

SAN LUIS NATIONAL WILDLIFE REFUGE  
LOS BANOS, CALIFORNIA

NARRATIVE REPORT

January 1 to December 31, 1968

UNITED STATES DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU SPORT FISHERIES AND WILDLIFE  
LOS BANOS, CALIFORNIA

SAN LUIS NATIONAL WILDLIFE REFUGE

P. O. Box 2176

Los Banos, California 93635

REFUGE PERSONNEL

Leon C. Snyder. . . . .	Refuge Manager
Stephen R. Vehrs. . . . .	Assistant Refuge Manager*
Ann M. McConnell. . . . .	Clerk-typist
James R. Mayle. . . . .	Maintenance Foreman I
Melvin Ford . . . . .	Maintenanceman II
Dave W. Mitchell. . . . .	Laborer**

\*Duty period - E.O.D. June 16

\*\*Transferred March 3, McNary N.W.R.

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## I GENERAL

### A. Weather Conditions

The following weather information was recorded at the San Luis Dam weather station located 12 miles west of Los Banos. This facility is administered by the Bureau of Reclamation in co-operation with the U.S. Weather Bureau.

January: Thirteen days of moderate to very dense fog and thirteen nights with below freezing temperatures occurred in January. Light to moderately heavy showers were recorded on the 10th, 15th, 27th, and 30th. Precipitation as a whole for January was considerably below normal, only .96 inches compared with 3.06 inches during January 1967. Days were predominately cloudy or overcast and the mean temperature range was below normal.

February: Above normal temperatures prevailed throughout the month with considerably below normal precipitation. The average precipitation through the end of the month was 6.04 inches compared with this season's 4.49 inches. There were fourteen days of fog this month; many more foggy days than during past years.

March: Precipitation for March totaled 1.00 inches, bringing the season total to 5.62 inches by March 31. Normal for this date is 7.35 inches--last year to this date we had 8.05 inches. Temperatures for the most part were above normal, especially the last ten days. Skies were mostly clear except for storm periods.

April: The month was very dry and windy with only .24 inches of precipitation. Except for a few warm days, temperatures ranged below normal.

May: May continued dry and windy with .04 inches of precipitation and 6994 miles of wind. Precipitation since January 1 was only 3.45 inches as compared with 7.02 inches for the same period in 1967. With the exception of the last week of May, mean temperatures ranged considerably below normal and were cooler than May of 1967.

June: Temperature from June 5 to 10 ranged from the high 60's to the low 70's, well below normal, but the remainder of the month was above normal averaging out at 73.73, 4.3 degrees higher than June 1967. While there was only one day of 100 degree temperature at San Luis Dam, the Fresno station recorded 13 days between 100 and 108 degrees.

July: July, with 7243 wind miles, appears to be the windiest month of the year, and the highest wind recorded since we took over San Luis, while July of 1967 had 6058 miles recorded. The high daytime temperature for the month was recorded on July 6 at 104 degrees. The evenings have been cool this month with the low being 47 degrees on the 16th. No precipitation was recorded by the weather station at the San Luis Dam; however, a trace was noted on July 29 at the refuge. The recorded evaporation rate was +20.07 inches, slightly less than last July's +20.68; this is obvious when one observes the low water levels in some areas and no water in other areas of the marsh.

August: The average monthly temperature for August was 10 degrees cooler than a year ago, which accounts for the decrease in evaporation rate; this again was apparent in the marsh since water levels started to raise.

September: The month of September brought with it slightly cooler temperatures and an increased wind record over the same period last year. At this time local residents were predicting an early and wet fall and winter.

October: The mean monthly temperature for October was calculated at 64.45 degrees: three and a half degrees cooler than the same month last year. The recorded rainfall was near normal; however, slightly greater than the past few years. The first recorded rain of the season at the San Luis Refuge was on October 13, followed by the first dense fog of the season on October 14.

November: November was a wet, cool month. More rain was recorded in Los Banos and Fresno than has fallen this early in the rainy season for the past 65 years. The last half of the month was somewhat cooler than the first half, and frost occurred several times during the month.

December: Rain and fog continued to be the prevailing story throughout the month.

## B. Habitat Conditions

### 1. Water:

Water used in the initial flooding and maintenance of marsh and pond areas, and water used for irrigation of refuge crops is pumped from Salt Slough at two locations along the west boundary of the refuge. When San Luis Refuge was purchased in early 1967 a Salt Slough water right of 91.9 c.f.s. came with the purchase price.

