

# **FARM/WETLAND ROTATIONAL MANAGEMENT - A HABITAT MANAGEMENT ALTERNATIVE FOR TULE LAKE NATIONAL WILDLIFE REFUGE**

## **INTRODUCTION**

Tule Lake National Wildlife Refuge (NWR) is located in extreme Northern California in Modoc and Siskiyou Counties approximately 6 miles west of the town of Tulelake, California. The refuge is one of 6 refuges within the Klamath Basin NWR complex.

Historic Tule Lake fluctuated widely from >100,000 acres (1890) to 53,000 acres (1846) (Abney 1964). Record highs and lows for the lake were undoubtedly greater before written records were kept. High water marks on surrounding cliffs indicate levels 12 feet higher than the 1890 records (Abney 1964). These extremes of water level were the key to maintaining the high aquatic productivity of this ecosystem. The historic lake was bounded on the north and west by vast expanses of tule marshes which supported tremendous populations of colonial nesting waterbirds and summer resident and migratory waterfowl.

In 1905, the states of Oregon and California ceded to the United States the lands under both Tule and Lower Klamath lakes. In that same year, the Bureau of Reclamation (BOR) filed Notice of Intention to utilize all unappropriated waters of the Klamath Basin (Pafford 1971) and ultimately the Klamath Project was approved. As part of the Klamath Project, the Clear Lake dam was completed in 1910 and the Lost River diversion was completed in 1912. The Clear Lake dam was intended to store water in the Lost River

basin for irrigation and the Lost River Diversion routed water directly to the Klamath River thus removing the major source of water to Tule Lake. As a result to these actions, Tule Lake receded in size. As this process occurred, parcels of the lake bottom were opened to homesteading. Between 1922 and 1948 44,000 acres were homesteaded into 613 farm units (Pafford **1971**).

## **LEGISLATIVE HISTORY**

Tule Lake NWR was created by Executive Order Number 4975 dated October 4, **1928**, and amended by 2 subsequent Executive Orders (Number 5945 dated November 3, 1932 (enlarged to 11,000 acres), and Number 7341 dated April 10, 1936 (enlarged to 30,000 acres)), the refuge was superimposed on lands ceded to the United States for reclamation purposes by the State of California as part of the Modoc Unit of the Klamath Reclamation Project. The present acreage of the refuge is 39,116 acres.

As mentioned previously, homesteading proceeded until 1948. After this time controversy developed between agricultural interests and conservationists over whether areas of Tule Lake refuge would be homesteaded. As a result of this debate, the Kuchel Act (Public Law 88-567) was passed on September 2, 1964 (Appendix 1). The Act declared that the lands within Tule Lake, Lower Klamath, Upper Klamath, and Clear Lake National Wildlife Refuges were dedicated to the major purpose of waterfowl management, but with full consideration to optimum agricultural use that is consistent therewith and that the refuge would not be opened to homestead entry (Sec. 2). The Act also allowed the Secretary to continue, consistent with waterfowl management, the present pattern of leasing the agricultural lands of the refuge (Sec. 4), and disallowed reductions to the present 13,000 acre sumps (Sec. 5).

The National Wildlife Refuge Administration Act of 1966, as amended in 1976 (Public Law 94-233), designated the U.S. Fish and Wildlife Service (FWS) as the agency required to administer units of the Refuge system, including Kuchel Act lands. An Interior solicitor's opinion of May 26, 1976, allowed for the continued presence of the Bureau of Reclamation on Kuchel Act land by way of a cooperative agreement which recognized the Fish and Wildlife Service's ultimate administrative control. This was necessary because the BOR administers the agricultural leasing program on the refuge. The one modification to the leasehold renewal procedure at this time, according to the solicitor's opinion, was that the Fish and Wildlife Service must make the ultimate decision whether the renewal of a particular agricultural lease is consistent with proper waterfowl management, as required by the Kuchel Act. Subsequent to these Congressional actions in 1976, the Fish and Wildlife Service and the Bureau of

Reclamation entered into a cooperative agreement in 1977. Again the cooperative agreement provided for the continued presence of and operations on the Kuchel Act lands by the BOR, subject to the ultimate administrative control of the FWS.

