

SALTON SEA NATIONAL WILDLIFE REFUGE  
Calipatria, California

ANNUAL NARRATIVE REPORT  
Calendar Year 1976

NATIONAL WILDLIFE REFUGE SYSTEM  
Fish and Wildlife Service  
U.S. DEPARTMENT OF THE INTERIOR



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Submitted by Date

Area Office Date

Refuge

Edward J. Smith 3-11-77  
Regional Office Date

# SALTON SEA

## NATIONAL WILDLIFE REFUGE



Salton Sea National Wildlife Refuge, at the southern tip of Salton Sea in California's Imperial Valley, is primarily a wintering area for an important segment of the population of migratory waterfowl which travel the great Pacific Flyway.

This refuge was established in 1930 for the protection of wild ducks, geese, and shorebirds. Originally, the area consisted of 32,407 acres bordering the Salton Sea. The inflow of agricultural drain water gradually raised the sea level, inundating all of the original refuge area. In 1947, the Imperial Irrigation District made available for leasing, for waterfowl management purposes, approximately 24,000 acres lying between the ~~sea~~ and private farmlands. These lands were to be divided equally in alternate strips, between the U.S. Fish and Wildlife Service and the California Department of Fish and Game.



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



The Salton Sea continued to rise from 1947 to 1964 when restrictions on water use resulted in a beginning decline of the sea level. Of the original 24,000 acres leased, an estimated 2,500 remain above water and are available for leasing today, all of which are administered by the Bureau of Sport Fisheries and Wildlife of the U.S. Fish and Wildlife Service.

Imperial Valley claims the hottest and driest climate in the United States. It has an average rainfall of about 3 inches and summer temperatures ranging up to 120 degrees. Winters are very mild and pleasant. Intensive irrigation and high evaporation rates result in high humidity in the summer.

With the dry, almost barren Sonoran Desert on one side and rich agricultural croplands on the other, this below-sea-level refuge is one of the most interesting in the entire National Wildlife Refuge System. The refuge birdlist attests to the unusual species which visit the general area. This is the wintering habitat of the Canada, snow, and white-fronted geese, and a dozen species of ducks. No other comparable area in the West can boast of the tremendous flocks of shorebirds which each year pass through the valley. December and January are generally the best months to observe concentrations of waterfowl; however, visitors will find an interesting variety of birds at all seasons of the year. High water levels in recent years have resulted in the loss of the nesting habitat of white pelicans, gulls, and terns.

The Salton Sea area supports the highest population of doves in the West, including mourning doves, white-winged doves, and Mexican ground doves. In the summer, gull-billed terns and laughing gulls, which have nested nowhere else in Western United States, are present. Wood and white-faced ibises, fulvous tree ducks, both white and brown pelicans, and many other interesting birds visit the area.

This is the native haunt of the roadrunner, the Gambel's quail, cactus wren, verdin, and many other desert species. The coyote, kit fox, raccoon, bobcat, and kangaroo rat, as well as skunk, muskrat, badger, cottontail, and jackrabbit are all present.

The surrounding desert slopes support typical native flora, including honey mesquite, screwbean, palo verde, and ironwood trees, in addition to creosote bush, iodine bush, catclaw, salt bush, and others.

Salton Sea was created in the spring of 1905, when the Colorado River burst manmade channels and for 2 years poured full-force into the valley. The shallow water is salty and subject to temperatures ranging from the low 50's in winter to a tepid 100 degrees in the summer. Barnacles abound on submerged shoreline vegetation, having been introduced in early 1940. The orange-mouth and shortfin corvina, and sargo perch, introduced in 1950, have replaced the mullet as the predominant fish species.



Fulvous Tree Ducks

No recreational facilities for camping and picnicking exist on the refuge. Tours through the main waterfowl concentration areas are usually possible. Guided tours through the refuge can be arranged by contacting the Refuge Manager. All wildlife is protected; firearms of any kind and unleashed dogs are prohibited.

Portions of the refuge are opened during some years to waterfowl hunting in accordance with existing Federal and State laws. Accommodations, general ground rules, and issuance of hunting permits are handled by the California Department of Fish and Game.

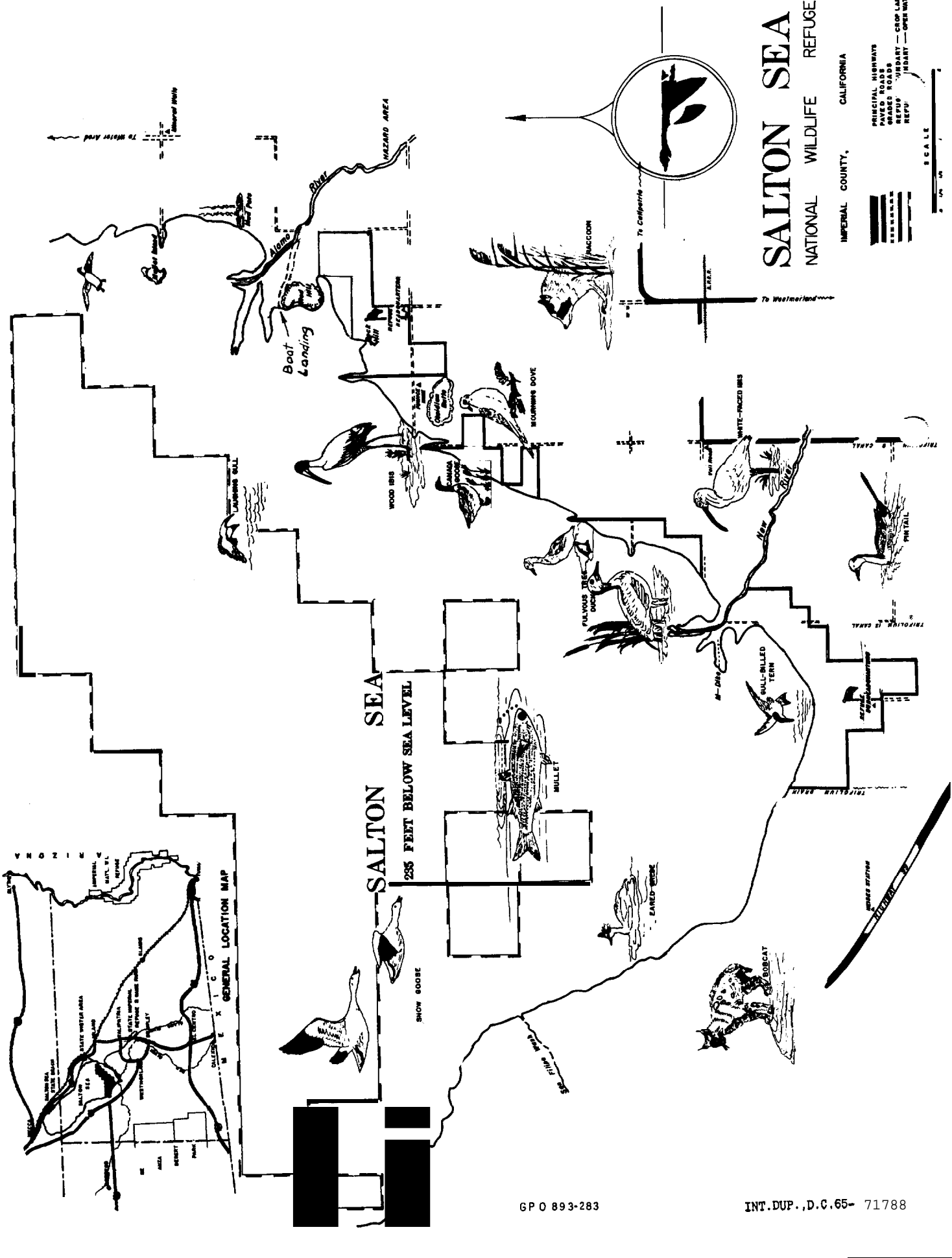
Refuge headquarters, northwest of Calipatria, California, are easily reached by paved road from State Highway 111. Turn west on Sinclair road just 4 miles north of Calipatria and proceed  $5\frac{1}{2}$  miles west to the end of the paved road. Refuge Unit I is reached by graded road just 4 miles north of Vendel's Station which is located on U.S. Highway 86. Headquarters may also be reached from Westmorland by proceeding 10 miles due north from that city.

