marsh.

#### B. Upland Game Birds

Some bobwhite quail are on the area but their habitat is mostly limited to dikes and hammock edges.

#### C. Big Game Animals.

White-tailed deer are present but not plentiful in the marsh.

#### D. Fur animals, Predators, Rodents, and Other Mammals.

Otters, bobcats, marsh rabbits, and armadillos are common. Cotton rats and rice rats are plentiful judging from grass clippings and nests. These rats are potential predators on Dusky Seaside Sparrow eggs and young.

#### E. Hawks, Eagles, Owls, and Crows.

Red-shouldered hawks, marsh hawks, southern bald eagles and common crows are sighted infrequently on the refuge.

#### F. Other Birds.

There is not a great variety of birds on the St. Johns. Common passerines during the winter include the Savannah sparrow, swamp sparrow, and short-billed marsh wren. Yellowthroats in the thicker areas and meadow larks in open habitat are year-round inhabitants.

#### G. Fish.

Largemouth bass and bluegill are present in the canals and ponds. Small fish such as Gambusia and Fundulus are abundant throughout the marsh and serve as effective mosquito larva predators.

#### H. Reptiles.

Ground rattlers are abundant on the spoil banks. Garter snakes and black snakes are occasionally sighted in the marsh and diamondback rattlers have been seen but are not considered plentiful. There are a few alligators on the area.

#### I. Disease.

None.

### III. REFUGE DEVELOPMENT AND MAINTENANCE

#### A. Physical Development.

None.

#### B. Plantings.

None.

#### C. Collections and Receipts.

None.

#### D. Control of Vegetation.

None.

#### E. Planned Burning.

None.

#### F. Fires.

Two wildfires occurred on the area. One in May burned about 250 acres. This was during the dusky nesting season but luckily only about 40 acres of nesting habitat were burned. Another fire in December burned about 700 acres. Much of this area contained excellent dusky habitat which did not need burning at this time. This burn forced us to postpone control burning of an adjacent area since little cover remained on this portion of the refuge. Vegetative recovery is quick in this climate and nesting cover should be adequate by late April. Of concern is the displacement of the dusky over a large area, and the question now is will the birds repopulate the entire area in the spring.

#### IV. RESOURCE MANAGEMENT

##### A. Grazing.

Although grazing was practiced on the area until a few years ago, no cattle are using the area at present.

##### B. Haying.

None.

##### C. Fur Harvest.

None.

##### D. Timber Removal.

None.

##### E. Commercial Fishing.

None.

##### F. Other Uses.

None.

#### V. FIELD INVESTIGATION OR APPLIED RESEARCH

Title of study: Management and Life History of the Dusky Seaside Sparrow on the St. Johns National Wildlife Refuge.

The four year study was initiated in May 1972 with a census which was conducted by counting singing males. A total of 110 males were located and plotted on field maps. Vegetative transects were conducted on five nesting territories to determine specific habitat preferences. Nine holes were augered three feet into the ground and lined with plastic pipe to gather data on ground water fluctuations and salinities. Ground water fluctuations ranged from ground level to 29.0 inches below ground level while water salinities varied from 4 parts per thousand in muck soils to 66 ‰ in "salt pan" areas. Forty dusky seaside sparrows were mist netted and banded with aluminum and colored plastic leg bands in September and October to study movements. Subsequent recaptures indicate that the bird is very sedentary with little daily or seasonal moving occurring.

Weights and wing chord measurements were taken on all birds to attempt to determine a sexing technique for non-breeding birds. Infrared and color aerial photos were supplied by Kennedy Space Center as an aid in cover mapping, determining carrying capacity, and vegetative changes in the future.

## VI. PUBLIC RELATIONS

### A. Recreational Uses

#### 1. Sport Fishing.

Most of the fishing is limited to a canal which contains largemouth bass, bluegill, and catfish.

#### 2. Hunting.

Since the refuge is still being acquired, no control is exerted over the hunters. Some deer, waterfowl, and snipe hunting occurs.

#### 3. Nature Study, Birdwatching, and Photography.

Increasing numbers of birders are encountered on the refuge in search of the Dusky Seaside Sparrow to add to their life list. Most of these are serious birders but many go away frustrated because of the physical obstacle of wading through waist-high cordgrass.

### B. Refuge Visitors

Only one organized tour was given on the refuge. This was for the Indian River Audubon Society and thirty people were on the tour.

### C. Refuge Participation

Since personnel from Merritt Island National Wildlife Refuge manage the St. Johns, records of refuge participation will be found in the Merritt Island narrative.

### D. Violations.

None.

### E. Safety

No accidents although some near "sun strokes" were observed.

VII. OTHER ITEMS

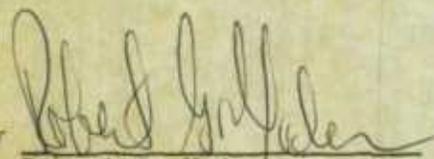
Garbage, old automobiles, and miscellaneous litter continue to be a major problem on the access road into the refuge. We plan to block public access as soon as the road is acquired.

