File 49

# SALTON SEA NATIONAL WILDLIFE REFUGE

NARRATIVE REPORT

# SEPTEMBER - DECEMBER 1963



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, U.S. FISH AND WILDLIFE SERVICE BUREAU OF SPORT FISHERIES AND WILDLIFE CALIPATRIA, CALIFORNIA SALTON SEA NATIONAL WILDLIFE REFUGE

# NARRATIVE REPORT

# SEPTEMBER - DECEMBER 1963

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Department of the Interior

U. S. Fish and Wildlife Service

Bureau of Sport Fisheries and Wildlife

Calipatria, California

# REFUGE PERSONNEL

# \* \* \*

John H. Nowak	Refuge <b>Manager</b>
(vacant)	Asat. Refuge Manager
Samuel E. Henson	Heavy Duty Mechanic
Jose * Barros	Tractor <b>Sperator</b>
Raymond Ybarra	Tractor Operator
Leo <b>B. Cox</b>	Irrigator
Michael J. Stewart	Irrigator
Lee L. Laisure	Irrigator
* *	*

E. Jeanette Henson

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Clerk(part-time)

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#### I. OENERAL

# A. Weather Conditions

Tabulated below is the weather data for the period. This data is secured from the Southwest Experimental Station located in Brawley, California.

间期望甘	PRECIPIT	PATION	TEMPER	ATURES
-	This Month	Normal	Haximum	Hnimum
September	1.30	.40	113	63
October	.30	.24	103	52
November	,24	.15	89	37
December	.00	.56	82	29
Totals	1.84	1.35	Sxt. 113	39

At least by Valley standards, the weather for the entire period was near perfect. September a bit hotter than normal butnot too many days of high humidity. Most of the days had either no wind at all or only a very slight breeze with no more than three days where high winds were recorded.

The first three months were wetter than normal with no precipitation during December. The 1.30 inches of rain in September were all received within a 43 hour period. Naturally with a rain of this sort, Highways 99 and 111 were blocked for a short time wherever a deep wash was crossed. The Alamo River overflowed it's banks at the Delta and near Red Hill, but the refuge experienced no damage as low temporary dikes protected our farm tracts In this area.

# B. Habitat Conditions

# 1. <u>Mater</u>

During the past 12 months, we have experienced the greatest rise in the

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elevation of the Salton Sea since the present refuge was established. A rise of 1.55 ft. from Januaryl, 1963 to Januaryl, 1964 with an elevation on this latter date of -231.20. The following graph will show the constant rise of 'Salton Sea over the period 1952 to 1964.

It is difficult to predict exactly where the Sea will be by spring but if rainfall approaches normal and crop irrigation is everage???! Last year we had a rise of 1.10 ft. between January and April with below average rainfall -- this same rise would put the elevation of Salton Sea et exactly -?30 feat below sea level! Strong northwest winds can easily raise the south end elevation of the sea another 1? to 18 inches.

Parts of the old Unit I headquarters site are already beginning to sub badly. Ground elevation at the remaining buildings is about -229 ft. Over the years considerable scrap iron has accumulated at the old storage yard. It is imperative that this be disposed of this winter. Even now a scrap-iron dealer will have trouble getting a truck into the area for loading.

The elevation of the headquarters at Unit IL is approximately -237 ft. so there is still some fee-way at this site. We know now it was a wise decision to move the headquarters from Unit I to kit 11. Vary little land will be left above water by spring at Unit II: a portion of Tract 7-14, less than half of Tract 1-2 and about half of Tract 3; none of which will be capable of raising barley.

A rise to elevation -230 would leave us only three full tracts at unit I: Tracts 1A, 2B and C --- a total of 460 acres left above water at this Unit. Most of Unit B is already under water. In Unit XI we would have 200 acres left that could be put into bulrush impoundments and 80 acres left for a marginal barley field. This totals 740 acres left above water for a refugethat carried almost 7,000,000 waterfowl-we. days during this period. Not a very promising outlook for 1964.

The above presents a black picture but if we can survive the 1964 rise we may well, be over the hump. In a very recent conference (January 14, th) with top Imperial Irrigation District officials, we were unofficially (for political reasons) advised that by next summer they should have their new Mater ConcervationPlan into effect. They predict that by 1966 w could well have 3,000 acres of land back above water! Reclaiming this floaded land would take sever81 years and would not be without it's problems hut it could be done for the production of bulrush.



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# 2. Food and Cover

A total of 560 acres of green barley was planted, 175 acres of millet and 380 acres of alkali bulrush were available for waterfowl feed. Success on barley was very poor and we doubt if the whole 560 acres produced much more than a total of 200 acres. By October, when the first of the geese started arriving, we were very approhensive about our wintering food supply. The millet was fair but this has never proven to be a preforence in this area. We had ideas on the bulrush but our theories had not been put to the complete test.

First arrivals were the white-fronted geese and their immediate preference was for the bulrush in tract 4, Unit I. After several days of this diet they moved to the millet in fract 5, Unit I. Next they moved to Unit II and one day would be in the dry barley in Tractl, the next in millet in fract 2 and then over to Tract 4-5 for bulrush. They showed no preference whatsoever for any green barley that was available in adjacent tracts 3 and 6. They maintained this pattern for over five weeks until the Canada geese began to arrive in numbers and then they switched to barley and stayed with it, joining the Canadas.

With the Canada geese it was a different story -- there was only one preference -- green barley. They would find three times a day in the barley in Fracts 3 and 6 and spend the rest of the time loafing and resting in the fresh water bulrush impoundment of Tract4-5, Unit II. Those Canada geese using the Unit I side of the refuge maintained the same pattern: Peed on the green arleyin fract C and return to rest in the Tract1A bulrush impoundment. The Canadas were observed utilizing bulrush but it was no; extensive.

With the Snow geese it was still a different story -- all bulrush! As the snow goose population built up and began to exceed anything we had ever had at Salton Sea, our concern increased in a direct ratio to the population increase. Snow geese had always been known to have a very definite preference for green marley -- of which we had little and the Canadas had this staked out.

Little need for concern. The snows started as ting bulrush in Tracts 1a, 3 and 1, Unit I and except for two occassions never left it, other than to go after gravel. One twening they went into the green arley In Tract C butafter an hour of grazing they were back in the bulrush. Several weeks later half of the Unit I flock moved over to Unit II and spent a day in the barley and then the bulrush.

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Unit I contained approximately 300 scres of alkali bulrush (S. tuberosus) which at the end of the period was 75% cleaned out and had supported a snow goose population totalling 1,113,190 use days!

By the end of the period very little green barley was left in Unit II and the Canada geese were beginning to move out to the commercial barley fields. Only about 50 acres of bulrush are left in Unit I and 30 in Unit II. Almost 160 acres of green barley remains untouched in Unit I and there is a possibility of this going to naturity if not utilized by the snow geese or unless the Canada's move over to Unit I.

If the geese is not move up to the State's Wister Refuge we are going to run out of feed sometime in the latter part of January.

At this writing we appear to have an adequate food supply for the ducks. In years past duck food production has been limited unless mature barley crops were available, but here again the new bulrush impoundments are paying their way. An unusual feeding pattern developed almost immediately this year.

The snow geese would begin working on a section of bulrush, utilizing the plant and in so doing would shake out the bulrush seeds. After the geese moved on to a new section in the impoundment the widgeon, pintail and teal would move in and start working the area for the treed. There were times when as high as 70,000 ducks could be counted in the 100 acre Tract 4. Not one complaint has been received on widgeon depredation 50 far this year!

There is a very meat possibility of running short on feed for geese this year but this till he nothinp compared to the problems Pacing us next year unless some action is taken to acquire additional land. This matter will be referred to in istail in Section III under Refuge Development, as it also involves a protec ion problem.

II. WILDLIFE

# A. Migratory Birds

#### 1. Ducks

During this period in 1962 the duck-use-days totalled 2,847,348 as compared to 5,350,218 for the same period in 1963. This is attributed mainly to the large increase in widgeon, pintail and rudiy ducks. The populations of the other species remained much the same as in the past. We started the period with a much higher than normal population of pintail and it maintained a steady increase until the peak of 24,000

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the week of December ??. There was little build-up of the widgeon until the first week of December and then the population increaded rapidly until it hit a peak of 50,000 on December ??.

It is our feeling that the extensive bulrush stands are responsible for this increase in duck use by drawing the birds into the refuge and holding them there. On about December 25 we experienced a rapid decline in widgeon, pintail, green-wingel and cinnamon teal and an increase in canvasback, scaup and goldeneye. The peak duck population this year was 132,790 as compared with 73,760 last year.

Although during the final week of the period there was a drastic falloff of widgeon and pintail, at this writing date they were beginning to build up again. We are beginning to wonder if they too take a couple weeks vacation down into Maxico like the snow geese do every year?

#### 3. **Geese**

We started out the period with 4 Black Brant. These geese had spent the summer with us hut apparently by the end of September they had moved on south as they were last observed in Unit I on September 26. Three Canada geese had also spent the summer with us and probably remained during the entire period.

True to form the white-fronted geese were the first of the migration to arrive when 70 showed up on October 1. By October 20, the population had built up to 500 but dropped back to 225 the following week. The 500 was the peak for the period in contrast to a peak of 2,000 for the same week one year ago. Past records indicate that the white-front peak is generally reached in October and seldom do more than 2-300 remain over the winter. The weather is ideal, the food supply is generally adequate but migration instinct and pattern is stronger and they continue down into Mexico.

The first Canada geese migrants arrived on October 27, but the build-up was not great until November 24. The beak on the refuge was reached with a population of 3500 on December 15. The population at Unit I varied from 250 to 500 and the remaining 3000 stayed at Unit II where more gr en barley was available. Another 1000 Canada geese remained on the State Wister Refuge just north of our area. The Canada population for the Valley was up about 14% this year. It may be that we were watching a bit closer this year but it seemed to us we had a higher than normal percentage of Cackling geese with the rest of the Canada's.