Further details about the refuge may be obtained by writing the Refuge Manager, Salton Sea National Wildlife Refuge, P. O. Box 247, Calipatria, California 92233.

RL-63-R

Issued: 1960

Revised: October 1965



# SALTON SEA

## NATIONAL WILDLIFE REFUGE

IMPERIAL COUNTY, CALIFORNIA

- ORIGINAL HIGHWAYS
- PAVED ROADS
- GRADED ROADS
- REFUGES
- WATER
- WETLANDS
- WATER
- WETLANDS

SCALE



## GENERAL INFORMATION

1. Hunters using Federal hunting areas must have one-day permits. Permits are issued by California Game Department at the Wister Check Station. Fee is \$3.50 for adults, no charge for junior hunters.
2. Hunting days shall be Wednesday, Saturday and Sunday. (Any exception will be published by California Department of Fish and Game.)
3. Loaded guns are not allowed in the parking areas.
4. No firearms, other than shotguns, may be discharged on the area.
5. Camping is allowed only in the designated parking areas.
6. Please keep the parking areas clean,
7. All blind materials must be removed from goose fields at the close of the hunt.
8. Please do not drive on roads posted "Closed to Vehicles".
9. All refuge visitors are requested to obey the closed area signs.
10. Dogs must be kept under control at all times.

Information available from: Salton Sea National Wildlife Refuge  
P. O. Box 247, Calipatria, California 92233  
Telephone: 714-348-2323

Wister Waterfowl Management Area  
Niland, California 92257  
Telephone: 714-348-2955



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## **I . GENERAL**

### **A. Introduction**

Salton Sea, approximately 229 feet below sea level, is the natural drainage sump for about 4,500 square miles including the Coachella, Imperial, and Mexicali, Baja California Valleys.

Salton Sea National Wildlife Refuge is located at the southern end of the Salton Sea in California's Imperial Valley. The refuge was established by Presidential Proclamation on November 25, 1930, Executive Order No. 5498, for the protection of migratory bird habitat. The refuge consists of 32,407 acres. The rising level of the Sea, caused by increased agricultural drainage waters, inundated the remaining upland habitat in the 1940's and 1950's. The current refuge consists of 2,400 acres bordering the Salton Sea which are leased from the Imperial Irrigation District and 357 acres purchased in 1972.

### **B. Climatic and Habitat Conditions**

The weather for 1976 was unusual. Spring was pleasant and summer temperatures were sub-normal. A July high of 119° was recorded, with temperatures in excess of this figure throughout many localities in the Imperial Valley. After this the temperature dropped below the July average and August was even "cooler." For many days during August the temperatures were below one hundred degrees.

On September 10, 1976, an event occurred that made this year even more unusual. A tropical storm, Kathleen by name, hit the Southern California mainland. The Yuma, Mexicali, Imperial and Coachella Valleys were buffeted by high winds and heavy precipitation. Extensive flooding occurred along the Mexican border. Luckily, the refuge received only light precipitation (1.20 inches) and winds. It has been over 37 years since a tropical storm from Baja California hit the mainland of Southern California. The toll was ten deaths, and millions of dollars in damage to homes, businesses, roads, and crops. A breakdown of damage estimates showed about one million dollars to power and water systems of the Imperial Irrigation District, several million dollars to Southern Pacific Railroad, several million to County and State highways, over one million in clean-up expenses and, twelve million dollars to agricultural lands and crops. One large agri-business claimed over two million in damages to land, crops, irrigation systems, and equipment. This ranch is located just a few miles northwest of refuge Unit I.

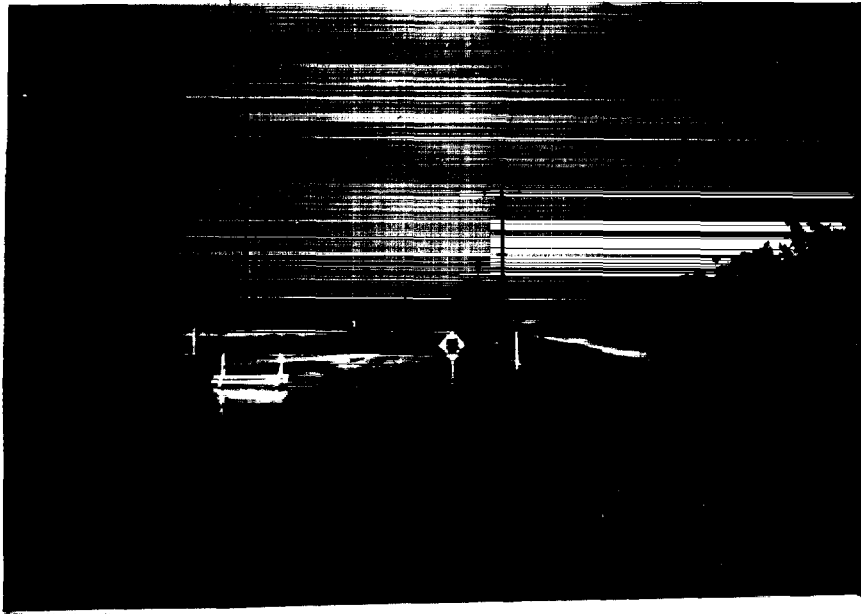
Precipitation for the year was 6.62 inches recorded at refuge headquarters. This was a very wet year compared to the annual average of 2.73 inches. The surrounding desert habitat looked more lush than normal at this time of year due to the excess rain. The most precipitation ever recorded in one day for the Valley was 4.08 inches in 1939. That September storm brought plenty of rain but was not as destructive as 1976's.

The level of the Salton Sea rose over eight inches after the storm due to flood waters. Many areas not inundated before were partially covered by the rising Sea. Surprisingly, the lowest Salton Sea level was in January at -230.05, and the highest was recorded on December 30 at -228.60. This is the highest the Sea has been since 1914.

Several refuge water control structures and dikes were washed out because of the storm. Some roads were partially eroded and several have been inundated around Unit II. Damage to refuge croplands occurred, with resultant delays in refuge farming. The bulrush-millet impoundments in Unit I and II suffered some flooding, with loss of wetlands, food and cover.



The west portion of Tract 1-2, Unit II, was inundated by the rising water level of the Salton Sea as was Severe and McKendry Roads. (Tiller, 10-04-76)



Sinclair Road, along the north side of Tract 1-2, Unit II, was also inundated due to the rising Salton Sea level. (Tiller, 10-04-76)

C. Land Acquisition

1. Fee Title

Nothing to report.

2. Easements

Nothing to report.

3 Other

Nothing to report.

D. System Status

1. Objectives

Under the N.F.I.O., we are meeting our targets; however, more and more effort is directed towards preventing or slowing refuge inundation by the Salton Sea. Within three years we will no longer be able to meet our N.F.I.O. due to the continual loss of habitat to the rising waters of the Sea. A long, hard

look at this situation will be made during the spring of 1977, and some decisions will be made concerning the future management of the refuge.

Our current D.V.E. plan was expanded to include botulism and coordination of efforts with the State Fish and Game. Our current area of responsibility for disease control is the Salton Sea - Imperial Valley area.

We were able to collect 100 gizzards for lead poisoning analysis this year, and efforts will continue to monitor lead shot in our marshes.

We provided technical assistance to the Southern California duck clubs in establishing natural food production on their clubs. This effort is being made to offer the clubs an alternative to the artificial feeding program they now conduct.

Our station sign plan was completed during this report period.

## 2. Funding

The following chart shows our funding pattern for 5 years plus the transition quarter in 1976. Funds are shown in fiscal years.

	1973	1974	1975	1976	1976 TO	1977
I & R		11,100	13,345	20,790		13,000
Operations	161,300	156,900	160,260	174,011	49,600	180,000
Const.& Rehab.			35,000			25,000
Total	161,300	168,000	198,605	194,801	49,600	218,000

The following chart shows manpower patterns in man-months.