## 1968 CLIMATOLOGICAL OBSERVATIONS

Month	Precip.	Normal Precip.	Evaporation Inches	Wind Miles	Max. Temp.	Min. Temp.	Mean Monthly Temp.	Normal Mean Monthly Temp.
January	.96	1.67	+00.60	1789	63	25	43.74	45.2
February	1.21	1.39	+00.87	1680	74	37	55.13	50.2
March	1.00	1.31	+04.26	2829	84	43	58.11	54.7
April	.24	.76	+10.58	5086	89	41	61.53	60.4
May	.04	.37	+14.02	6994	91	43	64.70	66.5
June	0	.06	+18.82	7157	100	49	73.73	72.8
July	0	.01	+20.07	7243	104	47	78.00	78.6
August	0	.01	+15.16	6327	100	53	73.62	77.1
September	0	.13	+12.42	5591	99	46	72.58	72.9
October	.48	.40	+06.36	3291	82	48	64.45	64.3
November	1.65	.98	+01.15	5748	71	32	53.12	53.4
December	<u>1.87</u>	<u>1.47</u>	<u>+00.11</u>	2031	66	27	45.00	46.4
Total	7.45	8.56	+104.42					

Salt Slough is actually a drain for a complex series of irrigation systems south of the refuge. The quality of water found in Salt Slough is low by irrigation district standards; however, at this time, it is adequate for our needs as water for wildlife. A program to check the quality of water entering the refuge should be initiated in the near future. Problems could very possibly arise from mineral build-up and pesticides entering with refuge water supply.

Since our water source is found on the west boundary, and the highest elevation point is found on the southeast corner of the refuge, and the natural fall of the land is northwest, it is necessary to lift the water 20 feet across our south boundary by means of a canal and three low lift pump stations, with two pumps at each station. Lift from the slough into our service canal is ten feet. The two additional pairs of pumps, located at points in the service canal farther east, each lift water an additional five feet. From the eastern-most lift station flow is by gravity to use areas.

Both pumps at Lift Station No. 1, in the southwest corner of the refuge, were in very bad shape when the refuge was established and were completely abandoned by the end of 1967. This meant that no water was entering the lift canal. During January, a 2500 g.p.m. portable diesel pump operated about one week until the small lift pump could be temporarily repaired. The temporary repairs lasted another three weeks. In the meantime, money was set aside for the purchase of a new 13,500 g.p.m. pumping plant to replace the large pump which was beyond repair. We struggled along with the small pump, capable of lifting only about 5,000 g.p.m., for most of the year, pulling and repairing it numerous times, until the new pump was installed in late September. The small pump alone was capable of furnishing only minimum water maintenance requirements during the low evaporation months.

We receive varying unmeasured amounts of waste irrigation water directly into our east-west lift canal. This comes from private agricultural lands south of the refuge. Flows are often quite substantial during heavy irrigation periods.

Water is also pumped from Salt Slough near the northwest corner of the refuge. This pump is capable of delivering 9,000 g.p.m. into Deadman Slough, a holding reservoir. Water from Deadman is pumped into the marsh by an additional pump, again the total lift being approximately twenty feet.

Water throughout the marsh was maintained at desired levels through March due to low evaporation and the variety of small water sources. However, in April water levels started to drop because of insufficient pumping capacity.

Repair and rehabilitation of 1800 feet of levee along the south side of Moffet Field in the north end of the refuge during the latter part of May made it possible to raise water levels in several pond and marsh areas in this section of the refuge. However, water in the remainder of the marsh stayed fairly constant, but was below desired elevations.

The flow in Salt Slough decreased steadily throughout May. On a few occasions it was so low that Lift Pump No. 1 would suck air. Also, the flow at the confluence of Salt and Deadman Sloughs was so low by May 25 that Pump No. 5 had to be shut off. We felt that if the sand bars at the entrances to both pumping sites were cleaned out the flow might be great enough to be utilized. This was accomplished in mid July and alleviated the problem. This will probably remain a problem in future years and it would be desirable to have it included in a routine bi-annual maintenance procedure.

Time and experience will give us a better picture of the Salt Slough situation; however, it is evident that the flow in the normal year will be low during May, June, and July, and again just prior to the waterfowl hunting season when the private duck clubs to the south of the refuge draw water from the slough to fill their ponds.

At present, with the installation of the new 13,500 g.p.m. pump at Lift Pump No. 1, we have the capability of pumping a maximum of approximately 62.4 c.f.s. from Salt Slough while our present water right remains at 91.9 c.f.s.

It is foreseeable that if we do not increase our pumping capacity in the near future, our water rights may be contested by other interests who also pump from the slough.

We experience many more problems other than just getting the water pumped into our lift canal and reservoir and getting it started to flow into the marsh. The marsh levels are manipulated by a maze of small wooden, concrete and metal control structures which are in dire need of replacement and repair.

The field force at San Luis with their "Yankee ingenuity" deserve enormous credit for keeping the water contained and manipulated with so many problem structures facing them day after day.

Funds were made available for rehabilitation of the east-west lift canal along the south boundary, and work was begun in July. Both sides of the levee were raised for an increased flow, and approximately 18 structures were installed for water delivery to the marsh areas north of the canal. Also, screw canal gates and pipes were installed to irrigate and pond two fields on the east end of the canal. More detail of this work will follow later in the report.

Enough of the rehabilitation work was completed by the beginning of the waterfowl hunting season to allow for ponding of water in both the open and closed hunting areas.

Early rains in October and November added to our water supply, and by year's end San Luis had more water ponded than any time since the refuge was established.

Annual summary of water use indicated a total of 17,400 acre feet on approximately 2700 acres, or 6.4 acre feet per acre. I feel that in future years, after development progresses, this 2700 acre figure can be increased to 3500 to 4000 acres, and the area can be returned more closely to the natural marsh situation reminiscent of "early" days in the San Joaquin Valley.