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With the Canada goose having A strict preference for green barley, problems began to arise after they had Tract 3 and 6 cleaned up. The Quantity of barley in Tracts 1, 7-14 and 15-22 was quite limited. In addition to this, these three tracts were part of the public hunting area. The geese could fee-1 here on Monday, Fuesday, Thrusday and Friday but would sat blasted off the fields on Wednesday, Saturday and Sundays. Only three depredation complaints were received during the period and all three involved Canada geese.

In view of the lack of protected green barley fields away from public roads and the refuge being so badly "compressed" by the rising sea Leaving little space between land and sea boundary the Canada Hill was exceptionally high this year. This problem will be covered in more detail under Refuge Development and Hunting.

The first of the Snow Geese (230) arrived the last week in October. They immediately started utilizing the bulrush at Unit I and except for two short occasions never left that area for the rest of the period. By November 24, the population had built up to 11,000. The following week the population was at 21,000, exceeding any other peak figure for the refuge. On December 15, there were \$1,000 snow geese using Unit I and finally the population peaked at 53,000 on December 22.

The "old-timers" in the valley, other State and Federal personnel familiar with the area, said they had nover seen anything like it. There are a number of other refuges that will have much higher populations of snow geese but these were all jammed into a relatively small area and it was quite spectacular. A total of 53,000 snow geese packed into a 100 acre bulrush impoundment IS quite a sight!

This writerhas always bean a conservative counter. These gease were counted and recounted but this type of an increase didn't add up to any past records. We can only speculate that in the part the snow geese have drifted in and out on their way to Mexice and this year we held them longer. This par we noticed a higher ratio of juveniles but this alone would not account for the large increase. We will be interested to know if the flight iownthroughUtah, etc. masrecorded a corresponding increase.

Ye attribute this large increase in snow geese to the availability, quantity and quality of the alkali bulrush in Unit I. The adjacent State refuge had about the same available acreages and yet little use was made of their area. This is probably easy to explain. The State dried up their bulrush impoundments in July after maturity, whereas we maintained circulating water in our impoundments all summer and fall. Consequently the State Fulrush was dry and ours had remaind in a greener condition. There wae also cost lerable volunteer reproduction all summer providing additional green forage. At one time about half of the snow geese moved up to the Wister Refuge but the heavy bombing by the military in the adjacent Chocolate Mountains drove them back to Unit I. On one other occasion about 36,000 snows moved into Unit II but stayed only one day as the boundary hunting pressure around Unit II was too great.

By the end of the period the snow goose population began to decline. The mid-winter aerial survey on January 6, indicated 30,000 left. On January 10 only 50 snow geese could be found in the Valley. This is a normal yearly movement and we can expect the geese back in two or three weeks. Apparently they take a "short vacation" down to the Delta in Baja California, Mexico but find little feed down there and return.

The refuge will not have sufficient feed to maintain the geese between now and March and they will eigher have to spend the rest of the winter on the State refuge or feed on commercial crops.

#### 3. Water and Marsh Birds

The cost population reached a peak of 7,600 at the end of the period. This is compared to a peak of 5,000 in 1962 but total use-days were more than doubled this year. Populations of all water and marsh birds remaind high up until mid-Nøvember and then began to decline. By the end of the period both species and numbers were low. Several brown pelicans have been observed throughout the season but the peak of the white pelican was much lower than last year totalling only 350 at the highest count. Three green dyed white pelicans have been observed on several occasions and on the last day of the period one brown-dyed white pelican was seen with a flock of Canada geese at Unit I.

Western grebe's were a little more common this fall but there was practically no migration of eared grabes such as we had a year ago. One double-created corporant showed up for a couple of days in late December but then apparently moved on south. This is the first cormorant seen here at Salton See for over three years. Common egrets are still on the area but a snowy egret has not been seen since November.

Observations of rails have been few and it is seldom that we saw Wilson't snipe. One lone American Bittern was seen on December 26. Observations of common Gallinule seem to be fewer this year.

#### 4. Shorebirds, Gulls and Terns

Lacking an Assistant Refuge Manager, coupled with an increased workload and hunting pressure, we found ourselves unable to devote the time to make the shorebird census that we should have. Salton Sea

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Refuge is a marvelous shorebird area and we are sorry that more work isn't being done on these species. Observations are always made during the weekly waterfowl census but these become only casual and good shorebird censusing is time consuming.

Our impressions were that there was little change either way in the fall and early winter populations. We didn't see the evening flights of the curlew's back to the sea from the fields as we did the year before so there may have been a decline of this specie. Western willet and godwit (marbled) populations showed a slight increase.

By the end of the period very Paw terns were present on the refuge. Gull populations were about normal with no unusual sightings.

# 5. Doves

The dove population is very difficult to census in this area but appeared to be in September and October, up a little. The December population was down this year and this may be attributed to cooler than normal nights. Very few shite-winged doves were observed but the refuge area seldom has a large population. These doves are more often found around the cattle feedlots in the southern end of Imperial Valley. No observations were made on either the Mexican ground dove or the Inca dove this period.

# B. Upland Game Birds

The **Gambel's** quail population on the refuge is up this fall. Covey6 were observed daily along Trifolium 13 Caual and in the desert sections of the private hunting clubs adjacent to Unit I. Hunter success this year was better than average.

The Stateagain released a number of ring-necked pheasats (13,500) on a put-and-take hunting program but other than two of the birds seen around the Unit IT headquarters sightings are few an3 far between.

# C. Big Game Animals

None present at this low elevation.

# D. Fur Animals, Predators, Rojents and other Mammals

We keep saying "one af these days" we are going to come out with a mammal list for the refuge but it doesn't seem to get done. There have been more eight observations of coyote and bobcat this fall, This may be because of crippling losses at this time of the year and these two species have moved into the refuge proper. "Recause of the rebies problem in this area, predator control is quite extensive by P&RC and the population is not allowed to increase. This applies also to raccoon and skunk. Raccoon tracks in the Unit I impoundments have increased lately. For are heard quite often at night around the Unit II headquarters but seldom seen.

The rabbits certainly manage to hold their own -- high! Cottontails remain about the same but we believe the fackrabbit population has increased this fall. Especially around the Rock Hill area. The Jack seems daily and routine to us but we find the bird clubs get a tremendous kick out of seeing a heri of a degen or more fackrabbits bounding over the rocks at this observation point. At least they have an esthetic value.

#### E. Hawks, Eagles and Owls

This would appear to be a popular area and migration route for raptors but their numbers are very low. In the three years the writer has been on the area not a single eagle observation has been made until recently when on December 4 an adult golden eagle was sighted at Unit B.

For the third straight year we have seen s very tark (almost black) phased marsh hawk at UnitI. The bird is very distinctive in flight. Few other observations of marsh hawks have been male. Sparrow hawks became fairly common again by the and of the period. The population of burrowing owls remains high. We have a number of them using the holes and crevices in the cliffs of Rock Hill and they put on a never ending show for the bird clubs.

#### F. Other Birds

There has been little opportunity for "birding" during this period and consequently few records were kept on the small birds. A redbreasted nuthatch was seen on October 21 and this appears to be the first fall record for this specie. A Myrtle wardler was seen at Unit II in December and this too is a rare observation. One new species can be added to the refuge check list -- a Slate colored junco observed on November 10, 1963 in the yard at the Manager's quarters.

#### 0. Fish

There is no fishing on the refuge. At times the corvina move into the southend of the sea and fishing ressure along our sea boundaries becomes qui te heavy. With the aivent of cooler weather starting in November, fishing drops off and remains rather poor until about the first of April.

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It seems very few people know or are aware of the possibility of the Salton Sea elevations declining in the near future. Any appreciable drop in elevation would have an almost immediate effect of raising the salinity content of the water. We have no idea just how much adaptability the marine life would have to an increase in salinity but over the next 2, 5 or 10 years the increase could be great. Rapidity of salinity change would be important to adaptability.

The following table will indicate the salinity changes of the Salton Sea since 1907:

YEAR	ELEVATION OF SEA	TONS OF SALT ACREMPT. WATER
1907	-195.0	0,95
1913	-223.0	4.85
1941	-241.3	49.65
1951	-237.0	48.55
1957	-233.9	16.78
1958	-234.4	47.87
1959	-234.6	54.40
1964	-331.2	46.51

Between 1957 and 1959 the Sea male a slight drop of 70 feet. During

the two year period the salinity increased 7.62 tans per acre/ft. In view of this the predicted drop of 2 feet by 1966 could result in a salt increase of 20 tons per acre/ft. or more.

When the Sea begins to decline and the fishing does likewise there will be much hue and cry to bring more water into Salton Sea and maintain a stable elevation.

#### H. Reptiles and Amphibians

Most reptiles were active up until mid-November when it got too cool for then. A few lizards can be seen on any warm day and ruing several above normal temperature days in December fresh side-winder tracks were seen. During September and October we had our usual problem with

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rattlesnakes. Everyone treads light the first day we pro-soak an irrigation ditch or canal as the snakes come out of their dry holes in the ditch banks by the bunches.

# I. Disease

Botulism was reduced about 50% on waterfowl this year and the decline is attributed to from water being maintained in the bulrush impoundments all surmer. These areas attracted many bir is away from the polluted areas. Somewhat the reverse is true on the shorebirds. The insect population seems to be greater in the polluted areas and more shorebirds were feeding there. Whereas the botulism was reduced 50% on waterfowl it increased 50% in the smaller shorebirds.