The following NR Forms are not applicable at this station:

NR-1c	Waterfowl Hunter Kill Survey
NR-5	Disease
NR-7	Non-agricultural Collections, Receipts & Plantings
NR-8	Cultivated Crops, Haying, Grazing
NR-8a	Refuge Grain Report
NR-11	Timber Removal
NR-12	Pesticide Applications

This report was prepared by Wildlife Biologist Baker. Asst. Refuge Mgr. Fields prepared the Public Use Forms.

Submitted by

  
Robert G. Yoder  
Refuge Manager

Assistant Regional Refuge Supervisor

Regional Office Approval

APR 1 8 1973

UNITED STATES  
 DEPARTMENT OF THE INTERIOR  
 FISH AND WILDLIFE SERVICE  
 BUREAU OF SPORT FISHERIES AND WILDLIFE

WATERFOWL UTILIZATION OF REFUGE HABITAT

December 31, 1972

Refuge St. Johns

For 12-month period ending ~~August 31, 1972~~ XXXXXXXXXXXXXX

Reported by Dr. James L. Baker

Title Wildlife Biologist

(1) Area or Unit Designation	(2) Habitat		Ducks	(3) Use-days	(4) Breeding Population	(5) Production
	Type	Acreage				
Land acquired as of December 31, 1972	Crops			5640		
	Upland	60	Geese			
	Marsh	1967	Swans			
	Water	40	Coots	39000		
	Total	2067	Total	44640		
-----						
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
-----						
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
-----						
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
-----						
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
-----						
	Crops		Ducks			
	Upland		Geese			
	Marsh		Swans			
	Water		Coots			
	Total		Total			
-----						

(over)



Improved pasture near refuge. This was previously good Dusky Seaside Sparrow habitat.

Baker



Borrow pits for highway construction are another cause of Dusky habitat loss.

Baker



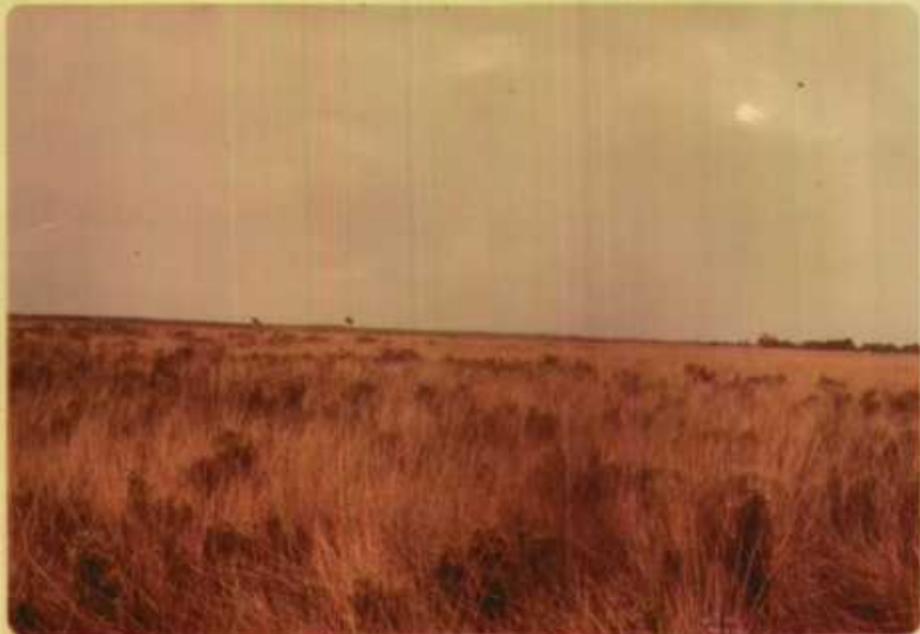
Coreopsis and Solidago in late summer on the St. Johns savannah.

Baker



Indian River Audubon Society toured the refuge and was given a talk on the Dusky and management plans on the refuge.

Fields



Heavy Baccharis angustifolia invasion on the refuge.

Baker.



Good Dusky Spartina habitat being invaded by Baccharis.  
This area was burned by a wildfire in December.

Baker



Pockets of high salinity areas (to 66 parts per thousand) termed "salt pans" are a part of the wet savannah's landscape.

Baker



A density board was useful in determining habitat preference of Dusks in nesting territories.

Baker



A Dusky Seaside Sparrow nest in Spartina. Nests are about 8 inches above ground and contain three or four eggs in a normal clutch.

Baker



Duskys were mist-netted for banding by driving the birds into the net.

Oberheu



Care must be taken in removing these fragile birds from the net.

Oberheu



Aluminum and plastic colored leg bands were placed on each bird. Different color combinations were used so that each bird was individually identifiable.

Oberheu



Birds were examined for color differences and stage of molt. . . .

Oberheu



Weights and wing measurements were taken.

Oberheu



This bedraggled Dusky is ready for release.

Oberheu



Junked cars (above) and other garbage (below) are a sign of the times on land slated for acquisition.