## 2. Food and Cover:

The normal growing season in this part of the country starts about the middle of October with the fall rains. The primary grasses and legumes grown in the area, other than native bromes, salt grass and clover, are barley, wheat and alfalfa. These plants offer an abundance of green browse for ducks and geese wintering outside refuge lands. The irrigation season starts about the middle of April, depending on how much moisture is retained from the preceeding winter rains.

During January on San Luis, upland grass growth was slow due to below normal rainfall and excessive freezing weather. The carryover of old grass gradually diminished due to heavy grazing by cattle. However, in February, warm weather coupled with foggy days and several fair to good rains were conducive to good upland grass growth. Range lands remained in a beautiful green state throughout March but did not provide the quantity that early 1967 produced.

In February a noticeable growth of marsh immergents such as cat-tail, hard-stem bulrush, and spike rushes produced lush young

shoots which were quickly consumed by some eight to ten thousand snow geese foraging on San Luis. As the immergent plants continued to grow and become rank, their importance as a food source diminished.

Sixty acres of volunteer barley growing from a crop harvested in 1967 produced a good stand, and was moderately utilized in the green browse stage by geese. As a mature field it became a feeding and loafing site for some 2,000 to 3,000 sandhill cranes during the late fall. Late in December the field was ponded as winter food for waterfowl, and drew over 100,000 pintail and mallards during the initial days of flooding.

All upland grasses matured by the end of April. It is surprising to note that in spite of winter and spring drought conditions, the density of upland grasses looked much better, after the full growth was obtained, than was anticipated earlier in the growing season. During April, the shoreline vegetation which surrounded ponds with receding water levels remained green but was being heavily utilized by cattle.

Reduced cattle use, compared to the summer and fall months of 1967, alleviated the possibility of over-grazing. Heavy cattle use was not increased until early December.

Nesting cover throughout the refuge was adequate during the nesting season, and food sources for the ducklings were abundant.

During July, 115 acres of wild millet, Echinochloa crusgalli sp., was broadcast seeded onto two contoured fields. These fields matured by early October and served as feeding and escape cover for pheasants and quail. These two fields will be kept dry until January 1969, when they will be flooded for winter feeding for waterfowl.

The marsh at San Luis is practically void of any submergent aquatics. In fact, due to uncontrolled cattle use on the refuge, our immergent plants produce practically no seed heads. The previous owner of the land has maintained the grazing rights on the area for a period of five years after the refuge was purchased. The cattle keep the valuable low immergent food sources cropped. Aquatics such as rush Juncus balticus, smartweed Polygonum spp., spikerush Eleocharis spp., alkali bulrush Scirpus paludosus, and several other cypresses are found at San Luis, and are under the control of the grazing cattle.

Cattails remain as a problem throughout the marsh. These plants have become so dense that unless control methods are initiated within the next two years, major waterfowl use areas will be completely choked up except for the centers of the deepest ponds. It is anticipated that a biological control plan will be submitted and augmented starting in early 1969.

## II WILDLIFE

### A. Migratory Birds

#### 1. Waterfowl:

##### (a) Swans:

Whistling swan use at San Luis started earlier this year than in 1967. Nine swans were observed loafing on the closed area of the refuge on November 13, a waterfowl shoot day; one full month earlier than last year. By year's end, the number using the area had built up to 25 birds. From January through the first week in March, the swan use averaged about 50 birds with the peak of 70 birds on February 15. These birds are usually seen loafing and tipping in the shallow ponded areas on the refuge. I am certain these birds move back and forth quite often between San Luis and Merced Refuges. Nine swans were shot at San Luis this year, and two of the violators apprehended accounted for four of the swans. In comparison, only one casualty was found last year. The birds had completely left the area by March 15.

##### (b) Geese:

The first white geese reported this fall started arriving the second week of October, slightly earlier than last year; however, they evidently moved through the area because none were seen again by either Federal or State personnel until the second week in November.

Small numbers of white-fronts started arriving by the end of October, soon followed by the cacklers. Large Canada geese arrived in the same numbers and on approximately the same date as in 1967; twenty-five the week of November 24-30. Heavy goose use on San Luis does not start until about the first of January, but there are several thousand geese in the area before this. They loaf and feed primarily on private land, and fairly large concentrations use the Merced NWR prior to January 1.

During early 1968, the total number of geese peaked in mid February at 36,000. These were made up of snow, cackling, white-fronts, Ross and large Canada geese in that order of decreasing abundance as shown in NR-1. We were able to find approximately 1200 Ross geese mixed in with the snows.

Geese at San Luis use the area for both feeding and loafing; however, most of the feeding is carried out in mornings and evenings on private agricultural lands surrounding the refuge on all four sides. These private areas are made up of permanent pasture, native pasture, green cultivated barley and alfalfa which serve as excellent feeding areas. Pressure thus far has not been concentrated enough on one individual's land to create depredation problems. Hunting pressure surrounding the refuge so far this year has forced more use within refuge boundaries, and I would anticipate this pressure to increase. Even though the surrounding area provides more preferred foods for the geese, San Luis has an abundance of natural grasses and this year has 55 acres of green barley which has thus far been used extensively.

During the period of large concentrations of geese, the snows and Ross seem to remain on the refuge areas to feed while the dark geese fly out in search of food.