#### III . REFUGE DEVELOPMENT AND MAINTENANCE

# A. Physical Development

The above title of "development" has rather a hollow ring in view of the drastic loss of refuge land over the past Pew years. Following this page are maps of Units I, B and II in which we have marked out the estimated refuge land that will be laft above the Salton Sea elevation of -230 after April 1964. Approximately 910 acres will be above water. Due to soil salinity and subbing problems only the 160 acres in Tract C, Unit I and about 60 acres in Tract 3, UnitII will be useable for barley. This totals 200 acres. Anadditional 480 acres will be available in UnitsI and II for alkali bulrush. Tracts 3, 4 and 5, Unit I and 15-22, 8-13, 4-5, Unit II farmed this past year will all be under water. All three tracts in Unit B are already inundated.

For an area that winters a total of 12,200,000 waterfowl' use-days the land situation cannot be considered anything but desperate!

We have finally reached the "moment of truth" and a decision must be made as to the future of Calton Sea Refuge. We have only one course and that is to acquire additional landfrom private owners. We have two alternatives3 (1) the lease of private land on a year to year basis, or (2) the outright purchase of a ijacent land. Until recently we have been reluctant to recommend purchasing, but based on the information just received from the IID it should be given consideration.

In addition to the loss or inability to produce the required food supply for wintering waterfowl, the area between our land and sea toundaries Fe badly compressed. There are now areas where the refuge is less than 1/2 mile wide. This now has the effect of trapping the geese as they fly through these narrow corridors. It is for this reason that the kill of Canada geese was so high this fall at thit U.



ESTIMATED REFUGE LAND THAT WILL BE LEFT ABOVE THE SALTON SEA ELEVATION AFTER APRIL 1964



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With the absence of an assistant refuge manager, enforcement work made heavy demands on the time of the Manager. Added to this was a large increase in the hunting pressure. Consequently many projects suffered or had to be shelved. A total of 456 man-hours were charged to cost code 19 (law enforcement) and at least half again this amount was volunteered by Nowak and Henson to get the job ione.

Mechanic Henson does not have enforcement authority but has completed the California Deputy Warden School Course and has proven invaluable.

The greatest man-day consumer during this fall period is on irrigation and bulrush impoundment construction. Little time is left for other projects and the remaining jobs listed are routine or were fitted in whenever we had the time between enforcement, irrigation, barley planting and construction of the impoundments:

1. The sea dikes on Tracts h and 5 and the tie-in diketoTract3 were all widened and reinforced with the tragline. On completion of this, all dikes and major outside borders were reshaped and graded for access roals, group tour route%, etc. After the rain@ in October a second grading was necessary. Because of the shape, alobe soil and slickness of these dikes a motor grader cannot be used and it required a Cat and pull-grader. A new and longer culvert was placed in the Fract 3 tie-in road to enable us to widen this spot.

2. Last summer a temporary electrical distribution system was installed at the new Unit II headquarters. During this period a permanent system was constructed with the installation of a heavy duty service panel at the shops.

3. A number of new tourist and directional signs were constructed, routed, painted and installed around the new headquarters.

h. Considerable control of salt cedar and brush was accomplished this period by means of LP gas ditch burners and dozer work. This work was done at Tracts IA and 2B, Unit I and Tracts 3, 6 and 8-13, Unit II.

5. One to the rise in the Sea last spring much of the original parking area of the Trifoli m-13 access road was inumiated. lo maintain this excellent endwell received access area we had to drop backand doze out a new and larger area. This is in more or less waste land and we figured this time we would make it big enough to last for a while. It lookslike this whole area will again Se under water by spring.

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6. With the release of certain lease lands in the Red Hill area and north end of fract 15-22 it was necessary to report much of the Unit II land on the sea side. While in the process of this re-posting considerable additional posting was added to the existing sea boundary at Unit II. New signs and double posting was also required all along the sea front at Unit I.

7. New water and sewer lines were installed at the office.

8. A new water control structure was installed on the Fract 6 input canal to correct a defect in the system.

9. Two heavy-duty tow bar8 and two portable trailer light bars were constructed for use in towing surplus equipment back to the refuge from the various military bases in our area\*

10. A total of 216 tons of surplus mile were received during the period for depredation feeding. Considerable advance work is always required for this feeding program in levelling storage ground and preparation for protection, etc.

11. Henson made two trips to Camp Pendleton inspecting deeps for Ruby Lake Refuge and 54 Dodge 3/4-ton cargo trucks for the Region. Henson and Nowak made one trip to Camp Pendleton to bring back two deeps. Henson also made one trip to South Dos Palos for 6 ton of bulrush seed.

12. Fortuna ely in view of the work load we had this period little in the way of major equipment repairs were required. The following units were worked on:

a. Replacement of rear axel on the s-ton truck-tractor,

b. Installation of tool-bar carrier on the MD wheel tractor.

c. Replacement of one carrier roller on the TD-18?, a new distributorend carbora tor overhaul.

d. Replacement of one carrier rolls on the TD-18A, a new Histributor and cartorator overhaul.

e. Construction of new racks for the GMC stake truck.

- f. Carberator overhaul and gas tank cleaning on the D4.
- g. New radiators installed on the grease truck and one pickup.
- h. Driveline replaced on pickup I-50810.
- i. Battery rack replacement on the MD Parmall.

Minor repairs were also need on the various piece; of farm equipment.

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# B. Plantings

- 1. Aquatic and Marsh Plants None.
- 2. Trees and Shrubs None.
- 3. Uplani Herbaceous Plants None.
- 4. <u>Cultivate4</u> Crops

In our report of one year ago we indicated a satisfaction with the production of green barley. We wish we could say the same for this year but this year it's an entirely different story. We have only onetract (Tract C, 160 acres) left in Unit I that is capable of producing barley. This tract was planted an.4 irrigated late In the period an? is doing quite well. In Unit TX a total of only 370 acres was available or suitable for barley planting. Results were very poor an2 we think that if all of it were scraped in a pile it might just possily cover 60 acres!

The soil appear 3 to be in good condition an igermination was good. After the first irrigation salt from the sub-soil began to rise through capillary action an3 that was it. Since October most of the ground in the lower (or sea side! part of the tracts asturned to the familiar "black alkali" color,

Tabulated below is a table of the acreages planted and the available acreage left for utilization as of December 31, 1963, compar d with that of December 31, 1962:

TRACT NO.	ACREAGE 1962	PLANTED 1963	ACREACE AS C 1962	)F 12/31 1963
C, Unit I	160	160	140	<b>1</b> 40
28, Unit I	30	*	20	*
E-2, Unit B	30	4	20	44
1-2, Unit II	100	60	80	10
3, Unit IT	100	80	80	40
6, Unit IT	7	60	6 <b>0</b>	10
7-14, Unit If	160	120	150	10
15-22, Unit II	120	50	110	10
	770	530	660	220

# Page 15.

# \*Tract completely inundated in 1963.

Experimental Tract 3x (40) had been worked "according to the book" and special instruction from the local Department of Agriculture Experiment Station in Brawley. Various test plots had been set up covering a number of salt-tolerant plants that would possibly have value a6 good goose food. Other plots had been set up to provide a spring cover crop and to provide additional crop residue plants, Rye grass, hubam and berseem clovers were added to the barley. The Sea and the salt have both taken their toll and it is doubtful if enough of the tract is left to make any conclusions to our noble experiments.

# C. Collections and Receipts

In December a trip was made to south Dos Palos, California to secure 10,870 Ha. of bulrush seed from Koda Bros. This seed is screenings from the area rice fields and rune approximately 80% bulrush. The remaining 20% is primarily watergrass, sprangletop and rice, Planting of this seed will be next March.

# D. Control of Vegetation

Ho chemical control is being practiced at this time. Control is limited to burning, cutting and dozing along the irrigation litch banks, canals and tract eiges.

- E. Planned Burning none
- F. Fires none

# IV. RESOURCE MANAGEMENT

No activities under this heading

# V. FIELD INVESTIGATION OR APPLIED RESEARCH

# A. Banding

None this period.

# B. Depredations

We are glad to report that depredations have probably been the lightest in the history of the refuge. It is strange considering

#### Page 16.

the small amount of barley available on the refuge and the very large increase in waterfowl populations. We know that without the very excellent crop of bulrush we would have had ourselves 8 serious problem. Our only problem specie this year is the Canada geese and they demand green barley. Asit was the little barley we did in have kept them on the refuge at least 90% of the time.

The following two herding permits were requested and issued:

Date	Name	Address	Permit No.	Crep	Specie
12/5	Riedman	Long Beach	H <b>64-</b> 641	Barley	Canada
12/17	Sevbert	Brawley	H64-642	Alfalfa	Canada

Both of the above permits were requested in "anticipation", but not on actual depredation. We don't mean to say that there was no utilization of commercial crops but the Canada's established a pattern of leaving the refuge in small flocks of 25-50 and no great concentrations were found in any of the outside fields. Therefore damage to any one field was very light.

#### C. Marsh Management

This subject has been well covered over the past two years in previous reports and in our special report to the Regional Office titled "Methods Used in Raising Alkali Bulrush at Salton Sea Refuge."

#### D. Salinity Tests

None during this perioid due to the rabid loss of farm land. A project is now being formulated and will be put into effect this spring to study the salinity tolerance of bulrush. in our soils. The results of this study will be of great value come the day we are in a position to start reclaiming land that has been flooded by the Salton Sea.

Additional salinity data on the Sea itself will be found in Section II, G, Fish.

#### VI. PUBLIC RELATIONS

#### A. Recreational Uses

Recreational use of the refuge is somewhat limited during September and October due to our temperatures remaining high. In November

Page 17.

and December actual use of the refuge is limited during the hunting season. With the refuge being reduced in size by the rising sea and an increase in hunting pressure along the boundaries, it dictates a policy of as little internal disturbance as possible.

We have arrived at a point where one doesn't always have to get inside the refuge to see -- now you can almost look through It!