### **CURRENT CONDITIONS**

The Kuchel Act had 3 major purposes: 1. to stabilize ownership of the refuges within the Klamath Project, 2. to eliminate homesteading of these refuges, and 3. to preserve the waterfowl values of the refuges. Since passage of the Act, its implementation has worked as a compromise. The agricultural community retained the mechanism (leasing) to continue farming, and conservationists were assured that homesteading and further drainage of the lake was stopped. In 1964, when the Kuchel Act was passed, the large acreage of agricultural crops was required to feed the tremendous populations of waterfowl in the Klamath Basin. In addition, these crops delayed the southward migration of waterfowl into the Central and Imperial Valleys of California where crop depredation was a serious problem.

Implementation of the Kuchel Act has frozen management of the Tule Lake NWR in time and has failed in one of its primary objectives; preservation of waterfowl values. Water levels were stabilized in the sumps and the agricultural lands remained intensively farmed. The stabilization of wetlands removed the very process that maintained the productivity of historic Tule Lake. As a consequence, wildlife and habitat values have declined over time. Specifically:

1. A lack of habitat diversity has led to reduced wildlife species diversity.
2. Productive marsh habitat has declined in Sump 1(A) due to siltation.
3. Waterfowl use has declined since late 1960's (Appendix 2), while on adjacent Lower Klamath NWR the same pattern is not evident (Appendix 2).
4. A decline breeding populations of waterfowl has occurred, especially redheads and gadwalls (Appendix 3).
5. Siltation has reduced deep water habitat for endangered suckers. Currently, <10% of the sumps are utilized by these fish.

Possible reasons for these declines in wildlife/habitat values include, siltation of the sumps, stabilized water levels, a lack of aquatic habitat diversity, water quality, and pesticides. Although it is difficult to determine the degree to which each of these factors is responsible, stabilized water levels and siltation are suspected to be the largest reasons for noted declines in wildlife values.

Agriculture is also not without problems. Specifically:

1. Soil born pathogens are reducing yields of crops.
2. Wind erosion and decomposition are reducing the organic matter content of the soil (a key to soil structure and fertility).
3. The current agricultural system is not sustainable.

### **ALTERNATIVES**

The problems facing Tule Lake NWR have been recognized for many years and potential solutions have been discussed. These solutions include:

1. No action - essentially the present situation.
2. Conversion of entire refuge to wetlands.
3. Dredging of channels and ponds in the sumps to remove sediment.
4. Farming Sump 1(A) and moving the water into the Southwest Sump.
5. Farm/wetland rotational management.

Farm/wetland rotational management (“sump rotation”) appears to be the most viable solution to the problems facing both agriculture and wildlife management. The following discussion presents the concept behind this proposal.

### **FARM/WETLAND ROTATIONAL MANAGEMENT**

Farm/wetland rotation management is the preferred option to alleviating the problems on Tule Lake NWR. **The purpose of this program is to return to Tule Lake NWR the ecological processes that historically produced diverse productive wetlands and deep water habitats while maintaining economically viable sustainable agriculture.** This project would involve dividing the present refuge into 1,000-5,000 acre management units (Appendix 4) and rotating wetlands and agriculture among these units. Agriculture would be used:

1. to provide food for waterfowl and other wildlife species and
2. as a tool to set back succession in wetlands.

Wetlands would:

1. provide habitat for a diverse array of wildlife species,
2. replenish organic matter in soils, and
3. reduce populations of soil born pathogens, thus reducing the need for pesticides.

One unit of 2,995 acres at the north end of the Southwest sump would be in long-term (>50 year) permanent water as habitat for the endangered suckers. In other units management would proceed on either a long-term or a short-term rotation cycle. The long-term cycle would include 15-20 years of wetlands followed by a similar time period of farming. The objective of this cycle is to maintain several wetlands in late succession for those wildlife species which are so adapted. The short-term cycle would involve 2-5 years of wetland management followed by 2-5 years of farming, thus maintaining habitat for species adapted to early successional wetlands. This concept of rotational management is in use on Lower Klamath NWR with promising results. The leasing program under this rotational management program would continue to be consistent with waterfowl management as specified in the Kuchel Act.