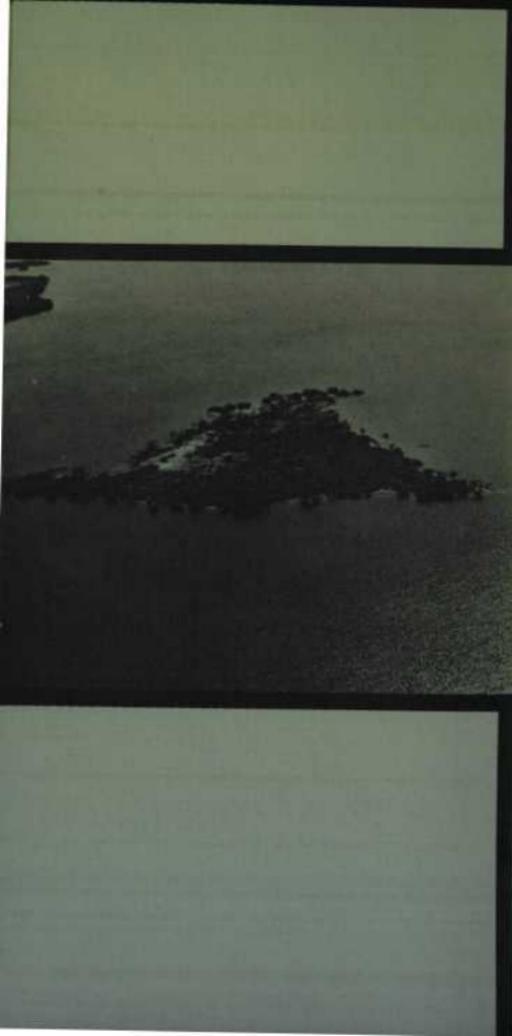
Oberheu



# Pelican Island

*National Wildlife Refuge*





# Pelican Island

## National Wildlife Refuge

As the country's first national wildlife refuge, Pelican Island holds a unique place in our nation's conservation history. Even before its establishment as a refuge in 1903 by President Theodore Roosevelt, the island was already an outstanding rookery for pelicans. It continues today as one of the important nesting sites for not only the endangered brown pelican, but also for the wood ibis, white ibis, common egret, double-crested cormorant, and Louisiana heron as well.

### Location

Pelican Island National Wildlife Refuge is located in Indian River County between the towns of Sebastian and Wabasso on Florida's east coast about 45 miles south of Cape Kennedy. The refuge extends for several miles along the east coast of the Indian River.

### History

The island acquired its fame at the turn of the century from some of the outstanding wildlife photographers and naturalists who visited the area. Many of these people were disturbed by the slaughter of countless pelicans, herons, egrets, and other birds by plume hunters. At the urging of the Florida Audubon Society and the American Ornithologists' Union, President Roosevelt signed an Executive Order in 1903 which permanently set aside the 3-acre island as a wildlife sanctuary. Thus, Pelican Island became the first of over 335 units that now comprise the National Wildlife Refuge System. Today the refuge consists of 4,359 acres, most of which are bottomlands and mangrove islands under lease from the State of Florida since 1968.

Paul Kroegel, a German immigrant boat builder, who lived nearby on the west shore of the Indian River at Sebastian, became the first Wildlife Manager, or Warden, as he was then called. Through his affection for pelicans on the island, he had acquired respect in the area as a concerned voluntary protector of habitat. He cared for the sanctuary officially from 1903 to 1920.

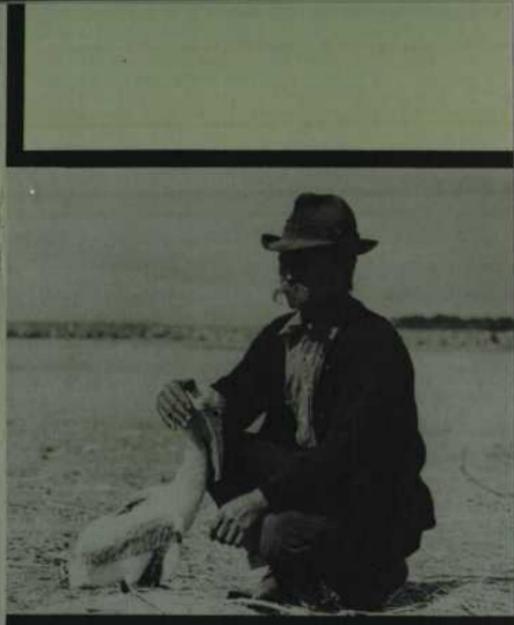
Pelican Island has had many crises over the years. One crisis came in the spring of 1918 when commercial fishermen from Florida, Alabama, Mississippi, and Georgia claimed that pelicans were destroying millions of pounds of food fish and therefore should be stripped of protection. In support of this protest, Florida fishermen invaded the island's rookery and killed many young birds still in the nest. The Florida Audubon Society, however, launched a counterattack which included a report—"A Defense of the Pelicans"—showing that these birds were not feeding on commercially important fish. This battle also was won.

In 1963 the island was designated as a National Historical landmark and in 1970 the island was designated as a part of the National Wilderness System.