On the surface our recreational use during this period appears to be light. But then when it is realized that the very existence of the refuge provides an estimated 26,000 hunter-use-days along its boundary, the situation takes on a different connotation. This is all within a two months period.

In our narrative of one year ago we inserted a map of UnitI showing a planned self-operating and/or guided tour route. The route was completed and some of the signs installed. We have already lost to the Sea the main observation point and 3/4 mile of the tour route off Fract 5. By spring there will be little of the original routeleft. Access to the Unit I observation boy will be restricted to probably no more than one or two cars at the most. This will create a problem with groups or clubs where 25-30 cars are involved.

Use of the area for photographic work ha6 greatly increased over the past year.

#### B. Refuge Visitors

In checking back on the visitor's list of a year ago we find that this year we have a nine-fold increase. The biggest single faction creating this increase is connected with the geo-thermal activities.

- 9/2 Guy McCaskie, San Diego, California Birding
- 9/2 Art Mang, Berkeley, California Birding
- 9/2 Rich Stallcup, Oakland, California Birding
- 9/10 T. H. W. Loomis, Mining Engineer, San Gabriel, California -Geo-Thermal
- 9/13 M. L. W. Doornbos, Prov. Engineer, San Gabriel, California
- 9/13 Ron Kassay, Linotype Operator, Artesia, California Survey of Refuge
- 9/14 Bill Lowery, President Southern Council, Lo6 Angeles, California -Survey of Refuge
- 9/19 Sliver L. Allen, Los Altos, California Bird observation
- 9/27 GeorgeAnderson, Management & Power, Los Angeles, California -Geo-Thermal

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10/1 J. Blocklunge, Border Patrol, El Centro, California -United Fund Campaigne Elder, Cofer, Moholt, and G. Wilson, GMA, BSFW, - Enforcement 10/22 N. Mariands, Conv. Edl, Portland, Oregon - M&E Photography 10/23 C. Lostetter, Reg. Sup., M&E, Portland, Oregon - Enforcement 10/23 Paul Gothere, O. Mar, Milway City - Observation 10/24 10/31 W. G. Simington, Right of Way Agent, Los Angeles, California 11/1-4 Lydia Berry, Refuge Clerk, Desert Game Refuge - Vacation Budi Mole, Photo., Los Angeles, California - Pictures 11/6 Fred C. Robards, OMA, BSFW, Juneau, Alaska - Enforcement 11/11 Ray Glahn, Pilot--Biologist, Portland, Oregon - Refuge Inspection 11/15 John B. Van den Akkar, Assistant Regional Supervisor, Portland, 11/15 Oregon - Refuge Inspection 11/26 Fredrick D. Haerick, 3t Petersberg, Florida - Birting 12/1 Mr. and Mrs. Paul Knight, Redlands, California - Birding 12/1 Mrs. Frank Knight, Rebobath, Mess. - Birding Harry J. Olson, American Metal Climax, Denver, Colorado -12/12 Geo-Thermal 12/14 Edward A. Block, Prof .- Wildlife, 3an Diego College - Mgt. 12/14 Leonard H. Frey, Prof .- Wiltlife, San Diego College - Mgt. 12/14 Wm. S. Perkins, Prof .- Wildlife, San Diego College - Mgt. 12/14 John W. Dickerson, Prof.-Wildlife, San Diego College - Mgt. 12/10 V. T. Mavity, Sr. Research Engineer, Chicago, Illinois -Geo-Thermal 12/20 Rich Stallcup, student, Oakland, California - Birding 12/28 Jan Kroesen, student, Oakland, California - Birding 12/28 Marianne Shepard, manufacturer, Glen Ellen, California - Birding 12/28 Art Wang, student, Berkeley, California - Birding C. John Ralph, Res. Asst., San Jose State College - Bir fing 12/28 Mr. and Mrs. Paul A. Knowles, El Cajon, California - Observation 12/28 Charles G. Hanson and family, Wildlife Biologist, Desert Game 12/28 Range - Vacation

Other frequent official visitors include GMA Elder and Moholt, State personnel from the Wister Refuge and personnel from Various Departments of the Department of Agriculture, U.S. Geological Survey, County Health Department and the Imperial Irrigation District.

# C. Refuge Participation

9/13 Nowak - Refuge tour with executive staff of the Southern Council of Conservation clubs.

10/20 Nowak - Tour and lecture on refuge management with Or. George Cox and Dr. Hazen and 35 Ecology class students from San Diego State College.

10/2? Nowak and Henson - Attending special enforcement meeting of California Department of Fish an i Jame.

17/1 Nowak - Refuge tour with the Sea and Sage Audubon Society of Garden Grove, California.

The above **list** of refuge participation **is not** long **as** our busiest "RP" period is during January, February and March. Law enforcement work also kept us pretty will pinned down during the **last half** of the period.

# D. Hunting

Public hunting, within the refuge boundary, is administered by personnel of the California Department of Fish and Game and was permitted on refuge Unit II from November 27, 1963 to January 5, 1964. i'he Unit IT tracts utilized this year were 1-2, 7-14, 8-13 and 15-22. State personnel handle all collections, administrative work and parking. Our responsibility is confined to posting the area and enforcement work.

Because of new or temporary personnel at the State Check Station a breakdown of species taken is lacking. Total waterfowl kill luring the 17 days of public hunting is a8 follows compared with like data from 1962 on U: days of hunting:

SPECIES 1963	NO, OF 1962	HUNPERS	NUMBER 1962	BAGOE 3 1963	BIRDS 1 1962	PER MAN 1963
Geese	316	2%	267	162	. 84	.54
Ducka	Ħ	**	13s	129	.42	.43

Utilization of the refuge fields under permithunting was somewhat reduced eventhough more acreage was available. Ironic but the hunting and goose kill outside and along: the refuge boundarieswasgreater. The flight pattern of the Canada geese this year was such that the boundary hunter got to them first.

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At Unit II the Canada geese fed in what green barley was available in Tracts 3 and 6, loafing and resting in the bulrush impoundment Fract 4-5. Inaddition to this twice daily flights were made out of the refuge for gravel in the east desert or to commercial barley fields. Early morning or late shooting was excellent as the birds had little room left in the refuge to gain altitude before crossing the boundary.

Practically all snow goose activity was confined to the bulrush impoundments in Unit I. The only time the geese would leave this area would be early in the morning or late at night to fly over to the Chocolate Mountains for gravel. Here, the geese had sufficient room to pain altitude before crossing the boundary and the kill was extremely light considering the high population. On one weekend about 36,000 snows moved over to Unit II and for that one day the kill was quite high.

Good duck hunting success was had along the sea front in the Red Hill and Obsidian Butte areas, the Panish area and excellent hunting was available in the New River Delta area with a boat.

As mentioned before the Canada goose population at Unit IT was quite high with a peek of 3500 alone using the two barley fields right around headquarters. With the geese being somewhat "trapped" we were surprised to have a number of hunters ack us if we didn't think the kill was going too high. As the season continued and the situation remained the same we were beginning to have some apprehension Put the barley supply became depleted and the geese had to move out to commercial fields and up to the State Refuge.

In view of the shave it is imperative that additional land be secured at Unit II prior to the next planting season.

# E. Violations

The following citations were made during this past hunting season:

NAME	VIOLATION	DISPOSITION
Phillip Dean Kensinger Long Beach, Calif.	Vehicle trespass	\$35.00
Thomas V. Greco Oceanside, Calif.	Hunting on refuge	35.00
Geo. Levellyn Malsod Corvina, Calif.	Munting on refuge	35.00
Gus Frederick Shouse Covina, Calif.	Hunting on refuge	35.00

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Loy Delbert Holt Covina, Calif.	Hunting on refuge	35.00
Gerald R. Hull Bell,Carden, Calif.	Vehic <b>b</b> Trespass	35.00
Marvin David Stuart Oceanside, Calif.	Hunting on refuge	35.00
Ernest M. Stevens Whittier, Calif.	Hunting on refuge	35.00

In addition to the above, one juvenile was apprehended for hunting on the refuge, two more trespass cases are still pending and one hording waterfowl with mircraft case is pending. All cases were turned over to the local state warden for precessing in the Calipatria Monicipal court. We are fortunate in having as fine a Court as any we have seen. The judge is fair and conscientious but isn't afraid to "lower the boom" when the occassion demands it.

The above aircraft herding case will be reported on in the next report. A good deal of this sort of thing was present this year but it was always a case of never being quite sure of the aircraft number. We finally ran into a very flagrant case with plenty of witnesses -- both hunters and bird-blubbers and one group was just as mad as the other at the pilot. The pilot was a mighty good one - eight passes at the geese with full power and full flaps, almost at stall speed and no more than ten feet above the bulrush! The first phase of the case is now in the hands of the FAA and they are being most cooperative.

Not having a boundary fence around Calton Sea Refuge traspass is by far our greatest enforcement problem. Next year it may be negessary to install a single-strand fence along some of our boundary, especially at Unit II and perhaps around the two sides of Fract LA at Unit I.

Many warning citations were given for borderline prespace and only the more serious cases were arreated. By the end of the season we were beginning to doubt the value of our policy of leniency in minor cases. Guess it's only normal human trait of "give an inch and take a mile". At the same time to arrest a hunter for being two feet inside the boundary and not having shot anything does not add to our public relation stature.

#### F. SAFTTY

Four formal SAFTRY meetings were held during the period blus several "on the site" meetings to cover special problems. A follow up has been maintained on all recommendations. Two fire drills were held during the period also.

This station was free from accidents luring the period and we now have 1,604 days elapsing since the last lost-time accident.