### **EXPECTED BENEFITS**

Wetland/farm rotational management is expected to increase the use and diversity of wildlife and the sustainability of agriculture on Tule Lake NWR. Anticipated benefits include:

#### **Wildlife:**

1. Increased use by endangered/threatened species (bald eagle and shortnosed and Lost River suckers).
2. Increased use by fall and spring migrant waterfowl.
3. Increased use and production of shorebirds.
4. Increases in waterfowl production.
5. Increased use by colonial nesting waterbirds (ibis, herons, egrets, etc.).
6. Increases in the wildlife species diversity of the refuge.

#### **Agriculture:**

1. Reduced use of pesticides and fertilizers while maintaining or increasing yields of crops.
2. Development of new techniques to increase the sustainability of agriculture which may be applicable to private lands.

## **ISSUES**

There are several issues that need to be resolved before the project can proceed. The following is a list of important issues.

1. Do organochlorine pesticides remain in the sediments of the lake?
2. What will be the impacts to water quality of this program?
3. What are the fates of pesticides/fertilizers under this program?
4. How will wetland habitat and associated wildlife respond to this project?
5. What is the wildlife disease potential of this program?
6. Is the project feasible under the existing Kuchel Act?

## **RESEARCH**

Prior to initiation of farm/wetland rotational management, answers to the above mentioned questions must be found. Research is currently underway to address these issues. The specific objectives of the research include (from Shennan et al. 1993):

1. to conduct pilot studies to assess the feasibility of wetland/cropland rotation (flooding of existing cropland to create new wetlands, and drainage of existing wetland to create new farmland) as a long-term management option for sustainable co-existence of irrigated agriculture and wetland reserves in the Tulelake basin.
2. to determine the impacts of wetland/agriculture rotations using various management strategies on: water quality, seasonal dynamics of nutrient release/immobilization, pesticide residue movement, crop productivity, development of marshland vegetation and the quality of wildlife habitat created.
3. to compare the ability of managed wetland systems and irrigated croplands to remove or immobilize nutrients and other residues from agricultural drainage water.
4. to test the utility of short-term flooding cycles to control soil born pathogen and nematode populations within irrigated cropland rotations, and determine the extent of use of these temporary wetlands by wildlife.
5. to assess the socio-economic impacts and policy implications associated with rotational wetland/agriculture management systems.
6. to coordinate this project with other research/planning activities in the Klamath Basin, and facilitate involvement of different community groups, State and Federal Agencies and other organizations in the development of the pilot projects.

## SUMMARY

This program represents an ecosystem restoration project in which an economically viable sustainable agricultural system is incorporated into a productive mix of diverse wetland and deep water habitats. The project will serve as a demonstration area to showcase methods of reducing chemical use on crops, rebuild soil productivity, and provide habitats beneficial to wildlife. Many of these techniques may be useful to farmers on adjacent agricultural lands or in other areas of the nation. Ultimately, the program must address the principals of integrated pest management, sustainable agriculture, and the spirit of the Kuchel Act.

## LITERATURE CITED

- Abney, R. M. 1964. A comparative study of the past and present condition of Tule Lake. U.S. Fish and Wildl. Ser., Klamath Basin NWR.
- Pafford, R. J. 1971. History and future of the Klamath Reclamation Project. Presentation to the 5th annual Klamath Basin Natural Resources Forum (May 10, 1971). 10 pp.
- Shennan, C., H. Carlson, and M. Abrams. 1993. Rotational management of wetlands and croplands in the Tule Lake Basin. Research proposal, Dept. of Vegetable Crops, Univ. of Calif., Davis, Calif. 12 pp.

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Public Law 88-567  
88th Congress, S. 793  
September 2, 1964

An Act

78 STAT. 850.

To promote the conservation of the Nation's wildlife resources on the Pacific flyway in the Tule Lake, Lower Klamath, Upper Klamath, and Clear Lake National Wildlife Refuges in Oregon and California and to aid in the administration of the Klamath reclamation project.