(c) Ducks:

Duck numbers in January 1968 dropped considerably from the peak of 493,000 birds using the area during the preceding November. Numbers declined from 123,500 to approximately 13,000 by the end of January; most of these being mallards, pintail, green-wing teal, baldpate and gadwall. The reason for this decline was the ending of the waterfowl hunting season in early January and the dispersal of ducks back into the grasslands of the western San Joaquin Valley. We did experience a modest increase in duck use during February and March as the duck clubs in the grassland area drained their pond areas and as ducks were pushed off private land during coot depredation shoots.

Courtship activities by mallards, pintails and shovelers were evident by mid February with quite a few pairs already mated up. It is also interesting to note that a good percentage of mallards were already paired off throughout the waterfowl hunting season starting as early as late September.

By the end of April, duck populations dwindled down to approximately 3500 birds. This may give an indication of the breeding population using the area. Mallards and pintails were starting

nesting activity and shovelers, green-winged and cinnamon teal were pairing off. Two pairs of wood ducks were observed along the wooded slough immediately north of the refuge headquarters. Since there were later sightings, these ducks apparently nested in that location.

The predominant nester at San Luis is the cinnamon teal, followed by the mallard and gadwall. Throughout the month of April considerable breeding activity was observed, and the first mallard brood of two ducklings was observed the last week of April.

Primary nesting occurred in the Moffit Field and Big Lake areas west and north of the main Dickenson Ferry Road. The nesting cover in that area was more than adequate. This is possibly deceiving since other areas on San Luis are heavily choked up with cattail and hardstem bulrush and consequently broods are very hard to census.

Production figures show approximately 30 percent less on-wing production during calendar year 1968 compared to last year as indicated on NR-1. A number of factors account for this. First, the San Joaquin River, bordering our east boundary with levees extending well into the refuge, was at flood stage during early 1967. Water levels remained high throughout the nesting season, and made excellent nesting habitat on the maze of exposed islands and pieces of high ground. Many broods were observed using these areas. Also, the amount of water in the northern San Joaquin Valley was higher than usual due to excess run-off, therefore, holding more nesting birds in the general area. San Luis Refuge had more water and maintained higher levels throughout the marsh area in the summer of 1967 than was maintained this year.

We are anticipating a good production year for 1969 since we will try to maintain many of the units which are now flooded for the winter waterfowl use. This will be accomplished if our pumps and water management facilities hold up.

I do not foresee San Luis Refuge as ever having a tremendous nesting potential because of its location. The native cover and habitat which we do have is far above average, and we will certainly do all that is possible to encourage maximum nesting potential and brood survival from the area.

Migrant pintails started arriving at San Luis the third week in September when numbers increased from 300 to 3350 with mallards and cinnamon teal influxes not far behind. The birds remain

dispersed over the surrounding grasslands area until the opening of the waterfowl hunting season in mid October. Numbers in our closed area jumped from 10,000 to 160,000 in a ten day period with the predominant specie being the pintail. By late November total duck numbers increased to 280,000; again, predominantly pintails.

On shoot days throughout the waterfowl season ducks loafed in the closed area during the day and spent the nights in the food producing areas of the valley and on several clubs which maintain waterfowl food units. On extremely windy days, ducks would be seen flying in from the many reservoirs and large bodies of water in the northern part of the valley to spend the day at the refuge. Total duck numbers by year's end remained about 223,500.

(d) Coots and Gallinules:

Coot and gallinule use at San Luis averages approximately a million use days annually. The breeding population this year was about normal; that is, 500 birds with successful production of about 700.

The migration buildup of coots and gallinules was noted in mid September; however, heavy use on San Luis takes place during late December, January, February, and March. Young grasses are plentiful throughout the refuge and the birds are pushed in from surrounding areas by depredation shooting at this time. Although coot concentrations make up the majority of the birds, gallinules are well represented.

It is interesting to note the increased interest taken in coots as a table bird by many waterfowl hunters. Many hunters this year bagged their limit and used the various recipes available to cook the birds. I feel that this is a resource which should be promoted as being desirable for a table bird since yearly harvesting of the surplus would enhance waterfowl management practices.

2. Water and Marsh Birds:

One could walk through any part of the marsh while at San Luis during any time of the day or year and find several species of marsh and water birds utilizing the habitat. Such birds as the common and snowy egrets, great blue herons, black-crowned night herons and the American and least bitterns as well as the Virginia and sora rails are common.

This year we noted a marked increase in sandhill crane use. The first cranes were observed using the area on September 22, and

most have generally departed by mid March. During last year a peak of 2,000 used the area occasionally. This year's population reached 5,000, and most of these used the area consistently. We flooded some new ground during our lift canal rehabilitation project and crane use picked up immediately in that area. Cranes were seen using the mature volunteer barley regularly during October and November. When the green shoots in the new barley field started appearing, the cranes kept them cropped. These birds use the surrounding agricultural lands as well as the refuge.

Approximately 500 pelicans, of which several were marked with wing streamers, used the Moffit Field, Big Lake and Loaf Lake areas during the summer and fall months. The marked birds were reported to have been banded at Anaho Island, Lower Klamath and Clear Lake. Several of these were first year birds. The pelicans were seen several times on the open bodies of water eradicating some of our non-game fish.