	1973	1974	1975	1976	1976 TO	1 9 7 7
Permanent FT	48	48	60	60	15	60
Permanent PT	12	12	12	12	3	12
WAE	3 6	3 2	24	28		24
Total	96	92	96	100	23	96

## II. CONSTRUCTION AND MAINTENANCE

### A. Construction

The Hazard tract was stake-leveled with a one-foot-per-thousand-foot fall to the north, and one-and-one-quarter-foot-per-thousand to the

west. A delivery ditch was also installed along the south border of this 206 acre field. The south half of the Johnson tract was also leveled on a one-foot-per-thousand to the north and west fall. This work was accomplished under contract with the Imperial Irrigation District, and will result in more efficient irrigation application and improved yields. The long range objective is to improve the quality of these tracts so that yields will improve to the point where we can interest cooperative farmers in raising waterfowl food on the land.



The Hazard tract was stake-leveled during April 23-29, 1976 (Tiller, 4-27-76)

Total cost of these contracts was \$35,000.

Work continued on approximately three and one-half miles of Salton Sea Dike. The dikes are being raised, widened and rip-rapped under force account to prevent the salt water from invading our developed farm lands and fresh water marshes. The Salton Sea raised 1.35 feet during this twelve month period. Our objective is to maintain a three foot free-board on the dikes.



During early April, the Alamo River flowed over into the north section of the Hazard tract. Rip-rap was hauled from Red Hill by Imperial Irrigation District dump trucks, while refuge personnel loaded and spread the materials. (Tiller, 4-20-76)

#### B. Maintenance

Maintenance of heavy equipment used in our refuge program continues to be a costly and never ending task. These costs will remain high as long as we continue to use outdated tractors and cranes.

All vehicles have been brought up to service maintenance standards with appropriate Safety standards met.

During routine maintenance and replacement of small (12") water structures, we are moving away from four sections of three foot concrete pipe to one section of 13 foot transite pipe which is easier to install and maintain. It has a twenty year life expectancy compared to ten years for concrete. Heavy salt concentrations in the soil attack the concrete and causes it to deteriorate.

Maintaining the several hundred thousand feet of subsurface leach tile continues to be a challenge. Cave-in damage caused by earth settling, and constant mud and root clogging must be excavated and repaired or jetted out with high pressure hose systems.

C. Wildfire

Nothing to report.

### III. HABITAT MANAGEMENT

A. Croplands

Alfalfa grown by a cooperative farmer continues to be the key for supporting snow and Canada geese in the wintertime. Pintail and wigeon also use it extensively during the spring migration period. The alfalfa crop will last three years in the Imperial Valley, and will continue to grow vigorously even under the abuse given it by the grazing birds. Before temperatures drop to below freezing in late November and early December, the alfalfa grows rapidly. Frost causes the plants to burn and become less attractive to birds. We have found that using cattle as a management tool to strip off the dead hay stimulates green growth immediately and produce a good post frost yield. The birds will keep this new growth clipped down until they depart in March.

Third year alfalfa continues to be preferred by geese over annual ryegrass, wheat, and barley and is much less costly to raise.

Sprinkler irrigation has proved to be a big plus in germinating alfalfa and cereal grains in this salty soil. Three applications to new alfalfa is preferred.

B. Grasslands

Not applicable.

C. Wetlands

Alkali bulrush continues to be the basic marsh plant consumed by both ducks and geese. By removing water in March, the plants are placed in stress and out-compete cattail for the available moisture. A late August burning stimulates a September growth period, with mature seed heads available in late October. In this manner we realize two seed crops and one forage crop annually for use exclusively during the October-March period.

In Unit I, the fresh water marshes are not protected by a sea dike. This allows the salt water from the Sea to inundate these units and kill out all plant life. In the marsh areas of Unit II a dike does keep the salt water from intruding; however, tail water from the marsh must be pumped up to sea level, or the fresh water



units become too deep for bulrush growth. These problems are not unexpected when operating 228 feet below the Pacific Ocean and four feet below the Salton Sea.

In those cases where salt water invades the fresh water marsh, prime goose and pintail habitat turns to shorebird, shoveler and ruddy habitat, of which we already have plenty.

D. Forest Lands

Not applicable.

E. Other Habitat

Not applicable.

F. Wilderness and Special Areas

Not applicable.

G. Easements for Waterfowl Management

Not applicable.

#### IV. WILDLIFE RESOURCES

A. Endangered and/or Threatened Species

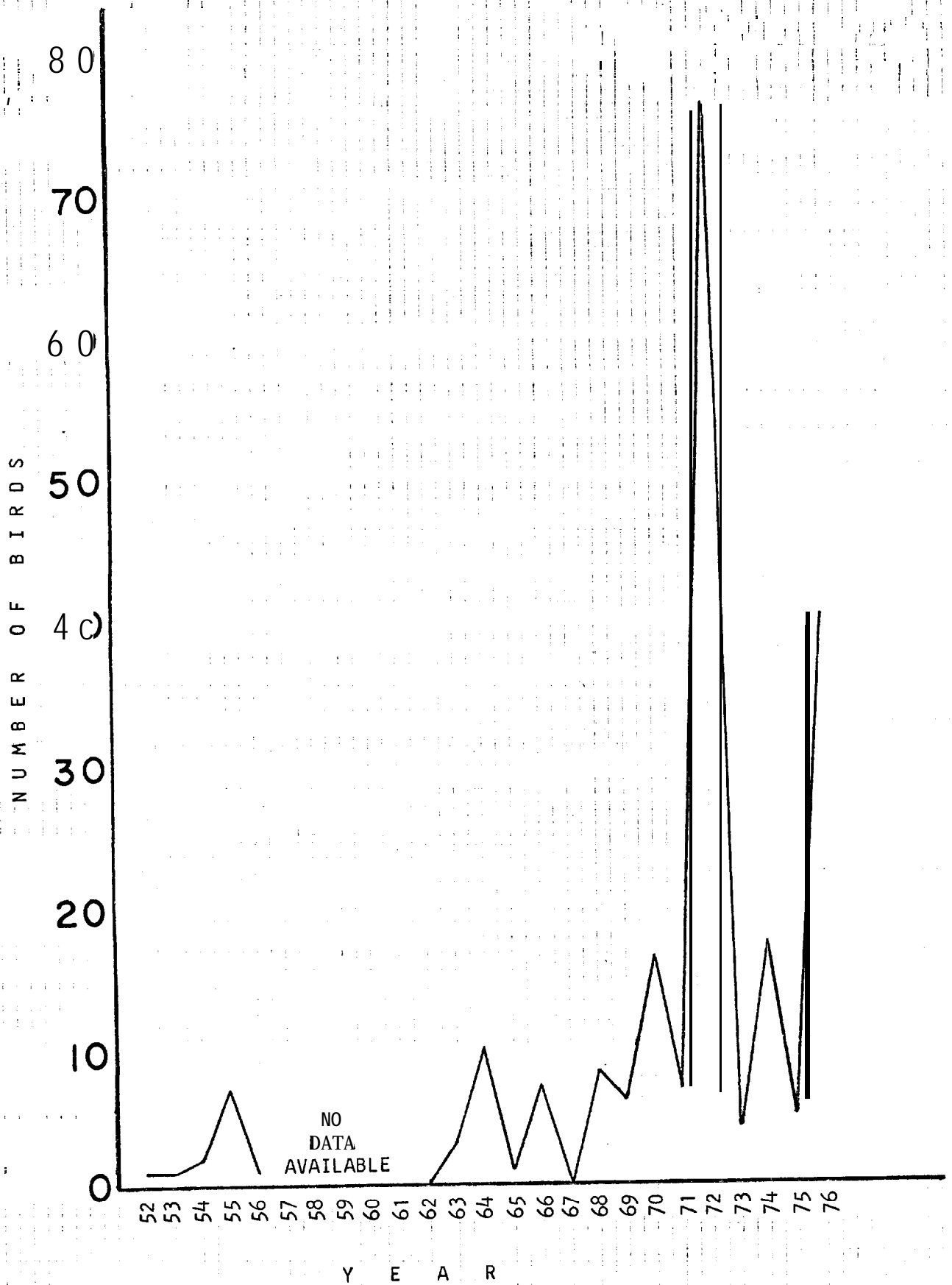
Endangered California brown pelicans (Pelecanus occidentalis californicus) arrived in early July. Seven birds were seen at **the** north end of the Salton Sea on July 12, and three birds at the south end on the same date. The peak population, all immatures, totaled 40 birds on August 11. They stayed later into the summer than normal, and by October 5 only 23 birds remained. The last sighting was of one immature bird with a flock of white pelicans on November 18. This is an extremely late date for brown pelicans to remain in the area. The following graph shows the annual peak, post-breeding dispersal population of brown pelican at Salton Sea from 1952-1976.