Pelican Island National Wildlife Refuge is administered by the Merritt Island National Wildlife Refuge, Titusville, Florida, and continues to receive the protection that was started in Paul Kroegel's time.

### *Wildlife*

Although best known for its historic pelican rookery, Pelican Island also attracts significant numbers of many other species. Records indicate that the rookery contained only pelicans in the early 1900's. In contrast, no less than 12 species nested in the rookery in 1966. Abundant nesting species include brown pelicans, wood ibis, double-crested cormorant, cattle egret, common egret, white ibis, Louisiana heron, and anhinga.



Paul Kroegel



While nesting activity has been recorded at Pelican Island in every month of the year, the principal nesting period extends from February through September and reaches a peak in April and May. The refuge islands and surrounding shallow water provide valuable year-round habitat for many of the nesting birds as well as seasonal habitat for a variety of waterfowl, shorebirds, and other species.

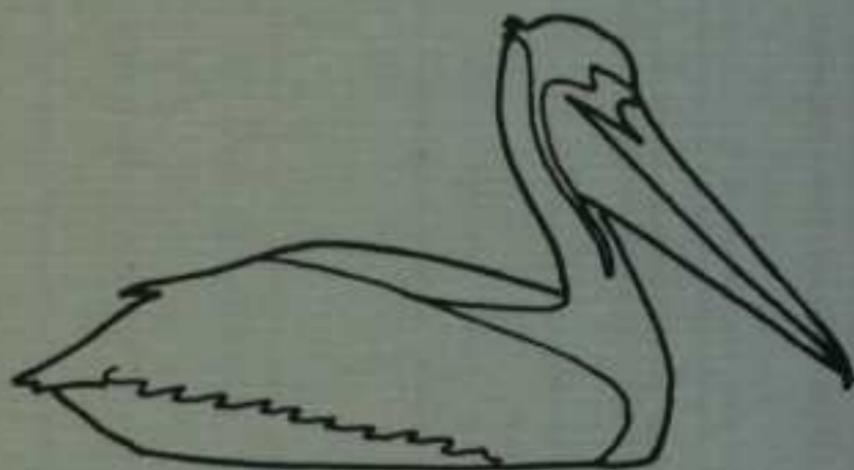
### Recreational Opportunities

Birdwatching, wildlife photography, and sport fishing are the most popular forms of recreational use associated with the refuge. Little opportunity exists for other types of recreational use. While public use of the island proper must be held to a minimum to avoid disturbance to the nesting birds, there are opportunities to view and photograph nesting activities from a reasonable distance offshore. An interpretive center is planned for the refuge to enhance visitor enjoyment and understanding of the area's rich bird life and aquatic resources. The center will be located on a nearby shore where it will not affect the wilderness character of the refuge islands.

### Information

For detailed information concerning the refuge, contact the Refuge Manager, Merritt Island National Wildlife Refuge, P. O. Box 6504, Titusville, Florida 32780. The office is located on State Rt. 402 east of Titusville.





U. S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service  
Bureau of Sport Fisheries and Wildlife

RL-572-R

December, 1972



	S	S	F	W
*Carolina Wren	c	c	c	c
Long-billed Marsh Wren			o	c
Short-billed Marsh Wren			o	c
*Mockingbird	c	c	c	c
Catbird	c	c	c	c
*Brown Thrasher	o	o	o	o
Robin	c		a	a
Hermit Thrush			o	o
Swainson's Thrush	o	o	o	o
Gray-cheeked Thrush	o		c	
Veery	o	o		
Eastern Bluebird	o	o	o	o
*Blue-gray Gnatcatcher	o		c	c
Ruby-crowned Kinglet			o	o
Water Pipit		r	r	
Cedar Waxwing	o		o	c
*Loggerhead Shrike	c	c	c	c
*Starling	c	c	c	c
*White-eyed Vireo	c	c	c	c
Yellow-throated Vireo	c		c	
Solitary Vireo			o	o
*Black-whiskered Vireo	o	c		
Black-and-White Warbler	c		c	c
Prothonotary Warbler		o	o	
Swainson's Warbler	c		c	
Worm-eating Warbler	c		c	
Tennessee Warbler	o		o	
Orange-crowned Warbler			o	c
Parula Warbler	c		c	c
Yellow Warbler	o	o	o	r
Magnolia Warbler	o	o		
Cape May Warbler	c	c	e	r
Black-throated Blue Warbler	c	c	r	
Myrtle Warbler		c	a	
Black-throated Green Warbler		r	r	
Blackburnian Warbler	c		c	
Yellow-throated Warbler	o	o	o	
Chestnut-sided Warbler	o		o	
Bay-breasted Warbler	o		o	
Blackpoll Warbler	c		c	
*Pine Warbler	o	o	o	o
*Prairie Warbler	c	c	c	o
Palm Warbler	o		c	c