Scattered reports of white-faced ibis sightings were reported as early as late August, but the peak concentrations do not occur until late December and January as reported in the NR-1A.

The water and marsh bird populations at San Luis find an abundance of food and cover available, and for this reason, San Luis will always offer the bird watchers an excellent opportunity for year-round enjoyment.

### 3. Shorebirds, Gulls, and Turns:

Both the California and ring-billed gulls are year-round residents at San Luis with periodically increasing and decreasing of their numbers. San Luis is approximately 65 air miles from the Pacific coast, and is located near several large water bodies here in the valley. Often, during the winter months, the gull population fluctuates between 100 and 5,000 birds depending upon food availability and storm conditions in our area as well as off shore.

Killdeer are abundant any time of the year, especially during the summer months. One can seldom drive a mile stretch of the refuge without seeing five to ten nesting killdeer during late spring and summer.

Both avocets and black-necked stilts are nesting residents during the summer months, and several avocets remain throughout the winter.

Although efforts were not entirely concentrated towards determining the number of shorebirds produced this year, we feel the figures

shown in NR-1a are quite accurate. As development of San Luis broadens and the habitat for production of waterfowl increases, the other categories of birds will also be benefited.

#### 4. Doves:

Dove use at San Luis this year was not as spectacular as 1967. During late September of last year 10,000 mourning doves were recorded using the refuge. Because of cooler temperature averages and less abundant sun flower and thistle plants, dove use peaked at a mere 1,000 birds this year.

Abundant dove nests were found both in trees and on ground this year. While preparing Fields C and D for wild millet planting during the summer, several nests were destroyed.

The mourning dove is abundant at San Luis primarily during migration and nesting season with some remaining year-round. We, therefore, have an excellent opportunity for clubs and scout groups to make and install dove nesting cones along our many tree-lined water courses.

#### B. Upland Game Birds:

Both the ring-necked pheasant and the California valley quail are found at San Luis. The refuge offers the ring-neck 2500 acres of cover vegetation, but the birds seem to be concentrated into only a small percentage of that available.

Most of the estimated 400 pheasants using the refuge are found in the southeast corner near the 270 acres of millet and barley where cover, food and water sources are at easy reach. Total numbers of pheasants using the refuge during 1968 were somewhat less than last year's estimate.

Climatic conditions were favorable for a good hatching success this year. A concentration of red-tailed hawks and coyotes in this small acreage accounted for a few loses. Pheasants in the surrounding area were observed nesting earlier as well as later than normal accounting for an excellent production year.

California valley quail use at San Luis has increased this year because of increased cover along Salt Slough and the San Joaquin River, as well as the many meandering sloughs which run through the refuge. Although only five broods of quail were observed this year, we felt this is a significant sign that quail will remain to benefit the future visitors of San Luis.

C. Big Game Animals:

Not applicable to San Luis Refuge.

D. Fur Animals, Predators, Rodents and other Mammals:

In order to fulfill basic refuge objectives, it certainly is desirable that we strive for maintenance of a substantial representative sample of all animals native to the refuge and surrounding area. Hearing the mournful howl of, or seeing a roaming coyote at dawn; the sight of a muskrat swimming across an open pond with a mouthful of vegetation for his house or for food; or even the chirping of the poker straight ground squirrel as he sits at the mouth of his burrow; all offer an abundance of public enjoyment for both recreation and study. Preservation of these and other animal species certainly is necessary to preserve the biota indigenous to the San Joaquin Valley.

A specie of furbearer which is observed less and less frequently in the interior valleys of California, affected by expanding human population, is the wary coyote. Since San Luis contains habitat conducive to the coyotes existence, this specie has received incidental benefits and thus has remained and flourished. Through refuge protection, the numbers of coyotes have tripled during the past year.

An animal management and control program has been submitted and approved this year; therefore, we will keep all numbers in balance with management objectives.

State trappers were called in this fall to trap coyotes on private range land bordering our north boundary. They took 26 of the animals over a six week period. This is a substantial number considering that the refuge population is approximately thirty.

Muskrats and ground squirrels remain our major problem animals at San Luis. Burrowing activities in our levees and dikes have caused terrific problems in controlling our water during 1968. We hope to harvest a minimum of 1,000 muskrats through a winter trapping program and lessen our ground squirrel problems with the use of anti-coagulant bait boxes in early 1969.

Skunks, badgers, possums and racoons were observed on a few occassions, and signs indicate that we do have a fairly large number of these animals present. Both the cottontails and black-tailed jack rabbits are abundant throughout the area, with numbers being held in check by coyotes.

E. Hawks, Eagles, Owls, Crows, Ravens, and Magpies:

Red-tailed hawks are very abundant year-round on the refuge as well as the surrounding area. During the nesting season, it was not uncommon to observe 40 to 50 red-tails sitting in trees and along power poles, as well as circling overhead during waterfowl brood census trips. Production of both red-tails and sparrow hawks is quite substantial on the refuge. Several marsh hawks can also be observed during a tour of the marsh areas.

Two golden eagles were observed using the refuge this year during December.

White tailed kite sightings were more numerous this fall than last year as well as Swainson's hawks. Great horned owls were quite frequently observed, with some nesting activities taking place.