One specimen of a California brown pelican was salvaged and donated to the University of California at Davis.

Wood storks (Mycteria americana) arrived unusually early this year.

On May 15, one adult and ten immatures were observed along the Salton Sea shoreline near the Alamo River. This is about one month earlier than normal. Fewer birds summered in the area; the peak population being about 250 birds.

CALIFORNIA BROWN PELICAN POPULATION AT SALTON SEA.  
FOR THE YEARS 1952 - 1976 ( ALL IMMATURE BIRDS )\*



\* 1 ADULT BIRD IN 1972

White-faced ibis (Plegadis chihi) must have had a good production year since over 150 birds wintered in the area. About 100 birds were at the New River in December.

Only one roseate spoonbill (Ajaia ajaia) was seen during the year, and this was earlier than usual. This lone bird was present from May 5 to mid-September.

One endangered Aleutian Canada goose (Branta canadensis leucopareia) remained on the refuge until early March. The family group that was present in December 1975 was not seen in January 1976. No Aleutians were observed this fall. Each year "small" Canada geese are present, and it may be that these were Aleutian geese, since this area is within the former known range of this subspecies.

Assistant Manager Tiller attended the Aleutian Canada Goose Recovery Team meeting held at Los Banos, California on January 29, 1976.

Another possible Tule white-fronted goose (Anser albifrons elgasi) was checked through the State hunting area check station, and represents the second sighting of this subspecies. One other bird was seen in the same area later and may have been its mate. One other bird was seen in the fall of 1975.

Only 3 Ferruginous hawks (Buteo regalis) were seen; all sightings were during the fall and winter period.

No osprey (Pandion haliaetus carolinensis) were seen during 1976. The last sighting of this species was in January 1975.

American peregrine falcon (Falco peregrinus anatum) sightings average about two each year. Single birds were seen in May and December.

Prairie falcons (Falco mexicanus) are usually seen during the fall migration, and winter locally. Several birds were seen during that period.

Endangered Yuma clapper rails (Rallus longirostris yumanensis) seem to be holding on around the southern Salton Sea, even though the rising water level is inundating much of their habitat. The first migrants were seen April 27, 1976. Most pairs were observed in May in their usual refuge territories and around the New and Alamo Rivers. Along Salt Creek, inland about two miles from the Salton Sea, an extensive area, was censused in early May, and revealed a minimum of 15 birds, and possibly more; since all available habitat could not be censused. In the past no birds were reported at this site, so perhaps they have moved into this habitat because of loss of nesting areas around the Sea. This

area is about twenty miles northwest of Unit II. Several birds were still in the nesting territories in Unit II on September 28. Most of the clapper rails are thought to leave the Sea in the fall, but some birds are present during the Christmas Bird Count in December each year. We don't know what proportion of the population remains during the winter period.

Assistant Manager Tiller attended a Yuma Clapper Rail Recovery Team meeting held in Yuma, Arizona, on March 2 and 3, 1976.

Due to habitat loss from flooding, the clapper rails may not utilize former nesting areas of the refuge in 1977. A census will be made on the refuge to find out what the loss will mean to this endangered species. The census will consist of playing tape recorded calls in areas of former nesting, and attempting to elicit responses from rails present.

The California black rail (Laterallus jamaicensis coturniculus) is listed as rare on the State's list, but status undetermined on the Federal listing. There are only a few records of this species on the refuge. None were observed this year but on the State's Finney-Ramer Unit of the Imperial Wildlife Area, one bird was seen during the Christmas Bird Count on December 20, 1976.

Western snowy plovers (Charadrius alexandrinus nivosus) are never common in the area but can be seen year round. Some nesting occurs locally but not on the refuge.

Mountain plover (Charadrius montanus) are primarily winter visitors. This year it appeared that the wintering population was smaller than normal .

The California least tern (Sterna albifrons browni) is a casual visitor to the Salton Sea, with only a small number of records, and is virtually unknown elsewhere in the interior of California. One adult bird was observed on the refuge April 29, 1976 and was the only sighting on the refuge this year. Three birds were at the north end of Salton Sea on June 19, however.

The California yellow-billed cuckoo (Coccyzus americanus occidentalis) is listed as rare on the State's list but isn't on the Federal list. There are no records of this species in the area for the past few years.

The Western burrowing owl (Speotyto cunicularia hypugaea) is present year round. Birds locate their burrows along the soft bank of the drainage canals in the Valley. After the storm on September 10, many of the burrows were under water, and it is not known how many birds perished. Fewer birds were observed after that time, so the

losses may have been excessive.

One specimen of a western burrowing owl was donated to a university during the year.

## B. Migratory Birds

### 1. Waterfowl

Total waterfowl use, including coots, amounted to 8,122,350 use days. This includes 390 swan use days, 946,740 goose use days, 6,264,720 duck use days and 910,500 coot use days for 1976.

Our total flyway objective is for waterfowl maintenance of fourteen million use days. Several factors have been the cause of lowered use. Loss of habitat due to the rising Salton Sea level has encroached upon valuable marsh habitat, especially in Unit I. The September storm caused delays in goose pasture farming, and this held goose use of the refuge below normal. Water project developments further north have short-stopped some ducks in those areas, causing a reduction of duck use at Salton Sea.

During the month of February, the refuge fed approximately 380 tons of grain to waterfowl under the supplemental grain feeding program. Feeding began on February 4 and terminated March 3, 1976. An estimated 100,000 pintail was the peak feeding aggregation at the feed zone in tracts 3 and 6, Unit II.

Only eleven depredation herding permits were issued this year for waterfowl damage; primarily on wheat, barley, and alfalfa. This has been the average number of permits issued to ranchers in the last two years. The reduced number may be due to our not handing our pyrotechnics as was done in the past, or may be due to the increase in paper work for the complainer. This year the farmer was asked to fill out a questionnaire so that we could obtain a better idea of actual damage caused by waterfowl in the Valley. It's interesting that by not issuing firecrackers, and by adding a little paper work, we can alleviate waterfowl damage complaints.

Unusual waterfowl sightings or occurrences for the year were as follows:

One family group of whistling swans were present in January and another in December. About one family unit is all that migrates here in the fall.

Spring migrant black brant were seen on March 28, when 21 birds were found at the north end of the Salton Sea (N.E.S.S.). Two birds summered there and one at the south end of the Salton Sea (S.E.S.S.). Two birds were in Unit II on October 21, 1976.

Early spring migrant white-fronted geese appeared in January. A refuge peak of 50 birds was seen on January 26.

In the spring, Great Basin Canada geese and lesser snow geese departed around their normal departure dates during the last of February and first two weeks in March, respectively. However, in the fall, migrant Canada geese returned about two weeks earlier than normal, with thirteen birds present in early October. Snow geese arrived about one week earlier than normal, with sixty birds in Unit I in mid-October.

Fulvous tree ducks were more common this winter. One bird was killed on December 4 in the Public Hunting Area, and six birds were seen December 30 on an aerial survey. Most tree ducks have vacated our area by October and are rarely seen after that date.

An albino pintail was killed in the Public Hunting Area on November 17 and a wood duck on October 30, 1976.

A male European wigeon that was present in late 1975 remained in Unit I until at least March 6, 1976. In the fall, another male was sighted again in Unit I and remained until the end of the year.

White-winged scoters are becoming regular visitors. Two males were at S.E.S.S. on February 22, and one bird probably summered at N.E.S.S. It was seen from early August on into September.