	S	S	F	W
Ovenbird	c		c	o
Northern Waterthrush	c		c	o
Louisiana Waterthrush			o	o
Connecticut Warbler	o		o	
Yellowthroat	c	c	a	a
Yellow-breasted Chat			o	o
Hooded Warbler	c		c	
American Redstart	c	c	c	o
*House Sparrow	c	c	c	c
Bobolink	c		c	
*Eastern Meadowlark	c	c	c	c
*Red-winged Blackbird	a	a	a	a
Baltimore Oriole			r	r
Rusty Blackbird			o	o
*Boat-tailed Grackle	a	a	a	a
Purple Grackle	c	c	c	c
Brown-headed Cowbird			c	o
Scarlet Tanager	o		o	
*Summer Tanager	c	c		
*Cardinal	a	a	a	a
Rose-breasted Grosbeak	o		o	
Indigo Bunting	o		o	o
Painted Bunting	o	o	o	c
Dickcissel			r	r
Pine Siskin			o	o
American Goldfinch			c	c
*Rufous-sided Towhee	c	c	c	c
Savannah Sparrow	c	c	c	c
Grasshopper Sparrow			o	o
Henslow's Sparrow			r	r
Sharp-tailed Sparrow			o	o
Seaside Sparrow			o	o
*Dusky Seaside Sparrow	r	r	r	r
Vesper Sparrow			o	o
Lark Sparrow			r	r
Bachman's Sparrow	r	r	r	r
Chipping Sparrow			c	c
Field Sparrow			o	o
White-crowned Sparrow			o	o
White-throated Sparrow			o	c
Fox Sparrow			r	r
Lincoln's Sparrow			r	r
Swamp Sparrow	o		c	c
Song Sparrow	o		o	o

The following 31 species have been recorded on the Refuge but are considered to be of unusual occurrence:

Red-throated Loon	Roseate Tern
Audubon's Shearwater	Sooty Tern
Wilson's Petrel	Bridled Tern
Blue-faced Booby	Noody Tern
European Widgeon	Black-billed Cuckoo
Common Goldeneye	Scissor-tailed Flycatcher
White-winged Scoter	Brown Creeper
Mississippi Kite	Wood Thrush
Krider's Red-tailed Hawk	Golden-crowned Kinglet
Swainson's Hawk	Nashville Warbler
Ferruginous Hawk	Orchard Oriole
Limpkin	Blue Grosbeak
Yellow Rail	Purple Finch
American Golden Plover	
Red Phalarope	
Wilson's Phalarope	
Northern Phalarope	
Sabine's Gull	



UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE



RL-225-R

November 1972

## Birds of the Merritt Island

### National Wildlife Refuge



The Merritt Island National Wildlife Refuge was established in 1963 by the Bureau of Sport Fisheries and Wildlife in cooperation with the National Aeronautics and Space Administration. The 140,393 acre Refuge and the John F. Kennedy Space Center share a common boundary. The Refuge is located on the east coast of central Florida. It contains various types of habitat, including ocean beach, brackish impoundments and marshlands, freshwater impoundments, cabbage palm hammocks, palmetto-pine uplands, oak hammocks, mangrove islands, and citrus groves.

Of special interest are the breeding populations of the southern bald eagle, brown pelican, dusky seaside sparrow, and mottled duck. Spectacular migrations of passerine birds, especially warblers, occur during spring and fall. Winter peak concentrations of waterfowl often reach 70,000 or more. Eight species of herons and egrets are commonly observed year-round.

Refuge Headquarters is located seven miles east of Titusville, Florida, on State Road 402. Information may also be obtained by writing the Merritt Island National Wildlife Refuge, P. O. Box 6504, Titusville, Florida 32780.

This list contains 251 species observed by refuge personnel, members of the Indian River Audubon Society, and other qualified individuals. The names of birds nesting on the Refuge are preceded by an asterisk (\*). Season and abundance symbols are as follows:

S—March-May a—abundant  
 S—June-July c—common  
 F—August-October o—occasional  
 W—November-February r—rare

	S	S	F	W
Common Loon			c	c
Horned Grebe			c	c
*Pied-billed Grebe	a	a	a	a
White Pelican	c	o	o	c
*Brown Pelican	c	c	c	c
Gannet				
Double-crested Cormorant	c	c	c	c
*Anhinga	c	c	c	c
Magnificent Frigate-bird	o	o	o	o
Great White Heron		r		
*Great Blue Heron	c	c	c	c
*Green Heron	c	c	c	c
*Little Blue Heron	c	c	c	c
*Cattle Egret	c	c	c	c
Reddish Egret	o		o	
*Common Egret	c	c	c	c
*Snowy Egret	c	c	c	c
*Louisiana Heron	c	c	c	c
*Black-crowned Night Heron	c	c	c	c
Yellow-crowned Night Heron	o	o	o	o
*Least Bittern	c	c	c	c
American Bittern			o	o
*Wood Stork	c	c	c	c
*Glossy Ibis	c	c	c	c
*White Ibis	c	c	c	c
Roseate Spoonbill	o	o	o	o
American Flamingo	o		o	o
Brant				r
Canada Goose			r	
Snow Goose				o
Blue Goose				o
Fulvous Tree Duck	o		o	o