F. Other Birds:

Red-wing, tri-colored and Brewer's blackbirds are year-round residents; however, this year heavier than normal concentrations were evident from late August through December. Heavy blackbird use accounted for approximately 25% loss to the mature millet crop. During November, millions of the rascals used the heavy cattail stands throughout the marsh as a roosting area after feeding on surrounding agricultural crops.

G. Fish:

Fishing season at San Luis opened on January 8 and lasted until the opening of the waterfowl hunting season on October 19. Fishing was allowed in Salt and Deadman Sloughs only. (Refer to fishing map). The San Joaquin River and the interior marsh areas were closed due to undeveloped public access roads and waterfowl nesting activities.

Fishing interest catapulted as soon as publicity was released on the opening of the refuge to public fishing. Prior to the establishment of the refuge, the area was unavailable for public fishing and only privileged people were allowed on the property. Good catches of catfish, striped bass, crappies and sunfish were made. One 29 pound channel cat was reported taken in Deadman Slough during the latter part of February.

Fishing pressure and success picked up during March and many very good catches of crappies were made. During April, a 13 pound catfish was taken by Foreman Mayle and son, along with several 3 to 4 pound cats.

Deadman Slough contains a very large population of Sacramento blackfish, Orthodon microlepidotus, as evidenced by gill-net sets made on May 10 by the Wildlife Services representatives working on pesticide studies. Also taken were large numbers of crappies, blue gills, bullheads, striped bass and black bass.

We have a substantial warm water fishery on the anadromous striped bass during January, February, and march in Salt Slough, which empties directly into the San Joaquin River. These fish are also found throughout the marsh and in sloughs and canals running through the refuge. They were evidently sucked through the pumps into supply canals as fingerlings, and are now land locked.

Conditions at San Luis are not unlike many other refuges which experience carp control problems. We do not know exactly how great the problem is at present; however, the numbers of carp in the canals and throughout the marsh are staggering. I feel that these carp play a dramatic role in keeping the submergent aquatic plants from growing on the refuge. I also feel, however, that it will take much more than carp control to establish submergent aquatics.

#### H. Reptiles:

Certain types of snakes, turtles and lizards are present and will be included in next year's narrative report.

#### I. Diseases:

No indication of any disease at San Luis this year.

### III REFUGE DEVELOPMENT AND MAINTNEANCES

#### A. Physical Development:

San Luis received no funds for physical development during the period covered by this report, and none will be available in the foreseeable future; however, some money was delegated for rehabilitation work from Operation and Maintenance funds.

Rehabilitation projects during 1968 include:

- (1) Replacement of worn-out lift pump at Lift Pump Station No. 1 with a new 13,500 g.p.m. pumping unit.

(2) Rehabilitated and enlarged three miles of existing water supply canal along south boundary of refuge, and widened north levee to 16 foot top for use as visitor tour route.

(3) Installed approximately 20 water control structures in lift canal and placed 550 cubic yards of riprap around these structures.

Maintenance:

1. Cleaned three sets of trashracks daily when supply pumps were in operation and serviced five sets of lift pumps.
2. Major repair to .25 mile of boundary fence.
3. Pulled small lift pump at Lift Site No. 1 four times to facilitate repair.
4. Performed all minor repair, adjustments and preventative maintenance on all refuge equipment.
5. Maintained grounds around buildings at refuge entrance.
6. Installed two mercury vapor lights; one at refuge headquarters and one at the hunter check station.
7. Cleaned out and made repairs to approximately 40 small wood, concrete and metal pipe water control structures. Most of these will need replacement in the near future for continued use.
8. Posted fishing area.
9. Raized old hunting cabins in southeast corner of refuge.
10. Made approximately 25 signs and put out in public use areas explaining public use regulations and directing visitors to public use areas. Also put up 20 litter violation signs.
11. Bladed public use roads and trails twice (16 miles).
12. Constructed a pamphlet display rack for refuge office.
13. Knocked down old 5,000 gallon fuel storage tank and concrete supports at old ranch buildings, and moved same to badly erroded site along lift canal to check drainage flows from further erroding canal bank. Dozed in fill to repair erroded area.

14. Cleaned up all old timbers, posts, wire and other debris at old ranch building site and leveled site with dozer.
15. Installed two wire gates in fence lines where these were replaced with cattle guards to facilitate moving cattle to and from grazing units.
16. Assembled and put three large refuge recognition and refuge informational signs at refuge headquarters and hunter check station.
17. Spent 970 hours on cleanout and enlargement of three miles of lift canal. Removed brush and trees, dozed off vegetation from crown of north and south levee and hauled approximately 1500 cubic yards of fill by refuge dump trucks.
18. Removed and repaired flap gates on seven of the lift pump discharges several times during the year.
19. Emptied garbage containers weekly during fishing season.
20. Posted public hunting area as well as closed waterfowl area.
21. Repaired hundreds of muskrat and ground squirrel holes numerous times in dikes and water control levees.
22. Surveyed and pushed up five miles of water control levees in millet Fields C and D.
23. Constructed and placed 15 redwood irrigation boxes in millet Fields C and D.
24. Constructed 1.5 miles graded and crowned road from Dickenson Ferry Road westward towards Salt Slough fishing area.
25. Dozed, graded, and crowned six miles of road on top of lift canal bank and sanded portions of same prior to rehabilitation.
26. Rehabilitated additional 1.5 miles of road to fishing areas by grading and crowning a 20 foot wide road surface.
27. Continued on with two miles of public use road to Pump No. 5, thence along east side of Deadman Slough to Pump No. 4, continuing southeastward to connect up with Dickenson Ferry Road at hunter parking lot No. 1.
28. Rehabilitated 1800 feet of levee on south side of Unit No. 2 (Moffit Field) 3 feet high by 12 foot top with 1.5:1 foot slopes.