#### VII. OTHER ITEMS

#### A. Items 0% Interest

#### 1. Geo-thermal Drilling

Drilling activities were stepped up this period. Although none of the wells are on the refuge one of the latest drilling operations are along the boundary of Tract 15-22, Unit II. Approximately 200 acres of land in Unit II have been turned back to the Imperial Irrigation District for re-leasing to Shell Oil Co. for geo-thermal exploration.

All of the remaining land on Red Hill  $(3W_{\pm}^{1}, \text{Section 22})$  and the north 40 acres of the SET of Section 22 were released. All refuge land is now lessed for the LUD and they have rotained full mineral, oil and geo-thermal rights. The Service did not contest the withdrawl request as the Red Hill area has no wildlife value or farming potential and the north end of Fract 15-22 is practically under water. It was necessary for Shell Oil to raise the trill site two feet before they could set up the drilling rig.

This well was completed the middle of December and Shell will return in June to dig the second steam well on Red Hill. Just across the Alamo from the northeast corner of Unit II Pure Oil Company (under their subsidary of Magma Earth Energy, Inc.) moved in and completed another well this period.

This well developed into the hottest geo-thermal well in the world. The other six wells in the area have all been drilled to a depth of 6,000 or less feet. Magma went to 9,000 ft. and although they won't give out any bottom-hole temperatures we will guess that it goes over 1,000 degrees. They were burning up drilling bits about as fast as they could put an a new one. 'de have no other data on the well but observing this one in comparison to the others we have seen "brought in" capacity is greater and the steam is clean and not

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colored like the others. There is reported to be much less brine flow but che fical potential is excellent, We note the chemical deposits are greenish wereas all the others have a yellow caste.

# 3. Earthquakes

Last period we reported a total of seven earthquakes. This period we do even better (or worse). Starting in the eveningofOctober26, three rather sharp quakes were felt at Unit II. On themorning of October 26 they started again with each repeat being stronger than the *next*. They continued all day and by the time the count reached 20 we quit counting! On the morning of the 28th several more were experienced.

There was no extensive damage except for some rather large cracks in several sea dikes at Unit I, minor foundation and wall cracks in the headquarters building, all the cruss bolts shaken loose in the steel Bu ler shop buildings and a few dented pors and pans that fell off the kitchen wall at Quarters No. 7.

The refuge is sitting on 3,000 feet of silt fill from the Colorado River and it's like being on a bowl fall of jello. Quite different from a solid rock quake. A little shake here goes a long way -in all directions!

# B. <u>Credits</u>

The entire report Was prepared and written by the refuge manager. The absence of an assistant refuge manager throughout theentire period was really felt. The entire refuge crew is to be commended on their work and attitude during this period. There were many times when they "took it on their own" to undertake and complete a project with little or no supervision. This is where the Credit belings this time. Mr. Henson, Refuge Mechanic has had to take over much of the field supervision and impoundment construction problems in addition to keeping equipment in top condition and chasing hunters.

# C. Photographs

several photographs are included in this report related to our operations and problems, Picture credits are as indicated. Personal equipment of Henson and Nowak were utilized using Government-owned film. The 4x5's were taken with the Government Speed Graphic. All film is the property of the fervice.

# SIGNATURE PAGE

Submitted by:

\* Nowak John H. Nowak

(Signature)

Refuge Manager (Title)

Date: January 27, 1964

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Approved, Regional Office:

Date:\_\_\_\_\_

(Signature)

(Title)

				(Contir	uation Sl	leet)					
REFUCE Salton S	8			1		HUNOW	LS OF	Sentember	r TO Decemb	<b>19</b> 6	۲
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(1) Species :	11/10-16:	11/17-23: 12	11/24-30	17-Va	12/8-14 15	2/15-21 12	2/22-28 12	16-62/3	waterfowl a days use	Broods:Esti Seen : to	mated tal
Swans: Whistling					-	2			35	none	
Trumpeter						•			}		
Canada	07	20	800	1.300	2.525	3.500	2.000	1.500	81.928		
Cackling Brant		1			51	25	2 S	15	202 202 2		
White-fronted	150	200	210	30	200	300	150	001	18,900		
Snow	14,000	5,300	11,005	21,100	25,000	000 11	53,000	30,000	1,341,690		
Other: Ross	N	N	n v N	3.10	273	150	28 <sup>2</sup>	ло Т	291. 1.193		
Ducks:			Ų		}.		i	3	1447,677		
Black	01	01	35	35		Ķ	8	63	2,667		
Gadwall	ž	65	38	38	66	ŝ	С С	С С	3.220		
Baldpate	1,125	00 00 00 00 00 00 00 00 00 00 00 00 00	3,000	008 E	27,000	10,000	20,000	15,000	1,045,275		
Green-winged teal	7.100	8 8 8 8	202.00	8 8 8 7 7 7 7 7	000	1,500	2000.12		380,135		
Blue-winged teal		2			2	0			3		
Cinnamon teal Shoveler	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1,800	675 1,800	675 2,000	2,200	600 2,800	3 <b>,000</b>	88°	59,220 118,320		
Wood Redheed	Ę	7.61		0.16		T C	1		7		
Ring-necked	2	ŝ		2 T	ЭX ЭX	2020	202	20	50, <b>1</b> 50, 20, 20, 20, 20, 20, 20, 20, 20, 20, 2		
Canvasback	역	Ъ	20	20	3	ন্থ	5	1,565	13,265		
Scaup		222	875	1,000	1,100	1,350	1,500	200	10,62		
Bufflehead	Å	<u>v</u> ř	2012	250	212 021	0430	470 600	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	247°47		
Ruddy	6,600	21,575	10,000	12,000	13,000	45,000	1,5,000	15,000	2,732,625	<u></u>	
Other: Fulvous TD	9	m					3	<u></u>	2,275		
						<del>******</del>			81 10055 5		
Coot:	6,700	6,000	6,000	000*2	7,000	7,000	7,000	7,600	646,555		
_				<b>M</b> 0		2		2		1.	

WATERFOWL

. .

**3 -1**75**UB** Cont. NR-1 (Rev. March 1953)

	Total Days Us3 :	Peak Number :	(7) Total Production	· SUMMARY
Swans	35	5	0	Principal feeding areas
Geese	: _1,443,190:	<u>55,375</u>	0	
Ducks	: _5,350,218 :	132,790	0	Principal nesting area8
coots	:646,555:	7,600	0	
				Reported by John H. Nowak
	INS	TRUCTIONS (See	e Secs. 7531 through	<b>7534,</b> Wildlife Refuges Field Manual)
(1) Spe	ecies:	In <b>addition</b> reporting pe to those spe	to the birds listed riod should be adde oiee of local <b>and</b> na	d <b>on</b> form, other <b>species occurring</b> on <b>refuge</b> during <b>the</b> d in appropriate spaces. Special attention <b>should be given</b> atioxial significance,
(2) We Re	eks of porting Period:	Estimated av	verage refuge <b>popula</b>	tions.
(3) Est <b>Da</b>	timated Waterfowl <b>ys Use:</b>	Average week	ly populations x <b>nu</b>	mber of days present for each species.
(1) Pro	duction:	Estimated nu <b>breeding</b> area breeding hab	mber of <b>young</b> produ as. Brood <b>counts s</b> vitat. Estimates ha	ced <b>based</b> on observations and actual counts on representative <b>hould be</b> made on two or <b>more</b> areas aggregating <b>10%</b> of the ving no basis in fact should be omitted.
<b>(5)</b> Tot	al Days <b>Use:</b>	A summary of	data recorded unde	r (3).
(6) Pe	ak Number:	Maximum numb	er of waterfowl. pr	esent on refuge during any census of reporting period.
(7) Tot	tal <b>Production:</b>	A summary of	data recorded unde	er (b).

Interior Duplicating Section, Washington, D. C. 1953

**3-1750** Form NR-1

(Rev. March 1953)

# WATERFOWL

REFUG<u>E</u> Salton Sea MONTHS OF September TO December , 19 63

1

:					(2)					
(1) <sup>±</sup> 3	9/1-7 :9	78-14 :	<u>Weeks</u> 9/15-21 :9	<u>of</u> r /22-23:9/	<u>e porti</u> 29-10/5:10	ng p /6-12 :10/	<u>eriod</u> <b>13-19 :10</b>	/2026 : 1	10/27-2 :	11/3-9
Species :	1 :	2	-3	4	5	6	7 :	8:	9	10
swans: whistling Trumpeter										
Geese: Canada	3	3	3	3				3	19	15
<b>Cackling</b> <b>Brant</b> White-fronted	Ъ	5	. 5	3	1 70	3	110	500	225	75
Snow Blue					, -				230	1,015
Ducks:	1.		Ŀ	1.						
Black	4		4	4		2		2		
<b>Gadwall</b> Baldpate					20	10	150	1,500	2 2,145	3 2,575
P <b>intail</b> G <b>reen-winged</b> teal Blue-winged teal	2,600 310	2,780 <b>615</b>	2,700 5%	3,300 1.060	1,270 660	<b>2,360</b> 630	2,950 625	4 <b>,35</b> 0 535	4 <b>,8</b> 25 9 <b>7</b> 5	6,025 1,175 2
Cinnamon teal Shoveler	<b>450</b> 20	455 <b>30</b>	400 30	375 30	515 2	- 790 - 35	<b>50</b> 0 30	125 33	190 <b>15</b>	325 30
Redhead Ring-necked	30	30	30	30		5	5	25	45	40
Canvasback Scaup Goldeneve	5	10	10	10	12	5 20	10 10	35 10	<b>30</b> 5	5
Bufflehead Ruddy	25 640	2 2 1,330	20 2 1,330	25 2 18 <b>.6</b> 00	> 14,70(	2 10 11.000	5 10,000	10 13,300	20 <b>11,300</b>	15 20,000
Other: Fulvous TD	60	32	43	- 45	Ťμ1	26	<b>2</b> 0	20	26	3
<u>Coot</u> :	1,500	2,040	2,050	5,200	1,650	4,075	4,650	6,000	6,200	,4,700
_		l							TNTDUP.	D.C53824-5

**3-1751** Form NR-1A (Nov. 1945)

MIGRATORY BIRDS

Refuge-----Selton-Set

(other than waterfowl) Months of...**September**to....to...December......19<u>5</u>63.