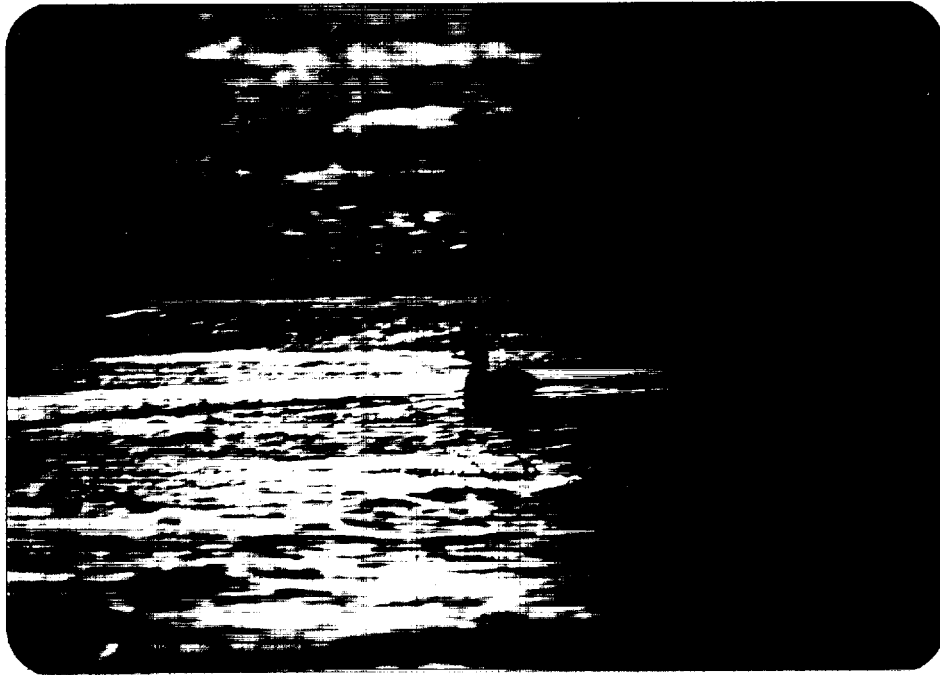
Surf scoters were present at S.E.S.S. during October and probably stayed on into 1977. Three females were seen near Unit I on October 29, November 6 and in early December. Four birds summered at N.E.S.S.

The most exciting record was of a black scoter (Melanitta nigra americana) seen around Red Hill on August 14, 1976. This is the first record of this species in the interior of California.

A female hooded merganser was seen on December 20, 1976. All mergansers are uncommon in the area with this species being the rarest.

The following 53 specimens were donated to colleges and universities or for research purposes: 1 whistling swan, 7 Canada

geese, 13 lesser snow geese, 3 Ross' geese, 4 pintail, 4 green-winged teal, 2 cinnamon teal, 5 northern shoveler, 1 ring-necked duck, 7 canvasback, and 6 ruddy ducks.



The first black scoter ever reported for the Salton Sea was seen near Red Hill on August 14. (Robert Copper, 8-14-76)

After the September storm, botulism was widespread through southeastern California. An outbreak occurred at the New River and along the southeast Salton Sea shoreline in early October. Not only waterfowl, but egrets and shorebirds were affected. The disease spread to several duck clubs at the south end of the Sea in late October. Deaths were also reported at the north end during November. Botulism was also noted on a duck club about seven miles southeast of Brawley, California, on December 3. At Salton City sewage ponds, the disease was observed in waterfowl in early December. About 325 birds perished at Salton City.

About twenty-five miles west of Blythe, California, an outbreak occurred from late November 1976 until January 1977. Water from the September storm flooded the Ford Dry Lake area creating a lake about seven miles long and four miles wide. Dead water-

fowl were first noticed November 27, 1976. Refuge personnel assisted State Fish & Game in disease control during most of December.

About two thousand ducks and coots died during the disease outbreak. Total estimated waterfowl losses for all areas indicated above were about 3,500 birds, including coots.

Twenty-five lesser snow geese were banded on February 27. These birds were color marked with green collars with codes CC76 through CC00. This concludes our quota of 200 neck collared lesser snow geese under the Cooperative Environmental Agreement, Project B-8, with the U.S.S.R. The project began in 1974 when we put the first neck collar on a female snow goose at Salton Sea (CA01).

Several lesser snow geese neck collared in 1976 by Jim King in Alaska were sighted on the refuge this fall. Several Ross' geese neck collared by Bob McLandress also showed up. A snow goose with neck collar AA68, banded by Tule Lake NWR, was seen in Unit I on October 30 and had returned to central California by mid-November!

## 2. Marsh and Water Birds

Unusual sightings or data on marsh and water birds were as follows:

The first common loons were seen on October 23 when two birds were observed at the New River. One bird was seen in that area on November 20 and none after that date.

Two horned grebes were seen on the Sea on December 20, 1976. This species is rare in this area anytime.

About 75 western grebes were seen at N.E.S.S. on July 12, 1976. One adult was observed with a chick on its back, indicating that nesting occurred.

While many areas are observing less nesting by this species, the Sea had its first in many years.

On May 5, about forty miles north west of the N.E.S.S. near Desert Hot Springs, Riverside County, there was a Laysan albatross (Diomedea immutabilis) seen flying over that desert area!

The September tropical storm brought other species into the



Salton Sea and gave the refuge two new birds for our birdlist. Storm-petrels were seen the day after the storm. This was a refuge first as well as an inland occurrence in Southern California! Over 250 least storm-petrels (Halocyptena microsoma) were found feeding on the Sea. On September 15, one Leach's storm-petrel (Oceanodroma leucorhoa chapmani) was discovered with several least storm-petrels. This was the dark-rumped subspecies from the Gulf of California. The last sighting of storm-petrels was on October 20 when two least storm-petrels were seen near Rock Hill, Unit II. No dead birds were ever found, so we assume they managed to fly southward back into the Gulf.

The storm also pushed a red-billed tropicbird (Phaethon aethereus mesonauta) into the desert where the albatross was seen in May!

Since 1968, both blue-footed booby (Sula nebouxii) and brown booby (Sula leucogaster) sightings ~~were usual~~ summer occurrences. For the last four years either no birds have summered or only one bird was present. During 1976 no birds were seen on the Salton Sea. We don't know why they haven't appeared in the last couple of years. Also, we don't know the species' status in the Gulf of California breeding colonies, which may have some bearing upon the lack of post-breeding dispersal into our area.

On July 11, 1976, one immature and one adult magnificent frigatebird (Fregata magnificens rothschildi) were at N.E.S.S., and ~~an immature~~ was seen near Unit II on August 18. Several frigatebirds were reported after the tropical storm along the Colorado River at Yuma, Arizona, and in the desert east of there, but none were seen at Salton Sea.

This must have been the "year of the heron." Great blue herons nested at S.E.S.S., N.E.S.S. and along the east side. Such widespread nesting has not been noted in many years.

Little blue herons (Florida caerulea caerulea) were also more numerous this year. **Four** birds were observed near the egret colony (S.E.S.S.) on August 6. No nests were found but nesting may be a possibility in the future.

The cattle egret nesting was again very successful during 1976. An estimated 1,200 nests were overflowing with chicks. Estimated production was 3,500 birds. Many birds re-nested and had young in October. Even though the Sea is rising and eliminating nesting sites, they seem to be successful at nesting. Next year will tell us whether they can be as productive as they have been the last few years.

The first great egrets in many years also nested within the egret colony this year. **Snowy egrets also nested successfully.**

**Another extremely unusual sighting occurred on July 10, 1976 at N. E. S. S. A white ibis (Eudocimus albus) in full breeding plumage was totally unexpected there. It is only the second California record; the first was in 1935. It was observed in Unit I on August 6, and was the first refuge record. It was not seen in the area after that date.**

The single remaining American flamingo (Phoenicopterus ruber) was present throughout most of the year.

The following specimens were donated during the year: 1 eared grebe, **6 cattle egrets, 1 American bittern, and 1 sora.**

### 3. **Shorebirds, Gulls, Terns and Allied Species**

Unusual sightings or occurrences were as follows for **1976:**

**American golden plovers were seen this fall. One bird was at the State area on October 23, and two were seen at a duck club south of Brawley on October 31.**

Ten spring migrant ruddy turnstones were at N. E. S. S. on May 3.

A winter high total **of 850 long-billed curlew were seen near Unit I on December 4.** Present with this aggregation of curlews was one albino bird.

On May 8, **eighty-five red knots were seen on the west side of the Sea at Salton City.** One bird was seen in Unit I on June 16. **Salton City is a very good location to observe spring migrant shorebirds.**

A single pectoral sandpiper was seen at a duck club south of Brawley on October 31.

On June 16, **a white-rumped sandpiper (Calidris fuscicollis) was observed in Unit I.** This is the first refuge record of the species and only the second record for California.

Two Baird's sandpipers were seen in Unit I on July 17 and were **possibly early fall migrants.**

One semipalmated sandpiper was seen at S. E. S. S. on May 16 and 20 and June 6, and another at a duck club south of Brawley on October 31.