29. Raized horse barn at interior set of ranch buildings.
30. Rehabilitated old bridge across San Luis Drain No. 1 for fishing access to southern portion of Salt Slough.
31. Dozed out one mile of roadway along southern end of Salt Slough for fishing access.
32. Constructed cat-walk at Lift Pump No. 2 for cleaning out trashracks. (Safety measure.)
33. Installed four cattle guards on temporary treated timber foundations in visitor access road throughout refuge.
34. Plowed, disced and seeded 115 acres of wild millet and 55 acres of barley.
35. Installed protective roll bars on International 500 tractor.

B. Plantings:

1. Aquatics and marsh plants:

Nothing to report.

2. Trees and shrubs:

Nothing to report.

3. Upland Herbaceous Plants:

Nothing to report.

4. Cultivated Crops:

In the southeast corner of San Luis Refuge are found five fields totaling approximately 260 acres. These fields were originally developed by the former land owners and used primarily to grow barley. However, other crops such as sugar beets and milo have been grown in the past.

Field B, consisting of 60 acres, contained mature barley during the summer of 1967 and was harvested by the prior owner. This field was left to volunteer in 1968 and after two irrigations during March and April respectively, produced a substantial crop. This field was used heavily by sandhill cranes, as well as pheasants, during the early fall. In December the field was flooded for waterfowl use. This field will be converted to wild millet in 1969.

Fields C and D, containing 35 acres and 80 acres respectively, were seeded to wild millet this year and produced good stands. These fields were plagued early by heavy blackbird use, and a 25% loss of seed resulted. These two fields will be flooded in January 1969 for winter waterfowl use.

Since Fields C and D took more time to prepare for wild millet planting than was anticipated, Field E, which was originally scheduled for millet planting during 1968, was planted to barley during October. This field will serve as winter browse for waterfowl and will be held over to produce a mature crop in 1969 if use as a browse crop is not too severe. If it does not survive browsing use, the field will be converted to wild millet during May or June. Field A will also go into wild millet during 1969, and plans call for all five fields being converted to millet by the fall of 1970.

C. Collections and Receipts:

1. Seed or other propagules:

During May, 5680 pounds of good quality wild millet, Echinochloa crusgalli, was purchased from Farmer's Rice Growers Cooperative in Dos Palos, California, at \$42 per ton. This seed was bought in combination with rice screenings, alkalie bulrush and smartweed seed; however, the bulk of the seed was wild millet.

During October approximately three tons of excellent quality smut treated barley seed was transferred from Merced Refuge to San Luis for seeding of Field E. The seed was treated with DuPont Ceresam M, a mercurial seed disinfectant, at the rate of two ounces per bushel.

2. Specimens:

Nothing to report.

D. Control of Vegetation:

The only control to report this year was hand tool control of cattails, hard-stem bulrush, and weed and grass growth around control structures and localized areas of water distribution system.

E. Planned Burning:

Nothing to report.

#### F. Fires:

There were two wild fires on refuge lands during 1968. Because of dense upland grass cover this year, coupled with the hot dry weather of summer and early fall months, the hazard of wild fires on grasslands was high. Increased use by fishermen and other refuge visitors during the high fire danger period, and the lack of radio or telephone communications from the refuge complicate the potential fire danger.

Containment of fires in hazard areas would not be too difficult to hold to localized areas, as they are between ponds and sloughs with wet and green border areas during most of the year.

On April 17, a 40-acre wild grass fire in the northwest corner of Unit 2, caused by high winds blowing down a 70,000 volt bulk power line, was contained within the natural barriers of ponds and wetlands and burned itself out.

On July 19, while burning vegetation from the south canal bank of the east-west lift canal, high, shifting winds caused the fire to jump a canal, and burn approximately 20 acres before refuge personnel could get equipment in to contain the fire.

### IV RESOURCE MANAGEMENT

#### A. Grazing:

Due to below normal rainfall last season, native range grass growth was much shorter than in 1967. Grass growth gained on consumptive use through March; however, in April the lack of rain, together with sunny days and drying winds, began to stunt range conditions.

Cattle kept grasses from returning until late November in areas of normally poor vegetative growth where sandy and alkaline conditions persist. Surprisingly, other areas in the marsh sustained heavy grazing during all of the hot months and still show an abundance of heavy grass growth at year's end.

San Luis remains saddled with a special use grazing permit allowing the previous land owners to graze a maximum of 700 animals from April 1 to October 31, and 1200 head from November 1 to March 31. This permit, which went along with the sale of the land, does not expire until December 31, 1972. Until this date, we have very minor control over grazing practices other than excluding grazing from our wild millet fields.