	S	S	F	W
Mallard			o	o
Black Duck			o	o
*Mottled Duck	c	c	c	c
Gadwall			c	c
Pintail	o		c	c
Green-winged Teal	o		c	c
Blue-winged Teal	c	o	c	c
Cinnamon Teal				o
American Widgeon	c	o	c	c
Shoveler	c	o	c	c
*Wood Duck	o	o	o	o
Redhead			o	c
Ring-necked Duck			c	c
Canvasback			o	o
Greater Scaup			o	o
Lesser Scaup	c	o	a	a
Bufflehead			o	o
Oldsquaw			r	r
Ruddy Duck	o		c	c
Hooded Merganser			c	c
Common Merganser				r
Red-breasted Merganser	o		c	c
*Turkey Vulture	c	c	c	c
*Black Vulture	c	c	c	c
Swallow-tailed Kite	r	r		
Sharp-shinned Hawk			c	c
Cooper's Hawk			c	c
*Red-tailed Hawk	c	c	c	c
*Red-shouldered Hawk	o	o	o	o
Broad-winged Hawk			o	o
*Bald Eagle	c	c	c	c
Marsh Hawk	o		c	c
Osprey	c	c	c	c
Peregrine Falcon			o	o
Pigeon Hawk			o	o
Sparrow Hawk	o		c	c
*Bobwhite	c	c	c	c
*King Rail	c	c	c	c
*Clapper Rail	c	c	c	c
Virginia Rail			c	c
Sora	c		c	c
*Black Rail	o	o	o	o
*Common Gallinule	c	c	c	c
*American Coot	c	c	a	a

	S	S	F	W
*American Oystercatcher	o	o	o	r
Semipalmated Plover	o		o	c
Piping Plover			o	o
*Wilson's Plover	o	o	o	o
*Killdeer	c	c	c	c
Black-bellied Plover	o		c	c
Ruddy Turnstone	o		c	c
American Woodcock			o	o
Common Snipe			c	c
Long-billed Curlew	o		o	o
Whimbrel			o	o
Spotted Sandpiper	o		o	c
Solitary Sandpiper	o		o	o
*Willet	c	c	c	c
Greater Yellowlegs	o		c	c
Lesser Yellowlegs	c		c	c
Knot				o
Purple Sandpiper				r
Pectoral Sandpiper			o	o
White-rumped Sandpiper			r	
Least Sandpiper	c		c	c
Dunlin	c		c	c
Short-billed Dowitcher			c	c
Long-billed Dowitcher			o	o
Stilt Sandpiper			o	o
Semipalmated Sandpiper	o		o	c
Western Sandpiper			c	c
Marbled Godwit			o	o
Sanderling	c		c	c
American Avocet	o		c	c
*Black-necked Stilt	c	c		
Pomarine Jaeger			o	c
Parasitic Jaeger			o	o
Long-tailed Jaeger			o	
Great Black-backed Gull			o	o
Herring Gull	c	c	c	c
Ring-billed Gull	a	a	a	a
Laughing Gull	c	c	c	c
Bonaparte's Gull	o		c	c
*Gull-billed Tern	o	o	o	o
Forster's Tern	c		c	c
Common Tern			r	r
*Least Tern	c	c	o	r
*Royal Tern	a	a	a	a

	S	S	F	W
Sandwich Tern				r
Caspian Tern				c
Black Tern	o	o	c	c
*Black Skimmer	c	c	c	c
*Mourning Dove	c	c	c	c
*Ground Dove	c	c	c	c
*Yellow-billed Cuckoo	o	o	c	
Smooth-billed Ani	o	o	o	o
*Barn Owl	o	o	o	o
*Screech Owl	c	c	c	c
*Great Horned Owl	c	c	c	c
*Barred Owl	o	o	o	o
Short-eared Owl				r
*Chuck-will's-widow	c	c	c	o
Whip-poor-will	r		r	o
*Common Nighthawk	c	c	c	c
*Chimney Swift	o	o	o	o
Ruby-throated Hummingbird	o	o	o	o
*Belted Kingfisher	o		c	c
*Yellow-shafted Flicker	c	c	c	c
*Pileated Woodpecker	o	o	o	o
*Red-bellied Woodpecker	c	c	c	c
Red-headed Woodpecker	r	r	r	r
Yellow-bellied Sapsucker				o
Hairy Woodpecker	r			o
*Downy Woodpecker	o	o	o	o
*Red-cockaded Woodpecker	r	r	r	r
*Eastern Kingbird	o	c	c	
*Gray Kingbird	o	o	o	
Western Kingbird				o
*Great Crested Flycatcher	c	c	o	r
Eastern Phoebe				c
Acadian Flycatcher	c		c	
Least Flycatcher	o	o		
Tree Swallow	o	o	a	a
Bank Swallow	o	o		
*Barn Swallow	c	o	c	
*Cliff Swallow	o			o
Purple Martin	o	o		
*Blue Jay	c	c	c	c
*Scrub Jay	c	c	c	c
*Fish Crow	c	c	c	c
*Brown-headed Nuthatch	o	o	o	o
House Wren	o		c	c

lists and related information are available.