~

(1) Species	() First	c) Seen	(3 eak Nu	) mbers	(4 Last	) Seen	<u></u>	(5) roduction		(6) Total
Common Name	Number	Date	nber	Date	Number	Date	Number Colonies	Total # Nests	Tota1 Young	Estimated Number
I. Water and Marsh Birds:									G	
Eared Grebe Pied-billed Grebe Western Grebe White Pelican Brown Pelican	Prevlous 1 Prevlous	Period Period	ζ, m	10/20 10/27	-	1/11				100 800 100 100 100 100 100 100 100 100
Double-created cormorant Great Blue Heron Common Egret Snowy Egret	Previous	Period	· · · · · · · · · · · · · · · · · · ·		م بر	12/J				202 202 202 202
American Bittern Glossy Ibis Wood Ibis	* # *	* = #			чőЛ	12/26 11/10 10/21			-	1,200 150
Common Gallinule II. <u>Shorebirds, Gulls and</u> Terns:	£	*								20
Semi-palmated Plover Killdeer	Previous	Period								20 30
Long-billed curlew Western Willet Greater Yellowlegs		* # *								1,500 150 50
Long-billed Dowitcher Marbled Godwit	8 F (	<b>F  F</b> 1								3,000
American Avocet Black-necked Stilt Northern Phalarope		* * *			50	12/1				6,000 1,000 1,000
Sandpipers (various) Common Snipe	4 4	<b>X X</b>								5 <b>,000</b> 150
(See Page 2 for con	tinuation	of II)								

(1)	(2	2)	(3)	(	4)	(5)	·	(6)
III. <u>Doves and Pigeons</u> : Mourning dove White-winged dove	Res	dent 1	No estimate - v No estimate - u	ery abundan ncommon				
IV. <u>Predaceous Birds</u> : Golden eagle Duck hawk Horned owl Magpie Raven	1	12/4/63		1	12/14/63			1
Crow Sparrow Hawk Marsh Hawk Turkey vulture Burrowing owl	Provious n n	Period N N						50 25 50 1,00 <b>9</b>
					Devendent	ha	John H. No	

#### INSTRUCTIONS

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance. Groups: I. <u>Water and Marsh Birds</u> (Gaviiformes to Ciconiiformes and Gruiiformes) II. Shorebirds, Gulls and Terns (Charadriiformes)
  - III. Doves and Pigeons (Columbiformes)

IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous

Passeriformes)

- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual counts.
- (6) Total: Estimated total pumber of the species using the refige during the period concerned.

	(6) Total	Estimated Number	88 88 88 80 80 80 80 80 80 80 80 80 80 8	
2		Total Young		ſ
195	(5) . roduction	Total # Nests		
	<b>F</b> 4	Number Colonies		
<b>t</b> (	t) Seen	Date		
IRDS erfowl) of	(, Last	Number		
GRATORY B: than wate Months o	) mbers	Date		(over)
MI (other	(3 Peak Nu	Number		
<u> </u>	() Seen	Date	Line and Lin	
	First	Number		
3-1751 Form NR-1A (Nov. 1945) Refuge	(1) Species	Common Name	I. <u>Water and Marsh Birds</u> : <u>Mater and Marsh Birds</u> : <u>Tores</u> : <u>Tores</u> : <u>Terns</u> : <u>Ring-billed Gull</u> <u>Menring Gull</u> Bonapart Gull Glaucous-winged Gull	

ŕ

(1)	(2)	(3)	(4)	(5)	(6)
III. <u>Doves and Pigeons</u> : Mourning dove White-winged dove					
IV. <u>Predaceous Birds</u> : Golden eagle Duck hawk Horned owl Magpie Raven Crow					
			Reporte	by	 

# INSTRUCTIONS

- (1) Species: Use the correct names as found in the A.O.U. Checklist, 1931 Edition, and list group in A.O.U. order. Avoid general terms as "seagull", "tern", etc. In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and national significance. Groups: I. Water and Marsh Birds (Gaviiformes to Ciconiiformes and Gruiiformes)
  - II. <u>Shorebirds</u>, <u>Gulls and Terns</u> (Charadriiformes)
  - III. <u>Doves and Pigeons</u> (Columbiformes)
  - IV. Predaceous Birds (Falconiformes, Strigiformes and predaceous

Passeriformes)

- (2) First Seen: The first refuge record for the species for the season concerned.
- (3) Peak Numbers: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned.
- (5) Production: Estimated number of young produced based on observations and actual counts.
- (6) Total: Estimated total number of the species using the refige during the period concerned.

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

Salton Sea

Refuge

WATERFOWL HUNTER KILL SURV ...

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Year 1963

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(1)	(2)	(3)	(11)	(2)	(9)	(2)	(8)	(6)
Weeks of Hunting	No. Hunters Checked	Hunter Hours	Waterfowl Species and Nos. of Each Bagged	Total Bagged	Crippling Loss	Total Kill	Est. No. of Hunters	Est. Total Kill
1/21-22/11	36	1129	Ducks (12), Geese (9)*	21	2	23	39	23
12/4-8	25	275	Ducks (15), Geese (9)	24	~	56	25	26
12/11-15	02	02.2	Ducks (12), Geese 33	145	t,	49	20	49
12/18-22	76	836	Ducks (42), Geese (89)	161	21	<b>51</b> 13	92	ELL
12/28-29	59	6119	Ducks (29), Geese 19)	48	Ŋ	<b>£</b>	59	53
1/4-5/64	27	297	Ducks (19), Geese (3)	22	m	52	27	25
	*Due to full dat	turn-over	of State personnel at checking station cies not available.					
	TIMATED GOOS!	KTLL AL	JACENT TO REFUGE BOUNDARY					
10/23-1/5	ک <b>،</b> ۵۵۵	20,000	Snows (200), Canada (400), White-front (50)	650	55	502	12,000	705
						,	•	
	>							
			(over)					

#### SNOILDOHLSNI

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

1613							
	<b>Jecember 19<u>4 6</u>3</b>	(2)	Remarks	Pertinent information not specifically requested. List introductions here.			
	\$	(9)	Total	Estimated number using Refuge	006	v	
$\sim$	Amber .		တု	For For			
	Sept	(5)	emoval	For Re- guidode	J N E	O N E	
ស្ត	jo s		ž	gaitanuH	W	N	
ND GAME BIRI	Mont	(7)	sex Ratio	Percentage	unourun	unitrown	
UPLA			(3) Young Produced	Estimated Total		ф Я	
~		(E)		ops'v'd. Number	none	0	
				Acres per Bird	0.5	<b>K</b> 80	
	Refuge Salton Sea	(2)	Density	Cover types, total acreage of habitat	Ditch banks, road- sides and abandoned farmland.	Principel wover is Atriplex and Tamari	
3-1752 Form NR-2	(OFCI IIIdV)	(1)	Species	Common Name	Gambel's Queil	Ring-necked Pheasant	

#### SNOLLOUATENI

FOTTA NR-2 - UPLAND GAME BIRDS.\*

- : SEIDERS (I) Use correct common name.
- size of sample area or areas should be indicated under Remarks. observations and counts on representative sample areas. Survey method used and No. 7 should be used where possible. Figures submitted should be based on actual grass prairie, etc. Standard type symbols listed in Wildlife Management Series swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short information but not so much as to obscure the general picture. Examples: spruce of cover types. Cover types should be detailed enough to furnish the desired information need not be repeated except as significant changes occur in the area number of acres in each cover type found on the refuge; once submitted, this information is to be prefaced by a statement from the refuge manager as to the numbers. Density to be expressed in acres per animal by cover types. STUJ. hunts, etc.). Detailed data may be omitted for species occurring in limited Applies particularly to those species considered in removal programs (public (S) DENZILIS
- .tstiden guibeerd evitatneserger ni (3) KONG FRODUCED: Estimated number of young produced, based upon observations and actual counts
- other species if available. This column applies primarily to wild turkey, pheasants, etc. Include data on (7) SEX HVIIO:
- Indicate total number in each category removed during the report period. (5) REMOVALS:
- include resident birds plus those migrating into the refuge during certain seasons. Terimited total number using the reluge during the report period. : JATOT (3)
- include other pertinent information not specifically requested. Indicate method used to determine population and area covered in survey. Also :SXHAMAH (1)
- \* Ouly columns applicable to the period covered should be used.

	(g) Sex Ratio							
	) ated Refuge ation	As of Dec. 31						
、 1	(7 Estimé Total J Popule	At period of Greatest use						
F-	(6) roductions	Source						
r Yea	Int	Number						
alenda	(5) 8388	Tetniw Ninter			-			
	Γ	Disease						
		noltaber4				<u> </u>		
	8	Research For				•		
	4) 0V8]	Sold				<del> <sub></sub></del>		
	Rem (	FOT Re- Stocking		<u> </u>			<u></u>	
		ButtnuH						
n Sea	(3) Young Froduced	Number						
Refuge Salto	(2) Density	Cover types, total Acreage of Habitat	None on Refuge					
(June 1945)	(1) Species	Common Name						

Reported by \_

Ке**шатка:** 

BIG GAME

Refuge Salton Sea

3-1753 Form NR-3 (June 1945)

# INSTRUCTIONS

Form NR-3 - BIG GAME

- ヒ SFECIES: Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer. It 1s
- (2) DENSITY: grass prairie, etc. changes occur in the area of cover types. Cover types should be detailed enough to fur-Detailed data may be omitted for species occurring in limited numbers. Density to be should be used where possible. Figures submitted should be based on actual observations spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short nish the desired information but not so much as to obscure the general picture. Examples: the refuge; once submitted, this information need not be repeated except as significant statement from the refuge manager as to the number of acres in each cover type found or expressed in acres per animal by cover types. This information is to be prefaced by a Standard type symbols listed in Wildlife Management Series No.
- સિ YOUNG PRODUCED: Estimated total number of young produced on refuge

or areas should be indicated under Remarks.

and counts on representative sample areas. Survey method used and size of sample area

- E REMCVALS: Indicate total number in each category removed during the year
- ઉ LOSSES: On the basis of known records or reliable estimates indicate total losses in each category during the year.
- 6 INTRODUCTIONS: Indicate the number and refuge or agency from which stock was secured.
- 6 TOTAL REFUGE

POPULATION: Give the estimated population of <u>each species</u> on the refuge at period of its greatest abundance and also as of Dec. 31.