Under the special use permit, the permittee used 9,685 animal use months. The maximum he could have used was 10,900.

A serious problem does exist between livestock and wildlife in the marsh areas at San Luis. Due to concentrated grazing in the shallow water areas, waterfowl food plants such as Juncus spp. and Eleocharis spp., which are very abundant, are consumed before seed heads are completely formed. Even submerged aquatic plants which are found in the shallow areas are pulled out by their root systems, and therefore provide no benefit to waterfowl. An enclosure in a sizable area would benefit investigative studies to show how dramatic this conflict is. Information gained would benefit management practices in the year 1973.

## V FIELD INVESTIGATION OR APPLIED RESEARCH

### A. Progress Report:

Wildlife Research investigators, headed by James O. Keith Research biologist, initiated pesticide research work on shore-birds, primarily American avocet and black-necked stilts. Pesticide investigations are scheduled to continue next year.

The following specimens were collected for residue analysis. The analyses are not completed yet.

30 Black-necked stilts  
40 American avocets  
40 Invertebrates

Fish from Deadman Slough were sampled by Wildlife Services personnel from Reno, Nevada, for possible pesticide involvement.

## VI PUBLIC RELATIONS

### A. Recreational Uses:

Public recreational use at San Luis continues to increase. During the non-waterfowl hunting season fishing pressure along Salt and Deadman Sloughs took top honors. The total number of users was over 8,000.

Waterfowl hunting is very important as a public use item at San Luis. This year almost 4,000 hunters were recorded passing through the State operated checking station. This number would be much greater if it were not for the \$3.50 hunting fee and the maximum of 150 hunters permitted in the area at one time.

During late September, San Luis was host to the inaugural trials of the San Luis Field Trial and Conservation Association. An agreement was reached for use as a trial grounds during August and September of next year. All club members were very pleased with the area offered by the Bureau, and maintain that it is the best they have had an opportunity to use, and it is ideally located for the National trials.

Following is the official visitor list for the April 3, 1968, San Luis Refuge dedication:

Clarence F. Pautzke, Deputy Asst. Sec. of Interior, Fish & wild-  
life & Parks, Washington D.C.  
Wm. L. Lindsey, Regional Supervisor, Div. of Realty, Portland, Ore.  
Vernon Ekedahl, Supervisor of Refuges, Region I  
Nick Mariana, Information & Education Officer BSPW, Region I  
John D. Findlay, Regional Director, BSPW Region I  
Newell B. Morgan, Manager Sacramento NWR  
Lynn Howard, Manager of Merced NWR and staff  
Mr. Martin Winton, President Grasslands Water District  
Castle Air Force Base Color Guard  
Pastor Ross Fees, St. John's Lutheran Church  
Emory O'Banion, Board of Merced County Supervisors  
Walter Shannon, Director, Calif. Dept. Fish & Game  
Howard Leach, Dept. Fish & Game  
Alvaro D. Sousa, local conservationist & strong backer of San Luis  
Los Banos High School Band, and Director Garry Wilburn  
Los Banos American Legion  
Mr. Henry Wolfson, Chairman Board of Directors, Los Banos  
Mr. Sam Cook, Central California Irrigation District  
County of Merced Fire Department  
Los Banos Mayor John Amibile  
Los Banos Councilman Mike Dambrasio  
Los Banos Councilman Torres  
Harry Cochran, California State Game Warden, Merced  
Mike Macias, California State Game Warden, Los Banos  
Barney Bryan, California State Game Warden, Los Banos  
Clyde Strickler, California Dept. Parks & Beaches  
Jack Arnold, California Dept. Water Resources  
Larry Stammer, representing Assemblyman Frank Murphy, Jr.  
Olga Olegēe, May Day Queen representing May Day Fair Board, Los Banos  
John Latorraca, Merced County Sherrif  
Lorris Broddrick, Los Banos City Police Chief  
Bob Hubbert, SCSC, Los Banos  
Chet Hart, Regional Manager, State Fish & Game, Fresno  
Dave Selleck, Game Manager, State Fish & Game, Fresno  
Carl F. Wente, Ex-commissioner, State Fish & Game

Sherman Chickering, State Fish & Game Commissioner  
Neil Sears, President Los Banos Chamber of Commerce  
Wm. Jorgenson, General Manager, Los Banos Chamber of Commerce  
Joe Doctor, representing Senator Howard Way  
Carl Stetson, District Engineer, State Dept. Natural Resources  
Don Peterson, Director, Merced County Agriculture Service  
Vaughn Bishop, Chief of Reservoirs, Watersheds & Recreation, USBR  
Herb Thompson, Chief, Tracy Division, USBR  
Lt. Bradford, California Highway Patrol  
Robert C. Flower, Chief US Navy Recruiting, San Francisco  
LeRoy Engberg, US Navy Recruiting Service, San Francisco  
Bob Freeman US Game Management Agent, Merced, BSW  
Fred Coleman, Sporting Dogs Council of Southern California  
Bob Erreca, President Los Banos Sportsman Club  
Chuck Erreca, Former State Public Works Director  
Elge Mastrangelo, Los Banos Councilman  
Owen Mello, State Fish & Game Captain, Merced