
CHAPTER IV K

San Luis National Wildlife Refuge Alternative Plans



*U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION*

CHAPTER IV K

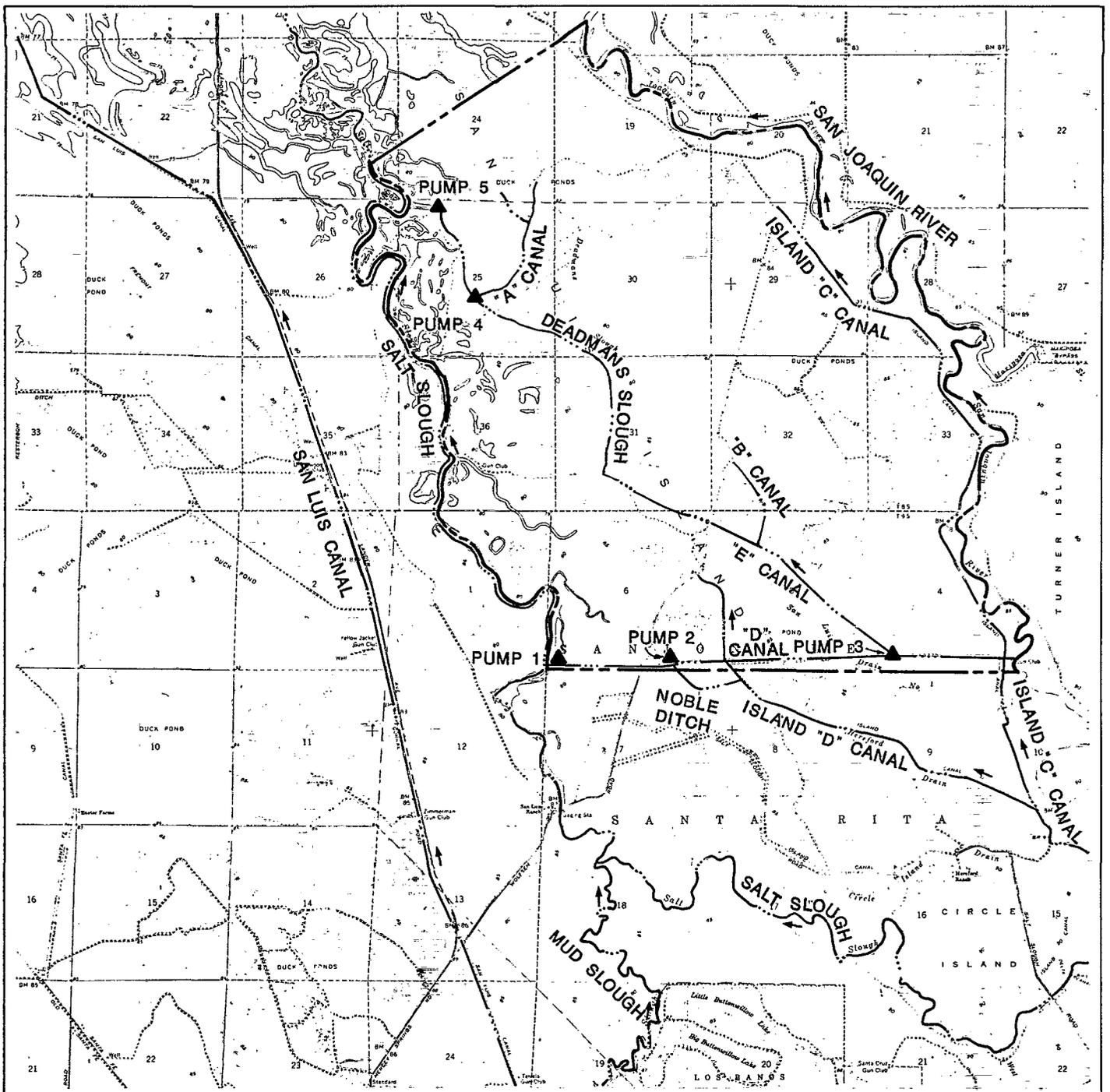
SAN LUIS NATIONAL WILDLIFE REFUGE

The Migratory Bird Conservation Commission created the 7,360 acre San Luis National Wildlife Refuge in 1966 under the Migratory Bird Conservation Act. The refuge was expanded in 1970 to 7,430 acres with proceeds from the sale of duck stamps. The refuge is located 12 miles northeast of the City of Los Banos, is part of Grassland Resource Conservation District (GRCD). Managed by the U.S. Fish and Wildlife Service, the refuge provides nesting, migration, and wintering habitat for ducks and geese, habitat for other migratory birds, recreational opportunities, and preservation of California's early ranch lands and valuable native grasslands.

The refuge is an interior island, flanked by riparian zones associated with Salt Slough on the west and the San Joaquin River on the east, as shown on Figure IV K-1. Land use on San Luis NWR can be classified as mixed marsh, upland, and riparian habitat. Approximately 3,500 acres of both natural and man-made marshlands, together with numerous historic San Joaquin River oxbows, are managed as marshes for maximum moist-soil plant production. These areas provide important feeding grounds for wintering waterfowl. Approximately 4,000 acres of the refuge are native grasslands and support a diversity of flora and fauna indigenous to the Central Valley. The refuge has recently identified a 5,500 acre addition, including permanent and seasonal wetlands. Pre-acquisition efforts are underway.

A. WATER RESOURCES

Under current management practices, water is provided to the ponds and sloughs at least once during the summer months for volunteer perennial and annual marsh plants, and for flooding the marsh beginning mid-September. Water deliveries are continued as needed throughout the remainder of the winter. Usually, by the end of February, the seasonal rains are sufficient to maintain the marshes and pumping is stopped. The mixed marsh is not considered permanent marsh because it is not wet year-round