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That it is hereby declared to be the policy of the Congress to stabilize the ownership of the land in the Klamath Federal reclamation project, Oregon and California, as well as the administration and management of the Klamath Federal reclamation project and the Tule Lake National Wildlife Refuge, Lower Klamath National Wildlife Refuge, Upper Klamath National Wildlife Refuge, and Clear Lake National Wildlife Refuge, to preserve intact the necessary existing habitat for migratory waterfowl in this vital area of the Pacific flyway, and to prevent depredations of migratory waterfowl on agricultural crops in the Pacific Coast States. Wildlife resources on Pacific flyway. Conservation.

SEC. 2. Notwithstanding any other provisions of law, all lands owned by the United States lying within the Executive order boundaries of the Tule Lake National Wildlife Refuge, the Lower Klamath National Wildlife Refuge, the Upper Klamath National Wildlife Refuge, and the Clear Lake Wildlife Refuge are hereby dedicated to wildlife conservation. Such lands shall be administered by the Secretary of the Interior for the major purpose of waterfowl management, but with full consideration to optimum agricultural use that is consistent therewith. Such lands shall not be opened to homestead entry. The following public lands shall also be included within the boundaries of the area dedicated to wildlife conservation, shall be administered by the Secretary of the Interior for the major purpose of waterfowl management, but with full consideration to optimum agricultural use that is consistent therewith, and shall not be opened to homestead entry: Hanks Marsh, and first form withdrawal lands (approximately one thousand four hundred and forty acres) in Klamath County, Oregon, lying adjacent to Upper Klamath National Wildlife Refuge; White Lake in Klamath County, Oregon, and Siskiyou County, California; and thirteen tracts of land in Siskiyou County, California, lettered as tracts "A", "B", "C", "D", "E", "F", "G", "H", "I", "J", "K", "L", and "N" totaling approximately three thousand two hundred and ninety-two acres, and tract "P" in Modoc County, California, containing about ten acres, all as shown on plate 4 of the report entitled "Plan for Wildlife Use of Federal Lands in the Upper Klamath Basin, Oregon-California," dated April 1956, prepared by the United States Fish and Wildlife Service. All the above lands shall remain permanently the property of the United States.

Appendix 1. Kuchel Act

SEC. 3. Subject to' conditions hereafter prescribed, and pursuant to such regulations as may be issued by the Secretary, 25 per centum of the net revenues collected during each fiscal year from the leasing of Klamath project reserved Federal lands within the Executive order boundaries of the Lower Klamath National Wildlife Refuge and the Tule Lake National Wildlife Refuge shall be paid annually by the Secretary, without further authorization, for each full fiscal year after the date of this Act to the counties in which such refuges are located, such payments to be made on a pro rata basis to each county based upon the refuge acreage in each county: Provided, That the total annual payment per acre to each county shall not exceed 50 per centum of the average per acre tax levied on similar lands in private ownership in each county, as determined by the Secretary: *Provided further*, That no such payments shall be made which will reduce the credits or the payments to be made pursuant to contractual obligations of the United States with the Tulelake Irrigation District or the payments to the Klamath Drainage District as full reimbursement for the construction of irrigation facilities within said district, and that the priority of use of the total net revenues collected from the leasing of the lands described in this section shall be (1) to credit or pay from each revenues to the Tulelake Irrigation District the amounts already committed to such payment or credit; (2) to pay from such revenues to the Klamath Drainage District the sum of \$197,315; and (3) to pay from such revenues to the counties the amounts prescribed by this section.

SEC. 4. The Secretary shall, consistent with proper waterfowl management, continue the present pattern of leasing the reserved lands of the Klamath Straits unit, the Southwest Sump, the League of Nations unit, the Henzel lease, and the Frog Pond unit, all within the Executive order boundaries of the Lower Klamath and Tule Lake National Wildlife Refuges and shown in plate 4 of the report entitled "Plan for Wildlife Use of Federal Lands in the Upper Klamath Basin, Oregon-California," dated April 1956. Leases for these lands shall be at a price or prices designed to obtain the maximum lease revenues. The leases shall provide for the growing of grain, forage, and soil-building crops, except that not more than 25 per centum of the total leased lands may be planted to row crops. All other reserved public lands included in section 2 of this Act shall continue to be managed by the Secretary for waterfowl purposes, including the growing of agricultural crops by direct planting and sharecrop agreements with local cooperators where necessary.