Playalinda Beach is an oceanfront recreation area where swimming and fishing are permitted except during hazardous operations and launch countdowns at Launch Complex 39. A snack bar and bath houses are provided. Lifeguards are on duty when the beach is open for swimming during months of major use.

Camping is provided only for conservation-minded youth groups in a designated area. Advance written permission and adult leadership are required.

Waterfowl hunting is permitted in several areas during the Florida hunting season in accordance with Federal, State and Refuge regulations. Detailed information for hunters is made available to news media prior to each hunting season.

#### MANAGEMENT

In 1957, before the establishment of the Space Center or the Refuge, the Brevard County Mosquito Control District began building dikes around marshes to stabilize water levels and improve the area for aquatic plants and fish. This in turn provided a home for water birds and a wintering area for waterfowl.

Today, the Space Center, the Refuge and the Air Force station at Cape Kennedy cooperate with the county in the mosquito control program.

Refuge operations include dike maintenance, control of impoundment levels and water quality, pest plant control, and supervision of waterfowl hunting, fishing and other recreation programs.

The Refuge is one of over 300 in the National Wildlife Refuge System. The System, totalling 30 million acres, is a collection of lands and waters selected for their value to America's wildlife populations, particularly migratory birds and rare mammals.

The public is welcome to visit Refuge Headquarters on State Road 402 about seven miles east of Titusville.

Feral hog



#### CENTER DEVELOPMENT

Dr. Debus, who directed Army and NASA launch organizations which conducted many historic missions from Cape Kennedy (then Cape Canaveral), played a key role in the choice of the site for the Kennedy Space Center. He was also responsible for the design, development and construction of the Center's unique facilities and equipment.

Before the advent of Apollo/Saturn V space vehicles weighing over 6 million pounds at liftoff, the facilities of adjacent Cape Kennedy were adequate for NASA launches of unmanned and manned missions. The Cape, managed by the Air Force for the Department of Defense, also was the location for the Kennedy Space Center and its predecessor organizations until 1964 when most of the Center's activities were shifted to the present site.

Beginning in 1962, title to some 84,000 acres was acquired by outright purchase. Over 55,000 acres of submerged land belonging to the State of Florida also came under control of the Center. Property investment today is close to \$72 million.

The 140,000 acres controlled by the Center provide for the huge facilities and equipment necessary to launch men to the Moon and for future space programs. The sprawling expanse also provides a buffer safety zone for rockets whose explosive potential at liftoff represents 1 million pounds of TNT.

Near the geographical center of the Spaceport is Launch Complex 39. Located here is the 525-foot-tall Vehicle Assembly Building where Apollo/Saturn V's are assembled and tested on 12-million-pound Mobile Launchers before being moved by gargantuan tracked Transporters 3.5 miles to ocean-side launch pads. Five miles south is the Industrial Area where many of the Center's support facilities are located.

LC-39 will undergo modification and enlargement to support Skylab and Space Shuttle missions. Skylab is the NASA experimental space station which will be visited by three three-man crews for periods of up to 56 days in 1973. Apollo spacecraft plus Saturn IB and Saturn V rockets will be used.

The Space Shuttle will be a two-stage vehicle designed to carry instrumented spacecraft and men into Earth orbit at a fraction of the cost of present space vehicles. The booster stage can be recovered from the ocean after launch and reused. The orbiter stage will return to Earth after completing its mission to land like a jetliner on a runway to be constructed near the Vehicle Assembly Building. Each orbiter will be designed for reuse up to 100 times.

MERRITT ISLAND NATIONAL WILDLIFE REFUGE  
ON THE  
JOHN F. KENNEDY SPACE CENTER, NASA



MERRITT ISLAND NATIONAL WILDLIFE REFUGE  
P.O. BOX 6504, TITUSVILLE, FLA. 32780

OFFICE OF PUBLIC AFFAIRS  
JOHN F. KENNEDY SPACE CENTER, NASA  
KENNEDY SPACE CENTER, FLA. 32899

NASA/PAFB JUL/72

# MERRITT ISLAND NATIONAL WILDLIFE REFUGE



ON THE  
**John F. Kennedy Space Center**  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

"The Bureau shall use said property as a National Wildlife Refuge to promote the conservation of wildlife, fish and game, for recreational and educational purposes, and for other purposes embodying the principles and objectives of planned multiple land use."

Paragraph 10, Agreement  
NASA-Bureau of Sport Fisheries and Wildlife

#### BACKGROUND

Early in the development of the John F. Kennedy Space Center, NASA entered into an agreement with the Department of Interior's Bureau of Sport Fisheries and Wildlife to establish a wildlife refuge within the confines of the Center.

An area of 25,300 acres was designed the Merritt Island National Wildlife Refuge in 1963 and placed under the Bureau's administration.

NASA took the initiative thereafter to increase the area administered by the Refuge, reserving the primary use of the property for the purpose for which it was acquired — the conduct of the national space program. The operational areas of the Spaceport remain under NASA's exclusive jurisdiction.