Sanderlings were seen only in the spring this year. A spring peak of 25 birds was observed at Salton City on May 20 and two birds were in Unit I on June 6.

An immature yellow-legged Western gull (Larus occidentalis livens) was seen on May 9. This is earlier than the usual mid-June appearance of the species on the Sea. A high total of 65 birds was observed at Salton City on August 11.

A Thayer's gull (Larus thayeri) and two new gulls (Larus canus brachyrhynchus) were seen near Unit I on December 20.

A laughing gull wintered on the refuge and was still present on January 10. One adult was at N.E.S.S. on May 16.

Up to four Franklin's gulls were seen at S.E.S.S. from May 1-9.

The first spring migrant gull-billed tern was observed on April 3. Nesting success was good this year even though nesting sites were more difficult to find because of high water. Over 100 birds were seen around the New River on July 12. This is a larger number than are seen in a normal year.

Another new species for the area was seen on June 12. Three adult Arctic terns (Sterna paradisaea) were seen near New River on that date!

Black skimmers (Rynchops niger niger) nested again this year. About 85 skimmers were seen around S.E.S.S. in early July. Up to 60 birds were still present on October 23, and 8 birds were seen at the New River on December 4. Two birds were seen on the Christmas Bird Count on December 20. These were the first ever recorded.

The following 56 specimens were donated to schools during the year: 1 killdeer, 3 willets, 3 least sandpipers, 9 long-billed dowitchers, 22 western sandpipers, 2 marbled godwits, 3 American avocets, and 13 ring-billed gulls.

#### 4. Raptors

Rough-legged hawks are becoming regular winter visitors. Two birds were present in January and February and at least three birds could be seen from October 30 through December.

It has been about 10 years since a Harris' hawk has been observed in the Imperial Valley and about 30 years since nesting has occurred. So, on June 19, when a pair of these hawks was found attempting to nest it was quite exciting. Unfortunately, we found out they had been seized by California Fish & Game Wardens

from falconers in Los Angeles and released in the Valley. The nesting attempt was unsuccessful and the birds were not seen after the end of June. A check of the nest in early July showed no eggs in the nest nor any evidence of eggs being destroyed.

At least one immature and maybe two bald eagles wintered at the S.E.S.S. One bird was in Unit .I during November and December.

The following species were donated to schools during 1976: 1 red-tailed hawk, 1 marsh hawk, and 6 American kestrels.

##### 5. Other Migratory Birds

The first spring migrant rufous and Allen's hummingbirds were seen around the office on March 19.

A white-breasted nuthatch was seen near Unit I on August 7, 1976. This was a first for the refuge.

A black-throated gray warbler was seen in the headquarters area on March 11. Evidently this was a very early spring migrant.

Great-tailed grackles are becoming more numerous in the summer and even wintered over here. Seven birds were still present on December 20.

A scissor-tailed flycatcher was seen on July 14 about 25 miles northeast of Unit II. This species is rare and irregular in Southern California and has never been recorded on the refuge yet.

The following 30 birds were donated to schools during 1976: 8 mourning dove, 2 ground dove, 6 roadrunners, 1 white-throated swift, 1 belted kingfisher, 1 tree swallow, 2 cliff swallows, 2 orange-crowned warblers, 3 yellow-headed blackbirds, 1 red-winged blackbird, 1 northern (Bullock's) oriole and 2 white-crowned sparrows.

#### C. Mammals and Non-Migratory Birds and Others

##### 1. Game Mammals

Nothing to report.

##### 2. Other Mammals

Nothing: to report.

### 3. Resident Birds

The following birds were donated to schools, etc. during 1976: 2 Gambel's quail and 4 ring-necked pheasants.

### 4. Other-Animal Life

Nothing to report.

## V. INTERPRETATION AND RECREATION

### A. Information and Interpretation

#### 1. On-Refuge

For the total use, by category, see the Annual Public Use Report. Total refuge visits for the last four years are shown in the table below.

#### Total Refuge Visits for the Years 1973-1976

1973	58,410
1974	45,248
1975	52,325
1976	54,044

The total visitor use was down in 1974 due to the energy crisis, and has steadily risen since then. Even though the cost of fuel is much higher now, total visits to the refuge have increased almost to the 1973 level.

#### 2. Off-Refuge

We have been attempting to discourage off-refuge slide talks as much as possible due to manpower limitations and funding. Only two off-refuge slide presentations were given during the year.

### 8. Recreation

#### 1. Wildlife Oriented

This year a change was made in the public hunting area. Available sites were limited in order to spread out the hunters and increase hunting opportunity. Each site was numbered, and a post was placed in the vicinity so the hunter could find their sites. The hunting party was to remain within a 100 yard radius around the numbered post to eliminate hunters encroaching upon other sites and avoid roving hunters. The parking lot contained numbered parking spaces corresponding with sites in the field.

ANNUAL  
PUBLIC USE REPORT

TR Co	Organization Number	Name	Report Period
1 2 3	4 5 6 7 8 9 10 11 12 13 14 15 16 17		Yr Mo
3 0 1	0 1 1 6 3 0 0 0 S A L 6		

1 of 3 Page 1 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	NON-STD TOT. REUS
	18	19	20	21	22	23	24	25	26	27-35	36-45	46-55	
INTERPRETATION													
Wildlife Trails - Nonmotorized													
Self Guided	0	1	1	0	0	0	0	P	S	795	765		
Conducted	0	1	2	0	0	0	0	P	C	745	745		
Wildlife Tour Routes - Motorized													
Self Guided	0	2	1	0	0	0	0	P	U				
Conducted	0	2	2	0	0	0	0	P	T				
Interpretive Center	0	3	0	0	0	0	0	P	R				
Visitor Contact Station	0	4	0	0	0	0	0	P	Q				
Interpretive Exhibits - Demonstra													
Self Guided	0	5	1	0	0	0	0	P	A				
Conducted	0	5	2	0	0	0	0	P	M				
Other On-Refuge Programs	0	6	0	0	0	0	0	P	P	500	530		
ENVIRONMENTAL EDUCATION													
Students	1	0	0	0	0	0	0	P	E				
Teachers	1	1	0	0	0	0	0	P	B				
RECREATION-WILDLIFE CONSUMPTIVE													
Hunting Mig. Birds - Waterfowl													
Ducks	2	0	1	0	0	0	0	P	D				
Geese	2	0	2	0	0	0	0	P	G				
Swans	2	0	3	0	0	0	0	P	N				
General Waterfowl	2	0	4	0	0	0	0	P	W	923	5650		
Hunting Mig. Birds - Other	2	0	5	0	0	0	0	P	X				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z				

Registration SALTON SEA NWR

Date Prepared

Form 3-239a-  
Rev. 12/75

Name

PUBLIC USE REPORT 22.

TR C-de	Organization Number									Name							Report Period	
1 2 3 4	5 6 7 8 9	10 11	12 13 14	15 16 17	Yr	Mo												
3 0 1 0	1 1 6 3 0	0 0	S A L	6														

Page 2 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	ACTIVITY HOURS	NON-STD TOT. REUS
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE CONSUMPTIVE (c't)													
Hunting Resident Game													
Upland Game Birds	2	1	1	0	0	0	0	P	L				
Big Game				(Species Code)									
Deer - Gun	2	1	2					P	H				
Deer - Bow	2	1	3					P	J				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
	2	1	4					P	K				
Small Game	2	1	5	0	0	0	0	P	Z				
Other Game	2	1	6	0	0	0	0	P	U				
Trapping	2	1	7	0	0	0	0	U	G				
Fishing													
Warmwater	2	2	1	0	0	0	0	U	W				
Coldwater	2	2	2	0	0	0	0	U	C				
Saltwater	2	2	3	0	0	0	0	U	S	5535	34,910		
Clams, Crabs, Oysters, Frogs	2	2	4	0	0	0	0	U	Y				
Other Consumptive Wildl. Rec.	2	3	0	0	0	0	0	U	M				
RECREATION-WILDLIFE NON-CONSUMPTIVE													
Camping	3	0	0	0	0	0	0	U	H				
Picnicking	3	1	0	0	0	0	0	U	B				
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z				

Region I Station SALTON SEA NWR Date Prepared \_\_\_\_\_  
 Name \_\_\_\_\_ Form 3-239b  
 Rev. 12/75