SEC. 5. The areas of sumps 1(a) and 1(b) in the Klamath project lying within the Executive order boundaries of the Tule Lake National Wildlife Refuge shall not be reduced by diking or by any other construction to less than the existing thirteen thousand acres.

SEC. 6. In carrying out the obligations of the United States under any migratory bird treaty, the Migratory Bird Treaty Act (40 Stat. 755), as amended, or the Migratory Bird Conservation Act (45 Stat. 1222), as amended, waters under the control of the Secretary of the Interior shall be regulated, subject to valid existing rights, to maintain sump levels in the Tule Lake National Wildlife Refuge at levels established by regulations issued by the Secretary pursuant to the contract between the United States and the Tulelake Irrigation District, dated September 10, 1956, or any amendment thereof. Such regulations shall accommodate to the maximum extent practicable waterfowl management needs.

~~RESTRICTIONS~~

3 STAT. 850.

3 STAT. 851.

USC 710.  
715.

SEC. 7. The Secretary is hereby directed to complete studies that have been undertaken relating to the development of the water resources and waterfowl management potential of the Clear Lake National Wildlife Refuge. The results of such studies, when completed, and the recommendations of the Secretary shall be submitted to the Congress.

Research studies.

Report to Congress.

SEC. 8. The Secretary may prescribe such regulations as may be necessary to carry out the provisions of this Act.

Approved September 2, 1964.

LEGISLATIVE HISTORY:

HOUSE REPORTS No. 1072 (Comm. on Interior & Insular Affairs) and No. 1820 (Com. of Conference).

SENATE REPORT No. 341 (Comm. on Interior & Insular Affairs).

CONGRESSIONAL RECORD:

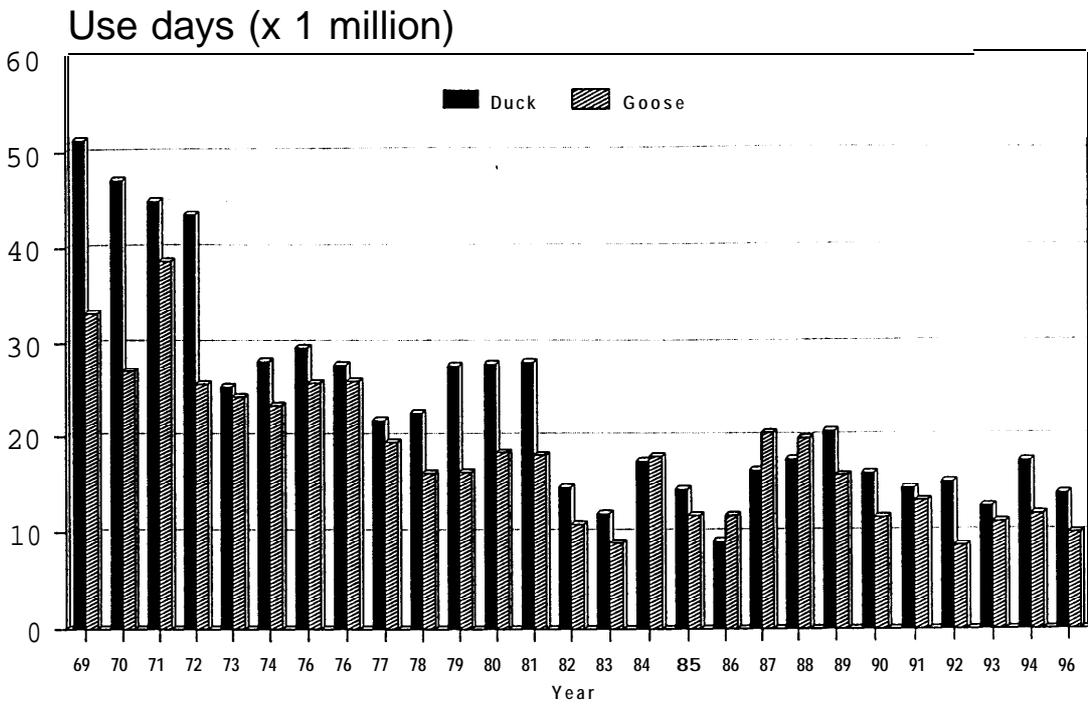
Vol. 109 (1963); July 15, considered and passed Senate.