but is flooded periodically to maintain the vegetation. Future plans call for the establishment of some permanent marshlands on the refuge. Approximately 100 acres of mixed marsh are irrigated several times during the summer months and managed to produce herbaceous browse for Tule elk. The native upland habitat is kept in its natural non-irrigated state. The riparian habitat thrives along Salt Slough and the San Joaquin River and does not require irrigation for management. However, riparian habitat located elsewhere on the refuge requires at least one summer irrigation. Any future groundwater pumping on adjacent lands, which would affect the water table, may necessitate supplemental water flows in the riparian zones (USBR, 1986a).



LEGEND

- — — — — REFUGE BOUNDARY
- — — — — WATER COURSE
- DIRECTION OF FLOW

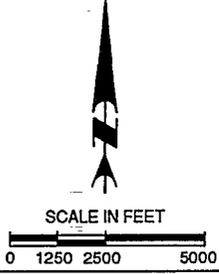


FIGURE IV K-1
SAN LUIS NATIONAL WILDLIFE REFUGE
EXISTING WATER SUPPLY FACILITIES



1. Surface Waters

Salt Slough forms the western boundary of San Luis NWR and was, until recently, the major source of water for the refuge. In 1985, this water was determined to be unacceptable due to water quality problems. The maximum yearly diversion permitted under the refuge's water rights is 19,910 acre-feet from Salt Slough. Salt Slough is an intermittent stream originating just southeast of the refuge at the junction of the Merced, Fresno, and Madera County lines. It empties into the San Joaquin River about seven miles north of the San Luis NWR. Most of the water in Salt Slough originates from operational spills, waste, and return flow from the San Luis Canal Company (SLCC) and the Central California Irrigation District (CCID). The quality of water from Salt Slough is currently unsatisfactory due to selenium contamination (>2 ppb) and therefore the Service has discontinued using Salt Slough waters for waterfowl habitat management (USFWS, 1987i). The refuge also has received delivered water from the San Luis Canal Company and from overflow and drainage. Discharge from Mud Slough, reaches the refuge via Salt Slough. Grasslands Water District and Los Banos WMA, among others, discharge water into Mud Slough.