Div

Wildlife Refuges  
23.TR  
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Number

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Report  
Period  
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PUBLIC USE REPORT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
3	0	1	0	1	1	6	3	0	0	0	S	A	L	6		

Page 3 of 3

OUTPUT TYPE	LINE CODE										NO. VISITS	OUTPUT UNITS	NON-STD TOT. REUS
	18	19	20	21	22	23	24	25	26	27-35			
RECREATION-WILDLIFE NON-CONSUMPTIVE												Act.Hr.	
Wildlife/Wildlands Observation													
Foot	3	2	1	0	0	0	0	U	E	35,115	135,280		
Land Vehicle	3	2	2	0	0	0	0	U	N	15,085	7,635		
Boat	3	2	3	0	0	0	0	U	L				
Other	3	2	4	0	0	0	0	U	P				
Photography	3	3	0	0	0	0	0	U	T	22	92		
Field Trials	3	4	0	0	0	0	0	U	X				
RECREATION - NON-WILDLIFE													
Camping	4	0	0	0	0	0	0	R	C				
Picnicking	4	1	0	0	0	0	0	R	P				
Swimming	4	2	0	0	0	0	0	R	S				
Boating	4	3	0	0	0	0	0	R	B				
Waterskiing	4	4	0	0	0	0	0	R	W				
Off Road Vehicling	4	5	0	0	0	0	0	R	V				
Other	4	6	0	0	0	0	0	R	M				
TOTAL VISITS TO REFUGE	0	9	0	0	0	0	0	P	V	54,044			
FISH & WILDLIFE INFORMATION											Per. Sars		
Public Inquiries	5	0	1	0	0	0	0	F	P		2,100		
News Releases	5	0	2	0	0	0	0	F	N				
Personal Appearances	5	0	3	0	0	0	0	F	A		5		
Professional Services	5	0	4	0	0	0	0	F	S		37		
Exhibits	5	0	5	0	0	0	0	F	E		1		
CONTROL TOTALS	9	9	2	0	0	0	0	R	Z				

Region I Station SALTON SEA NWR Date Prepared \_\_\_\_\_

Name \_\_\_\_\_

Form 3-239c  
Rev. 12/75



Hunters were allowed to move from one location to another if a vacant parking space was available at another parking lot.

This method of hunter dispersment dramatically increased the quality of the experience.

Generally, hunter reaction to this new system was good. There were some problems, but in most cases hunters liked the new rules.

A photo blind was installed near the supplemental feeding site in Unit II. Many photographers took advantage of the blind and obtained excellent photos of ducks or geese on the feed zone. Several persons indicated they thought it was one of the best opportunities they had ever had to photograph birds. Demand for this recreational opportunity was so high that we had to start making reservations for use of the blind.



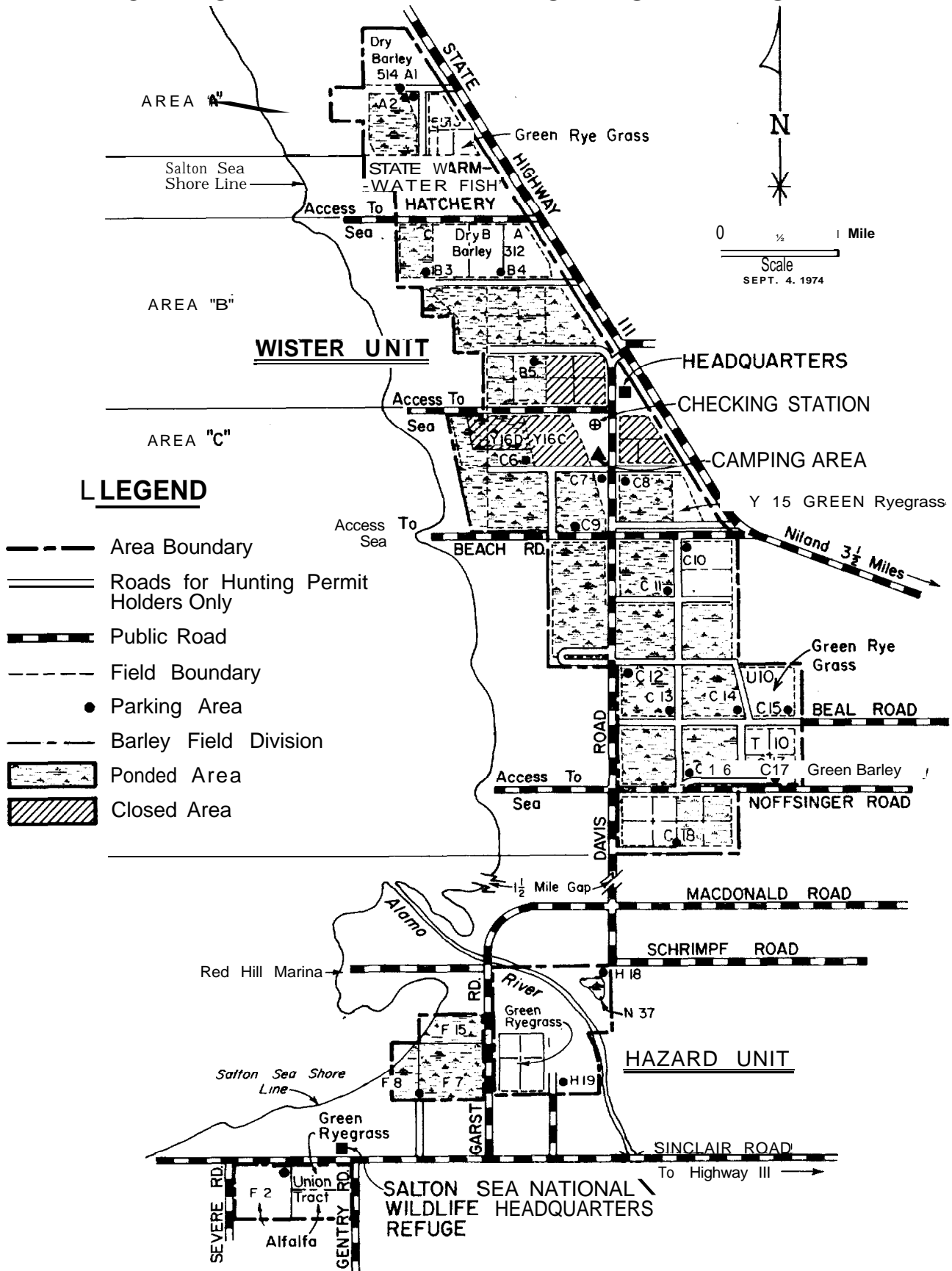
A typical sight from the photo blind installed near the feeding site in Unit II. (D. Tiller, 3-4-76, 135 mm lens)

2. Non-Wildlife Oriented

Nothing to report.

# IMPERIAL WILDLIFE AREA 25.

## CALIFORNIA DEPARTMENT OF FISH AND GAME



STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF FISH AND GAME

GROUND RULES -WISTER UNIT  
OF IMPERIAL WILDLIFE AREA  
1974-75 WATERFOWL SEASON

1. If you have any questions regarding rules, regulations or laws concerning your hunt, contact an area representative of the Department of Fish and Game.
2. All persons using the area (hunters **and nonhunters**) must check in at the checking station on Davis Road.
3. Reservation holders must present their reservations no later than 1-1/2 hours before the daily shooting time.
4. All persons not holding reservations and waiting to hunt must be present at the following headcounts to retain their place in line:

For Wednesday's Hunt - Tuesday, 10:00 a.m. and 8:00 p.m.

For Saturday's Hunt - Thursday, 8:00 p.m. 1 Friday, 10:00 a.m. and 8:00 p.m.