Vol. 110 1964: Apr. 20, considered and passed House, amended.

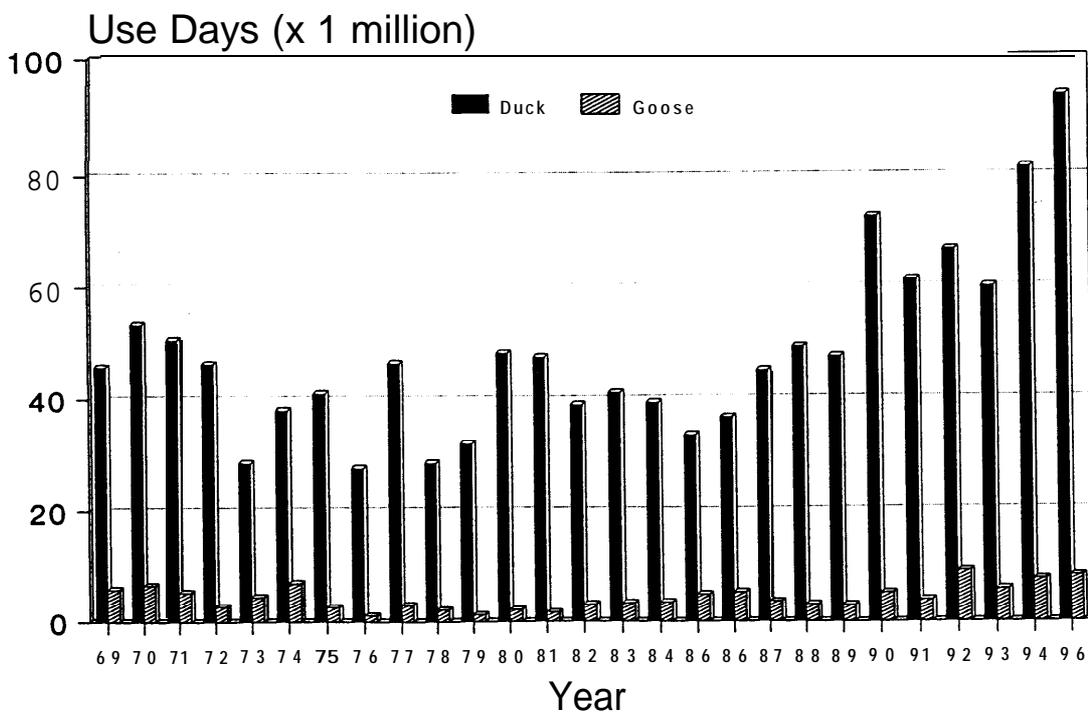
Aug. 18, House agreed to conference report.

Aug. 19, Senate agreed to conference report.