San Luis NWR has also agreed, via deed encumbrances, to receive drainage and overflow irrigation water from the SLCC. This water is received from neighboring lands at three points along the refuge's southern boundary. The amount has been quite substantial, but the source is not dependable and has been difficult to measure until recently. It is estimated to be anywhere from 800 to 4,000 acre-feet per year.

Other sources of water for the refuge are from the SLCC and from domestic wells. In 1977 and in other years prior to 1974, the Service has had to buy water from SLCC to offset potential water shortages in Salt Slough. The SLCC is delivering interim CVP water to the refuge as a Salt Slough replacement. The refuge has one or two domestic wells which supply refuge buildings with water but are not used for habitat management. Table IV K-1 lists water delivered to San Luis NWR. Estimated annual water requirements and the existing dependable supply of water for the San Luis NWR are 19,000 acre-feet and 0 acre-feet, respectively, as presented in Table IV K-2.

As mentioned previously the only water rights for the refuge are from Salt Slough which currently has contaminated water. The only other available source of water is the current source: imported surface water obtained from the CVP on an interim basis from Reclamation and delivered via SLCC facilities.

2. Water Conveyance Facilities

The SLCC is currently transporting CVP water to San Luis NWR through three conveyances, the Noble Ditch, Island "C" Canal, and Island "D" Canal, as shown on Figure IV K-1 (USBR, 1986a). The island "C" Canal, a SLCC facility, supplies water from the

IV K-2

TABLE IV K-1
WATER DELIVERIES
SAN LUIS NWR
(acre-feet)

Year	Salt Slough	San Luis Canal Co.	Overland and Drainage	Total
1977	6,885	1,700 (a)	(b)	8,585
1978	6,998 (c)	(d)	(b)	6,998
1979	9,315	(d)	(b)	9,315
1980	13,054	(d)	(b)	13,054
1981	10,261	(d)	(b)	10,261
1982(e)	6,628	3,500	(b)	10,128
1983(e)	7,590	3,500	(b)	11,090
1984	9,398	4,200	(b)	13,598
1985	2,795 (f)	7,792 (a)	(b)	10,587 (g)
1986	0 (f)	13,350 (a)	(b)	13,350

(a) Purchased water

(b) Quantities not measured

(c) Drought conditions

(d) Operational spill not quantified these years

(e) 1982 and 1983 were extremely wet years and less water was needed

(f) USFWS discontinued the use of Salt Slough in May 1985 due to selenium concerns.

(g) The 1985 total was lower than normal due to the difficulty of obtaining desired delivered water

Source: USBR, 1986a; USFWS, 1986h and 1987b

CVP. It enters the refuge in the southeast corner and extends to Dickenson Ferry Road which intersects the refuge. The capacity of the Island "C" Canal is 20 cfs. Island "D" Canal has a capacity of 60 cfs and extends into the southwestern section of the refuge.

Two lift stations, Lift Station 1 with pumps 1A and 1B with a total capacity of 50 cfs, and Lift Station 5, with a capacity of 15 cfs, have supplied the west side of the refuge internal conveyance system with water from Salt Slough. Three lift stations, Lift Station 2 with a capacity of 60 cfs, Lift Station 3 with a capacity of 55 cfs, and Lift Station 4 with a capacity of 15 cfs, distribute water through the internal system of canals and ditches. Lift Stations 2 and 3 are located along the southern border of the refuge and Lift Station 4 is located near the northwest corner of the refuge.

The capacity of Salt Slough, which is not being used currently due to contamination concerns, is adequate for future water delivery to San Luis NWR. The SLCC ditches and canals have restrictions due to undersized control structures. However, guaranteed flows in Salt Slough, plus inefficient means of capturing the flows, are major concerns.