5. Hunters may hold a position in only one line at a time. If you hunt on our area on one day, you must turn in your permit at the checking station before taking a place in line for the following shoot. If you are unable to secure a **permit to hunt before** we reach our **quota, you may** do one of the following, **but not both**:
  - (1) Remain in line for that **same** shoot day and take a chance that you will be able to secure a **permit**.
  - (2) Move into the line for the following shoot day.
6. All permit holders must return their permits to the checking station before leaving the area and not later than two hours after stopping time each day. Failure to return permits will result in a citation being issued. If the checking station is unattended, leave permits in the yellow box on the front counter.
7. You may hunt only in your assigned area and you must park in the designated parking lots. Roads open to entry may be used to drop and pick up decoys if your vehicle remains on the road no longer than 10 minutes. Obey "one Way" signs. On nonshoot days, all area roads, except for access roads to the sea, roads to the fishing ponds and mud pots, are closed.
8. Hunting in the goose fields will be by party only. The entire party must appear together at the check station. Hunters must have decoys (excluding napkins, diapers, newspapers, etc.) to hunt in these goose fields. All blind material must be removed at the end of each day.
9. Conduct your hunt in a sportsmanlike ~~name~~. "Sky-scraping" is prohibited. Do not wear white or other conspicuously colored clothing. Attempt to conceal yourself whenever possible. Hip boots and waders are recommended for hunting in ponded areas. Stay at least 100 yards from other hunters' decoys when passing through to another location.
10. Camping is allowed only in the designated area of the checking station parking lot. Camping requires a daily visitor use permit and is allowed up to a maximum of nine consecutive days. Any trailer left unattended for more than 24 hours will be removed at the owner's expense. Boisterous and loud noises after 10:00 p.m. will not be tolerated.
11. Open fires are permitted only in the concrete rings.
12. Please do not litter your parking area or camping space. No permits will be sold until the parking area is clean.
13. Dogs **must be** kept under control at all times.
14. Loaded guns are not allowed in the parking lots. Your gun must be carried unloaded until you reach your assigned hunting area.
15. During the waterfowl season, the only uses of the area other than waterfowl hunting are fishing and sightseeing and they are confined to Y16-C and part of Y16-D.
16. Any authorized representative of the Department of Fish and Game shall be a judge of your behavior. Unsportsmanlike practices or failure to comply with any of these rules may result in the forfeiture of your permit, loss of your place in line, or the issuance of a citation.
17. Shooting days and hours for waterfowl at the Imperial Wildlife Area and Salton Sea National Wildlife Refuge are as follows:

Date	Day	Start A. M.	Stop P. M.	Date	Day	Start A. M.	Stop P. M.
Oct. 19	Sat.	6:18	6:05	Dec. 4	Wed.	7:00	5:35
20	Sun.	6:19	6:04	7	Sat.	<del>7:02</del>	5:35
23	Wed.	6:22	6:01	8	Sun.	7:03	5:35
26	Sat.	6:25	5:58	11	Wed.	7:05	5:36
27	Sun.	6:26	5:57	14	Sat.	7:07	5:37
30	Wed.	6:28	5:54	15	Sun.	7:09	5:37
Nov. 2	Sat.	6:31	5:51	18	Wed.	7:11	5:39
3	Sun.	6:32	5:50	21	Sat.	7:12	5:39
6	Wed.	6:34	5:48	22	Sun.	7:12	5:40
9	Sat.	6:36	5:45	28	Sat.	7:15	5:44
10	Sun.	6:37	5:45	29	Sun.	7:15	5:45
13	Wed.	6:40	5:42	Jan. 4	Sat.	7:16	5:47
16	Sat.	6:43	5:40	5	Sun.	7:16	5:48
17	Sun.	6:43	5:40	8	Wed.	7:17	5:51
20	Wed.	6:47	5:39	11	Sat.	7:17	5:53
23	Sat.	6:50	5:37	12	Sun.	7:17	5:54
24	Sun.	6:51	5:37	15	Wed.	7:16	5:57
27	Wed.	6:54	5:36	18	Sat.	7:15	6:00
30	Sat.	6:57	5:36	19	Sun.	7:15	6:01
Dec. 1	Sun.	6:58	5:35				

All times are daylight saving time.

area is ideal for such endeavors.

A Special Use Permit was issued to USGS in cooperation with the California Institute of Technology to place a seismic station in Unit I. A network of six seismic stations is being established in the southern Salton Sea area to collect data which will help define currently active fault segments in the area. Hopefully, this data will also provide an important basis for development of earthquake prediction capabilities.

The Environmental Protection Agency has been sampling plants, small mammals and soil on the refuge just north of the San Diego Gas and Electric's geothermal test facility. This collection of data is also for baseline information prior to geothermal development.

#### C. Items of Interest

Large earthquakes were recorded on January 10 and 16, April 16 and 22, and May 27, 1976. A swarm of earthquakes was recorded on April 13, 1976, but no damage was reported. A few items in the office were knocked down but nothing was broken.

Mr. Raymond Ybarra, Engineering Equipment Operator, transferred to Kern NWR in late December 1975 after working at Salton Sea for thirteen years. A going away party was held on December 20, 1975 for Ray and his family.

On January 15, 1976, a group of Canadian Wildlife Officials were given a tour of the State and Federal wildlife management areas in the Imperial Valley. The Canadians were touring waterfowl wintering areas in California.

The sum of \$3,423.43, based on three-fourths of one percent of acquisition cost of refuge lands, and due annually, was presented to the Imperial County Supervisors by Assistant Refuge Manager Tiller on February 3, 1976.

Sections I, D. (1), II, and III were written by Refuge Manager Vehrs. Sections IV, V, and VI were written by Assistant Refuge Manager Tiller. The report was typed and assembled by Mrs. Fischer. She also prepared Section I, D. (2).

Mrs. Fischer was given her 10-year bracelet charm and card at a staff and Safety meeting held on June 28, 1976.

#### D. Safety

Monthly Safety meetings were held during the year. Regional SAFETY memoranda were discussed at meetings as appropriate.

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On June 10, 1976, Mr. Gonzales was injured when the tongue of a land plane he was unhooking from a tractor slipped and fell on his right foot. The foot was broken and the employee was off work for four months.

At the end of the year the refuge had a total of 204 days since a lost-time accident. The previous record was 6,156 days.

C. Enforcement

This year, due to funding, refuge personnel spent less time on law enforcement activities, and there was a slight decrease in apprehended violators.

Dr. Leigh Fredrickson, from the Gaylord Memorial Laboratory, University of Missouri, is under contract to the Fish and Wildlife Service to study the duck club feeding program in Southern California. This is a two year study with the objectives of developing a better understanding of the 'role of feeding-in waterfowl management and defining the federal baiting regulations. Law enforcement, refuge, and research personnel, along with State Fish and Game personnel made many field observations on feeding and non-feeding duck clubs in the Imperial and Coachella Valleys this fall.

VI. OTHER ITEMS

A. Field Investigations

A graduate student from Arizona State University in conjunction with the University of California, Lawrence Livermore Laboratory, (LLL) is studying the ecology of the Yuma clapper rail in the Imperial Valley. This study is being funded by the Energy Research and Development Agency, (ERDA) through LLL, to gather baseline data before geothermal power plants become a reality in the Valley. The Yuma clapper rail recovery team has indicated that they would like to use radio transmitters on some clapper rails for telemetry purposes in monitoring migration, local movements, etc., of this endangered species.

B. Cooperative Programs

Assistant Refuge Manager Tiller attended the Imperial Valley Environmental Project Workshop held at Lake Arrowhead, California, on November 8-11. This workshop was sponsored by the Lawrence Livermore Laboratory and ERDA. The project is concerned with baseline studies on the total environment Valley-wide prior to the development of geothermal power plants.

Assistant Manager Tiller attended a Geothermal Workshop held in El Centro, California on March 23-25. County, State and Federal participants also toured the geothermal facility south of Mexicali, at Cerro Prieto, Baja California.

Earthquake research in the Valley has been increasing each year. A USGS seismic recorder located about one mile southwest of refuge headquarters registers in excess of 90-100 quakes each day. This

area is ideal for such endeavors.

A Special Use Permit was issued to USGS in cooperation with the California Institute of Technology to place a seismic station in Unit I. A network of six seismic stations is being established in the southern Salton Sea area to collect data which will help define currently active fault segments in the area. Hopefully, this data will also provide an important basis for development of earthquake prediction capabilities.

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#### D. Safety

Monthly Safety meetings were held during the year. Regional SAFETY memoranda were discussed at meetings as appropriate.

On June 10, 1976, Mr. Gonzales was injured when the tongue of a land plane he was unhooking from a tractor slipped and fell on his right foot. The foot was broken and the employee was off work for four months.

At the end of the year the refuge had a total of 204 days since a lost-time accident. The previous record was 6,156 days,