From its original dimensions, the Refuge has grown to include most of the 140,393 acres of land, water and submerged land controlled by the Center. In effect, the Refuge boundaries are superimposed on those of the Spaceport except for the areas required to support Apollo and programs such as Skylab in 1973 and the Space Shuttle later in the decade.

The joint boundaries encompass a unique blend of nature and technology. Close by the space vehicles which carry men to the Moon, a rich variety of wildlife exists peacefully — apparently untroubled by bustling work crews, vehicular traffic and rocket blastoffs.

A NASA policy since the agency's inception in 1958 has been to provide useful information to students, teachers and the general public. At the Kennedy Space Center, an attractive Visitors Information

Ten-foot alligator



Center and conducted bus tours contribute to this policy. The establishment of a Refuge at the Center provides visitors with opportunities to share in the area's historical, wildlife and recreational resources.

Dr. Kurt H. Debus, Center Director, has noted, "The harmonious relations we enjoy with the Bureau of Sport Fisheries and Wildlife have worked to our mutual advantage. The Bureau's effective administration of areas not required for launch operations assures us that the great natural assets of the Center will be preserved for the benefit of the public."

Southern bald eagle at nest



#### GEOGRAPHICAL AND HISTORICAL FEATURES

The Kennedy Space Center extends approximately 35 miles from north to south on Merritt Island and is about 10 miles across at its widest point. It is located about 40 miles east of Orlando.

The Center is bounded on the east by the Atlantic Ocean and the eastern shore of the Banana River. Its western boundary is the Indian River. The northern boundary is some 25 miles south of Daytona Beach. The southern boundary is the Barge Canal near the center of Merritt Island. The major portion of the Spaceport is in Brevard County; it extends north seven miles into Volusia County.

The area is essentially level. Elevations greater than 10 feet above mean sea level are rare. Most of the land averages five feet above sea level.

Scrub vegetation, including saw palmetto, covers most of the land with the exception of the extensive marshland. Cabbage palm, slash pine and oak grow on higher ground. Groves of Australian pines mark

the homesites of the first settlers on Merritt Island.

There are over 3,000 acres of citrus groves on the Center which are leased back to the former owners who harvest the crops. A score of beekeepers maintain hives essential to pollination for citrus production. The Refuge administers lease arrangements.

Much of the Refuge consists of impounded marshes and saltwater creeks and lagoons. The water in the rivers, creeks and lagoons tends to be shallow and brackish. It contains abundant marine food resources, a factor which contributes much to the Spaceport's rich archeological past.

Shellfish were an especially important food resource for the small bands of prehistoric Indians who inhabited the area some 3,000 years ago. As the Indians consumed the shellfish, they tossed the refuse underfoot. Over the years, the refuse collected to form mounds, termed "middens" by archeologists. Bones from fish, birds and other animals, as well as crude stone and shell implements, have also been found in the middens.

Spanish treasure fleets once sailed the Gulf Stream off Cape Kennedy. Some of the galleons floundered off the coast and the contents are still being salvaged. Other traces of early Spanish activity have been discovered, especially in coastal areas.

Today, one can see the remains of Fort Ann, built in 1837 by the U.S. Army to protect a vital water link, called Haulover Canal, between the Indian River and Mosquito Lagoon. The original canal has been replaced by a modern one, also called Haulover, which is part of the Intracoastal Waterway that provides a protected route for pleasure craft and small commercial vessels along the Atlantic Coast.

#### WILDLIFE

Wildlife thrives on the Refuge. There are raccoons, armadillos, bobcats, feral hogs, deer and alligators. The alligator population is well over 2,000.

White pelicans



Common egret



There are many varieties of snakes, including the poisonous diamondback rattlesnake, the cottonmouth or moccasin and the coral snake.

The large number and variety of birds at the Refuge attract many bird watchers. The complete Refuge list contains approximately 250 species.

There are several species of herons, egrets and ibises plus numerous shore birds. Among the birds are some of the rare and endangered species list: bald eagle, dusky seaside sparrow, red-cockaded woodpecker, brown pelican and peregrine falcon. In recent years, a score of bald eagles has been noted nesting at the Refuge, generally arriving in October and departing in the spring when the young have reached flight age.

The Refuge is located near the end of the Atlantic flyway. Over 22 different species of ducks winter here, with the estimated peak population around 70,000. The wintering coot population generally exceeds 100,000.

#### RECREATION

Much of the Refuge is open to the public year-round from one hour before sunrise until one hour after sunset. Areas temporarily or permanently closed to the public are clearly designated.

Recreational activities available include freshwater and surf fishing, sightseeing, birdwatching, swimming and picnicking at the ocean beach, camping for conservation-oriented youth groups and waterfowl hunting in season.

The impoundments and canals offer excellent sport fishing. Largemouth bass, bluegill and shell-crackers are the principal freshwater species. In the ocean surf, speckled trout, red drum, blue fish and whiting are the major species. Two fishing camps are located near the Haulover Canal in the northern half of the Refuge. Florida fishing regulations apply.

Sightseeing and birdwatching are encouraged. Nature trails are located for easy public access. Bird

Dusky seaside sparrow