8 SEX RATIC: field observations or through removals. Indicate the percentage of males and females of each species as determined from

110008

3 -1755 Form NR-5 60701		DISEAS	E
	Refuge	Salton Sea	<u>Year 19. 63</u>
	Botulism		Lead Poisoning or other Disease
Period of outbreak	Septembe	r and October	Rind of disease Unknown (sewage pollution or pesticides)
Period of heaviest	losses Septer	mb <b>er <sub>on</sub> shore</b> birds -	Species affected Shore and wading birds
Losses: (a) Waterfowl (b) Shorebirds (c) Other	Actual Co	Dunt Estimated 2,000 1,000	Number Affected     Actual Count     Estimated       3     200     2-3,000
Number Hospitalized	No. Recov	vered 🔏 Recovered	Number Recovered unknown
<ul><li>(a) Waterfowl</li><li>(b) Shorebirds</li><li>(c) Other</li></ul>	none none		Number lost 2-3,000 Source of infection unknown
Areas affected (loca Entire <b>Refuge</b> shorel, poundments.	tion and <b>appr</b> ine and <b>salt</b> w	oximate acreagel vater sections of im-	Water conditions Receding sea levels during summer evaporation, high water temperatures (105°). Fresh water impoundments available adjacent to the Sea.
Water conditions (av are Shoreline <b>mudflats</b> ex <b>beginning middle of</b> S cay and pollution and	erage depth o as, refloodi posed during eptember o algae growth	of water in <b>sickness</b> ng of exposed <b>flats,etc.</b> g <b>summer</b> become flooded r during high win&. De- n heavy on these flats.	Food conditions <u>Excellent</u>
Condition of vegetation no vegetation present life becoming quite p Remarks <u>Fresh water w</u> poundmentsall summer (waterfowl) away fro reduced the botulism	tion and inve in the <b>Salt</b> er prominent. <u>as maintain</u> • <b>These</b> are m the pollute potential by	rtebrate <b>life</b> <u>Little or</u> n Sea. Invertebrate ed in the bulrush im- as attracted many birds ed areas and we believe at least <b>50%</b> .	Remarks <u>Hardest hit species during the summer were</u> the small sandpipers. Death was quite rapid showing little evidence of normal botulism symptoms. Die-off was also noticeable among slack-neck d stilts, avocets and white pelicans. Pesticides are in heavy use at periods of die- off,

# PUBLIC RELATIONS

(See Instructions on Reverse Side)

Refuge Salton sea

Calendar Year 1963

1. Visits

a. Hunting

26,296

b. Fishing none

c. Miscellaneous 3,000

d. TOTAL VISITS 28,305

la. Hunting (on refuge lands)

TYPE	HUNTERS	ACRES	MANAGED BY						
Waterfowl	296	400	FedState						
Upland Game									
B1g Game		<b>**</b> **							
Other									
Number of perman	ent blinds	0							
Man-days of bow	hunting incl	uded above	0						
Estimated man-days of hunting on lands adjacent to									
refuge <u>26.000</u>									
'ishing (area open to	o fishing on	refuge la	nds)						
TYPE OF	AREA	ACRES	MILES						
Ponds or Lakes									
Streams and Shor	es								
iscellaneous Visits									
Recreation	L.130	Official	120						

Industrial

35

2.	. Refuge Participation (groups)						
		On	Refuge	Of	f Refuge		
-	TYPE OF ORGANIZATION	NO. OF GROUPS	NUMBER IN GROUPS	N0. Of GROUPS	NUMBER IN GROUPS		
,	Sportsmen Clubs	<u>म</u> ें	60	I			
-	Bird and Garden Clubs	זאר	350	I			
	Schools	4	200	<b>2</b> I	100		
_	Service Clubs	1	30	I			
_	Youth Groups	<u>2</u>	<u>26</u>	Į			
-	Professional-Scientific	4	18	2	400		
_	Religious Groups	1	20	I			
_	State or Federal Govt.	10	60	2	20		
	Other		1				

3. Other Activities

TYPE	NUMBER	TYPE	NUMBER
Press Releases	0	Radio Presentations	0
Newspapers (P.R.'s sent to)	6	Exhibits	0
TV Presentations	1	Est. Exhibit Viewers	0

3-1756 (Rev. 4/63)

Economic Use

5

lb.

lc.

#### INSTRUCTIONS

Item 1: Total of a, b, and c, equal d.

"Visit" - definition. Any person who is on refuge lands or waters during a day or part thereof for the purpose of: hunting, fishing, bird-watching, recreation, business or economic use, official visit, or similar interest. INCLUDE - those who stop within the refuge while traveling on a public highway because of an interest in the area. EXCLUDE - persons engaged in oil or other industry not directly related to the refuge, persons using refuge as most direct route or principal avenue of traffic, and those boating on navigable rivers or the Intercoastal Canal, unless they stop to observe wildlife on the refuge.

<u>Computing visits</u>. Where actual counts are impractical, "sampling" is used with midweek and weekend samples varied by season or weather. A conversion factor of 3.5(of passengers per car) is used when accurate figures are not available. Each refuge will develop a conversion factor for boats based on range of usage. Count a camper once for each 24-hour period or fraction thereof.

Item la: Acres - of refuge open for each type of hunting.

Managed hunts require check in and out of hunters, issuance of permits, or assignment of blinds.

Other - INCLUDE crow, fox, and similar hunting.

Lands adjacent to refuge. Normally considered within 1 mile or less of boundary, unless established sampling procedures cover a wider area. For big game hunting, the distance may be greater.

- Item 1b: <u>Acres of streams</u> open to fishing, if practical; otherwise just miles open. Information on "shores" is primarily for coastal fishing.
- Item 1c: <u>Recreation</u>. INCLUDE photography, observing wildlife, picnicking, swimming, boating, camping, visitor center use, tours, etc. TOTAL Recreation, Official, and Economic Use visits under Item 1.

Industrial. INCLUDE persons engaged in industry, i.e., oil industry or factories. EXCLUDE these from Item 1.

- Item 2: INCLUDE the "On Refuge" groups in Items lc and l. In "Off Refuge" column include only those group meetings in which refuge employees actually participate. EXCLUDE these from Items lc and l.
- Item 3: Exhibits INCLUDE displays, fairs, parades, and exhibits OFF the refuge; EXCLUDE those ON.

3-1757 Form NR-7 (Rev. June 1960)

(1) NONAGRICULTURAL COLLECTIONS, RECEIPTS, AND PLANTINGS

Refuge Salton Sea Year 19 63

	(See	Coll ds, r	ection:	s and Re <b>cks, tre</b>	eceipts es], h	<b>r</b> ubs)		(	PLant Marsh - Aqua	ing <b>s</b> tic - Upland	)		
Species	Amount (Lbs., bus., etc.)	(2) C or R	Date	Method or Source	cost	<b>(3)</b> <b>Total</b> Amount on Hand	<b>Location</b> of <b>Irea</b> Planted	Rate of Seeding or Planting	Amount <b>Planted</b> (Acres or Yards of Shoreline)	Amount and Nature of <b>Propagules</b>	)ate	Survival	Cause of Loss
Jap Millet H H H H						8,450	Tract 5-I Tract 2-II Tract 2-II	30#/ac. 30#/ac. 80#/ac.*	<b>60 acres</b> 60 <b>acres</b> 60 <b>acres</b>	1800 lbr 1800 <b>lbs</b> 4800 lbs	'/17 1/11 1/5	75% 10% 20%	vater poor control
rush (S. Tuberos	10,570 is)	R	12/18	Koda Bros.	2 <sup>°</sup> i7.a)	10,570	Tract <b>4-II</b> d <b>ract 14-I</b> Tract 3-1 Tract 4-I	35#/ac. 35#/ac. 27#/ac. 27#/ac.	60 acres 90 acres 60 acres LOO acres	2100 lbs 3150 lbs 1620 lbs 2700 lbs	1/8 1/11 1/20 1/20	50% 80% 80%	(1) (2) (3)
(1) <b>Report</b> (2) <b>C = Co</b>	agronom	ic fa 18 an	erm cro nd R = 1	ps onF Receipta	onnNR-	- 8	Remarks: (1) (2) Poor wat	Loss of ha	alf the trac	t by <b>inundat</b>	ion of	Salton se	a

(3) Use "S" to denote surplus

# Total acreage planted:

430 Marsh and aquatic hedgerows, cover patches Food striper, food patches

Forest plantings

\* The original seed was purchased in 1961 and germination la poor. Tigher than normal seening rate was used as an experiment and to use up seed,

INTERIOR -- POR LAND, OREGON

3-1758 rm NR-8		Fish and V	) Vildlife	e Service	Branc	h of Wildl	ife Refuge	S		
(Rev. Jan. <b>1956)</b>			CULTIVA	ATED CROPS	- HAYING	- GRAZING				
Refuge Sa	lton Sea			County	In	perial		State	Californ	ia
Cultivated Crop8	<b>Pern</b> Share	ittee's Harvested	Gove Ha	ernment's S m <b>rested</b>	hare or Unha	Return rvested	Total Acreage	Green Ma Cover al fowl Bro	nure, nd Water- owsing Crops	Total
Grown	Acres	Bu./Tons	Acres	Bu./Tons	Acres	Bu./Tons	Planted	Type and	1 Kind	Acreage
fariout Barley fariout Barley			10	15 tons	200	320 tons	550	Matured : and used Green bat browse	from 1962 cr for seed in rley for	<b>60</b> 1963. 550
								Fallow Ag	g. Land	nono
No. of Permittees:	Agricultur	al Operatio	ons n	one	Haying	perations	none	Grazin	g Operation	,s none
Hay - Improved (Specify Kind)	Tons Harvested	Acres	Cash Rever	n ( nue	GRAZING	Num Ani	<b>ber</b> mals	AUM' S	Cash Revenue	ACREAGE
none				1.	Cattle	nor	ne			
				2.	Other					
				1.	Total Re	efuge Acrea	age <b>Under</b>	Cultivatio	on	550
Hay - Wild	none			2.	Acreage	Cultivated	l as Servi	ce Operati	lon	550

.