# DUCK AND GOOSE USE DAYS, 1969-95. TULE LAKE NWR

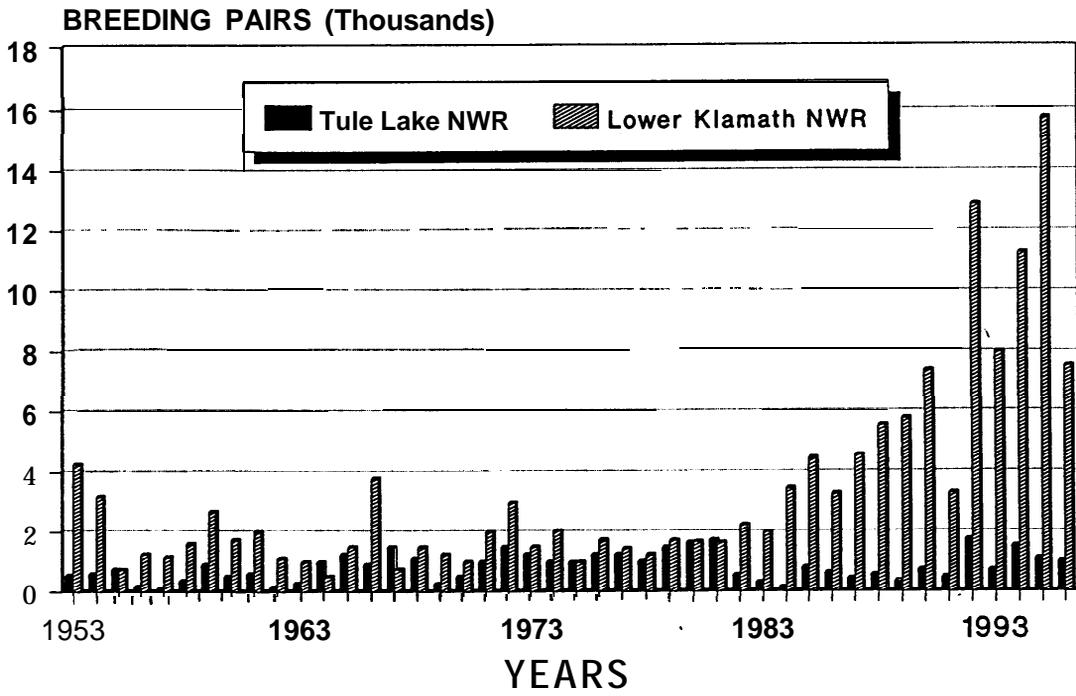


# DUCK AND GOOSE USE DAYS LOWER KLAMATH NWR, 1969-95.

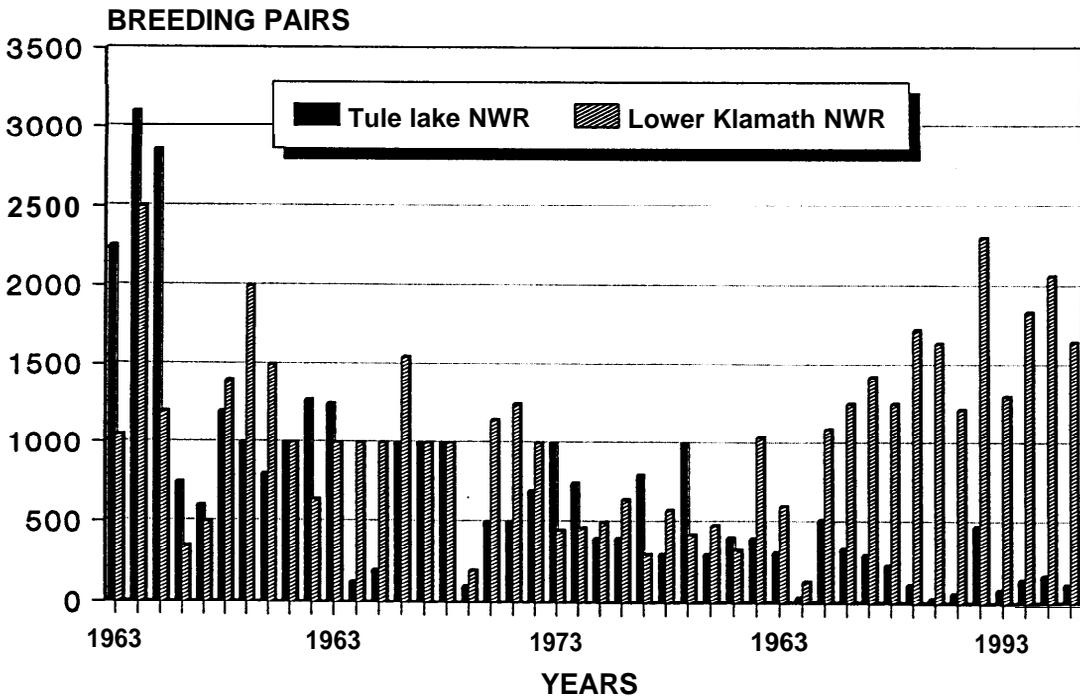


APPENDIX 2. DUCK AND GOOSE USE DAYS  
TULE LAKE AND LOWER KLAMATH NATIONAL WILDLIFE REFUGES,  
CALIFORNIA, 1969-1995

# ESTIMATED GADWALL BREEDING PAIRS, TLNWR AND LKNWR, 1953-96.

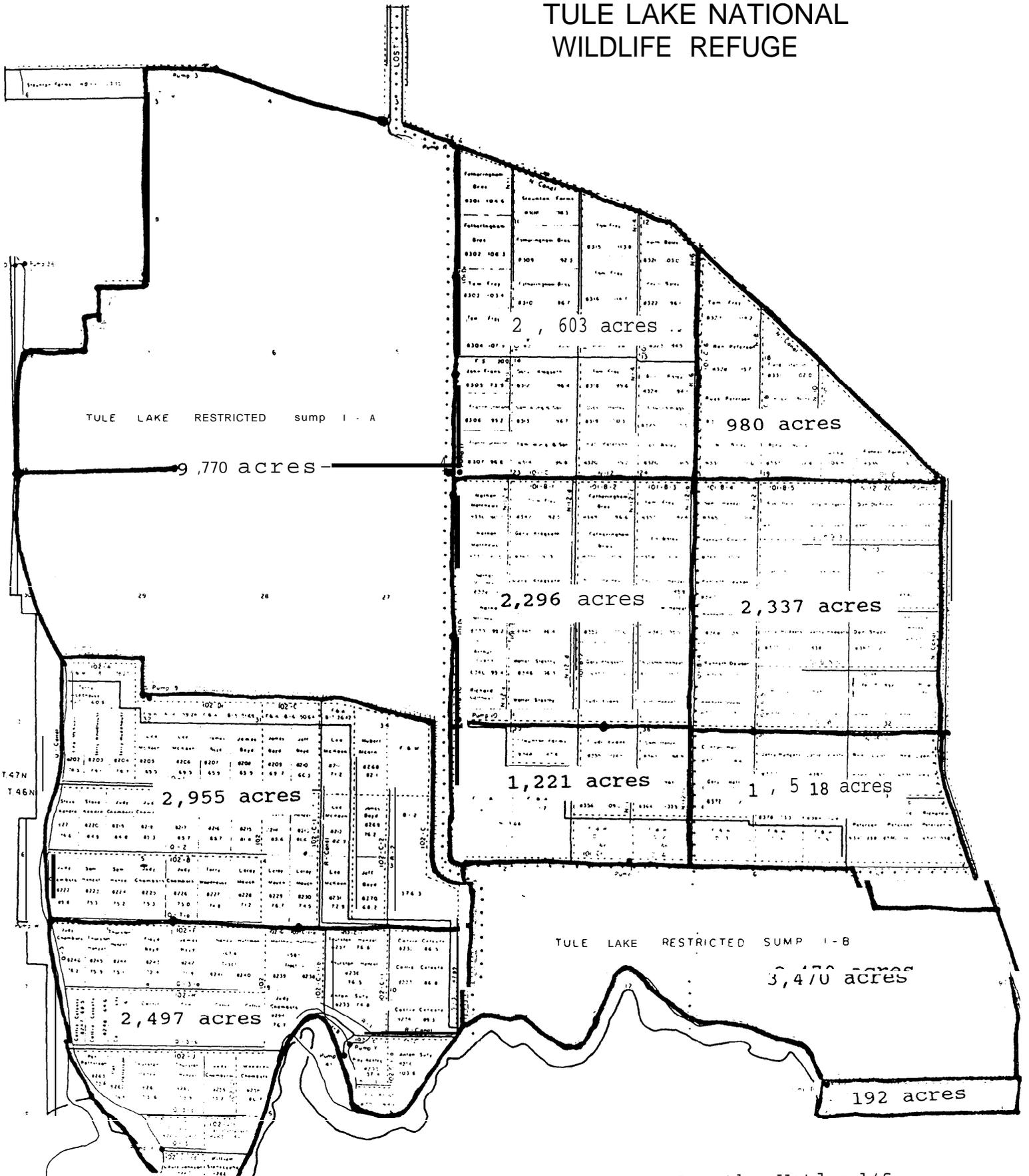


# ESTIMATED REDHEAD BREEDING PAIRS, TLNWR AND LKNWR, 1953-96.



APPENDIX 3. REDHEAD AND GADWALL BREEDING POPULATIONS  
TULE LAKE AND LOWER KLAMATH NATIONAL WILDLIFE REFUGES,  
CALIFORNIA, 1953-1996.

# TULE LAKE NATIONAL WILDLIFE REFUGE



Appendix 4. Potential management units under the Wetland/farm rotational management scenario, Tule Lake NWR, California.