# DIRECTIONS FOR PREPARING FORM NR-8 CULTIVATED CROPS - HAYING - GRAZING

Report Form NR-8 should be prepared **on** a calendar-year basis for all crops which **were** planted during the calendar year and for **haying** and grazing operations carried on during the same period.

Separate reports shall be furnished for Refuge lands in each county when a refuge is located in more than one county or State,

<u>Cultivated Crops Grown</u> - List all crops planted, grown and harvested on the refuge during the **reporting** period regardless of purpose. Crops in kind which have been planted by more than one **permittee or** this Service shall be combined for reporting purposes.

**Permittee's** Share -Only the number of acres utilized by the permittee for his own benefit should be shown under the Acres column, and only the number of bushels of farm crops harvested by the permittee for himself should be shown under the <u>Bushels Harvested</u> column. Report all crops harvested in <u>bushels</u> or fractions thereof except such crops as **silage**, watermelons, cotton, tobacco, and hay, which should be reported in tons or fractions thereof.

<u>Government's Share or Return - Harvested</u> - Show the acreage and number of bushels harvested for the Government of crops produced by permittees or refuge personnel. <u>Unharvested</u> -Show the exact acreage and the estimated number of bushels of grain available for wildlife. If grazing is made available to waterfowl through the planting of grain, cover, green manure, grazing or hay crops, estimate the tonnage of green food produced or utilized and report under <u>Bushels Unharvested</u> column.

Total Acreage Planted - Report all acreage planted, including crop failures.

<u>Green Manure, Cover and Waterfowl Grazing Crops</u> - Specify the acreage, kind and purpose of the crop. These crops and the acreage may be duplicated under cultivated crops if planted during the year, or a duplication may occur under hay if the crop results from a perennial planting.

**Hay - Improved** - List separately the hinds of improved hay grown. Annual **plantings sh**ould also be reported under <u>Cultivated Crops</u>, and perennial hay should be listed **in the same** manner at time of planting.

Total Refuge Acreage Under Cultivation - Report total land area devoted to agricultural purposes during the year.

3-1979 (NR-12) (9/63)	Bure.	au of Sport Fisheries	ilbliw bug	e Ee	Ref	uge Salton Sea	đ	
	ANNUAL KE	PORT OF PERSILOI		ICATION	Pro	posal Number	Reporting Y	ar
INSTRUCTION	<b>JS:</b> Wildlife Refuges <u>Ma</u>	<u>anual, secs, 3252d, 3394b an</u>	d 3395.				Cal. 1	963
Date(s) of Application	List of Target Pest(s)	Location of Area	Total Acres	Chemical(s) Used	Total Amount of	Application Rate	Carrier and	Method of
(T)	(2)	I reated (3)	Ireated (4)	(5)	Chemical Applied (6)	(1)	Kate (8)	Application (9)
				Ŧ				
10. Summary	of results (continue on re	everse side, if necessary)						

2

No applications at this station during the period.

35 500

#### "Count 'em!"

Snow geese concentrated in Tract L, Unit I, an alkali bulrush impoundment. The geese are packed in bill-to-tail for a distance of almost 1/2 mile. The view is fore-shortened as it was taken with • LOOmm lens.

R-52/20 December 1963 Henson

Close up of snow geese in one of the bulrush impoundments at Unit I. Note good percentage of juveniles. A number of both red and green neck-banded geese were in this flock.

R-59/17 December 1963 Nowak

ĥ



# Photo Transect No. 4

Tract Ho. 4, Unit I Pine	0930 -	10 8/8/	63
Carera 4x5 Speed Graphic	Lens 270mm	a an	الم
Shutter speed 1/400	Aperturef	,16	لور بر دیکھتریں ہے۔ اور میں توجیع کی میں بر میں
Film Tri-X	Film speed (A)	<u>3A) 400</u>	. 7 27 1. <b>222 100</b> 6.2 100 Taylor (1976) 10 20 10 10 10 10 10 10 10 10 10 10 10 10 10
Elevation of Correra bed of pickup	Domnass direc	tion west	14.4944-001-007100710071007-001-001000-0122-
Weather conditions hi haze - hot	and humid (ter	mp. 116°, (	52% humidity)
Conments Although this photo we change in vegetation by November bulrush and an increase in cattain	as taken in Au Some additional Some Some Some Some Some Some Some Some	ust there onal volum or water an	was not much teer green

R-48/6

 $\Box$ 

Nowak

Photo Tran	sect No	4	
Tract Ro. 4, Unit I Fine	1030	Date	12/13/63
Comerce 4x5 Speed Graphic	Lens	270mm	A Performanta a participation of the state of the
Shutter speed 1/200	Aperture	f.45	a Bara d'Andrés - Vient Barda d'Andrés d'Andrés (Andrés - Vientes)
Film Tri-X	Filn speed	(ASA)	100
Elevation of Camer pickup bed	Compass di	rection	vest
Weather conditions clear but hase	on horigan	. Tempe	rature 750
Comments The two photo's will sh rush planttubers to seedhead. H peaked at 53,000, no vegetation we reproduction in 1964, this tract we seeding.	how the util by January 1 as left. To will be give	lization 1, when o assure en a lig	of the entire bul- the population successful and full ht aerial booster

R-55/3

Nowak





# Photo Transect Ko.\_\_\_3

Tract No1A, Unit-I(	Drive_8/8/63
Gumera 4x5 Speed Graphic	Terris 2.70mm
Shutter speed_1/400	Aneroure 1.16
Film	Film speed (ASA) 400
Elevation of Comera pickup bod-	Compass direction west
Neuther coeditions Hi hane - hot	and humid

Connerts North 2 of Tract 1A aerial seeded 3/11/63. Growth was slow until end of July. By end of August, standwas quite luxuriant, Submergents quite well established in deep ends. In comparing this with growth In Transact No. 4, note difference inheight of bulrushplant. This is partly due to deeper water but mostly to stunted growth due to higher soil salinity in Tract 1A. Seed production, was good but slightly leas than in Tract4.

# R-48/4

Nowak

Photo Transact No. \_\_\_\_\_.

Bruct Ho 14, Unit I - Time 10	15 12/13/63
Comerca	
Shutter speed1/200	for the fully
Fin Tri-X	Film speed (ASA) 400
Elevation of Camera -pickup bed	Compass direction west
Keuther conditions clear with hor	izon haze, Temp. 75°.
all of the submergent vegetation rapid growth ofsalt cedarinfore	w geese - 95% By January 1. Practically has been utilized by ducks. (Note ground between August and December.)

R-55/12

Nowak



Widgeon and pintail in Tract IA. Normal pattern in all the bulrush tracts evolved down to the geese moving in, cleaning up all the green vegetation and in so doing shelled-out the seed heads. Several days after the geese moved on to fresh areas the tucks moved in to utilize the seed. During the week of December 25th, 50,000 widgeon were using the bulrush areas.

R-59/9 December 1963 Heneox

Nowek

Aview very typical of the refuge boundary hunter's problem. Refuge boundary immediately to the right of the picture and private hunting club land immediately to the left. An irrigation canal on me side of the road and a drainage ditch on the other. The hunter only hopes he can drop his googe right on the road. We have miles of refuge boundary subjected to this type of pressure.

R-50/L December 1963 Henson



The drainage problem typical of most of the refuge barley fields. Levations on the lower end of the fields are becomming lower than the level of the main IID drains. It has become! necessary to dike off the field and then pump the irrigation tail water over the dike into the main drain. Through this method we managed to produce some barley in 1963, but the fiel is will have to be converted to bulrush impoundments next year. Tractl, unit II.

<b>R-58/11</b> Octobe	r <b>1963</b>
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Precarious as are the refuge elevations today a good rain could almost put us out of business. In September a one inchrainwas experienced -- the Alamo River was unable to carrytheflow at the delta and overflowed it's banks, Over one mile of the Red Hill Marina road went under water immediately. Our Tracts 7-11, end 15-22, Unit IT are to the left and adjacent to this road. Fortunately both tracts were protected by temporary low dikes.

**R-58/6** 

September 1963

Nowak

Nowak





Anyone for a kettle of hot steam and a bucket of chemicals; ? This one adjacent to our Tract 15-22, Unit II boundary will produce 600,000 lbs. of steam and 2080 tons of chemicals every 24 hours. It it one of Shell Oil Co.'s geo-thermal drilling rigs and represents an investment of one-half million dollars. One of six steam wells already drilled just outside the refuge area.

R-54/12 December 1963 Nowak