The water conveyance system within the refuge has had major problems caused by the inability to bypass certain areas of marshlands when needed. Many improvements have been made, allowing refuge personnel the ability to bypass energy-intensive low lift pumps. The Service is now looking for winter deliveries that can bypass these pumps and has begun modifying the water delivery system. A number of construction projects were completed between 1982 and 1986 to help achieve water management efficiency goals. Additional rehabilitation will be needed before the overall project is complete.

Water could be pumped into Island "C" Canal from the San Joaquin River if water rights can be obtained or an arrangement can be made to utilize the river as a conveyance system. The 20 cfs capacity limitation of Island "C" Canal would limit the potential of this system for the refuge. Island "C" Canal could be enlarged or the San Joaquin River could be used in conjunction with other sources.

3. Groundwater

The general groundwater conditions of the San Luis NWR have been described in Chapter IV G of this report. The refuge borders the San Joaquin River floodplain and channel deposits on its eastern side.

On the San Luis NWR, groundwater is used for domestic supplies only. Currently, there is no groundwater used for wildlife management of San Luis NWR. Reclamation has estimated a safe pumping capacity of 18,700 acre-feet per year for the refuge. Water table seasonal fluctuations vary from 10 to 20 feet (USBR, 1986c).

B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

For the purposes of assessing the impacts of water delivery alternatives, four levels of water supply have been identified and are presented in Table IV K-2. Each of the water supply levels provide a different rate and volume of water, summarized as follows:

- Level 1 -Existing firm water supply
- Level 2 -Current average annual water deliveries
- Level 3 -Water supply needed for full use of existing development
- Level 4 -Water delivery needed for optimum management

Multi-objective project evaluation procedures, in accordance with concepts outlines by the Water Resources Council, is one of the tools used in evaluating and comparing alternatives. The Water Contracting EIS's will evaluate the national, regional, and site-specific environmental impacts of providing water to the refuges and other users under the different water delivery levels. Based on the results of the Water Contracting EIS's, water delivery levels will be identified for each refuge. Following completion of the Water Contracting EIS's, the plans to meet the identified water level will be compared under the National Economic Development Account, Environmental Quality Account, and Social Account.

The beneficial and adverse effects of each alternative to provide additional water to the refuge also were compared with respect to many criteria. A summary comparison of the alternatives to provide additional water to the refuge for Water Delivery Levels 1,2,3, and 4 is presented in Table IV K-3.

The following delivery alternatives have been developed and are shown on Figure IV K-2 to convey the identified levels of water supply described above.

1. Delivery Alternative for Level 1 (No Action Alternative)

Since this level represents the existing dependable water supply, no additional facilities are required. However, the refuge would continue to be managed without a dependable source of fresh water.

TABLE IV K-2
DEPENDABLE WATER SUPPLY NEEDS
ALTERNATIVE SUPPLY LEVELS FOR THE SAN LUIS NWR

Month	Supply Level 1		Supply Level 2		Supply Level 3		Supply Level 4	
	ac-ft	cfs	ac-ft	cfs	ac-ft	cfs	ac-ft	cfs
January	0	0.0	500	8.1	1,000	16.3	1,000	16.3
February	0	0.0	700	11.4	1,000	18.0	1,000	18.0
March	0	0.0	1,000	16.3	1,000	16.3	1,000	16.3
April	0	0.0	550	8.9	1,250	21.0	1,250	21.0
May	0	0.0	550	8.9	1,500	24.4	1,500	24.4
June	0	0.0	1,700	27.6	1,500	25.2	1,500	25.2
July	0	0.0	350	5.7	1,250	20.3	1,250	20.3
August	0	0.0	200	3.3	1,000	16.3	1,000	16.3
September	0	0.0	1,000	16.3	1,000	16.8	1,000	16.8
October	0	0.0	3,350	54.5	4,000	65.1	4,000	65.1
November	0	0.0	2,500	40.7	3,000	50.4	3,000	50.4
December	0	0.0	950	15.5	1,500	24.4	1,500	24.4
Total	0	0.0	13,350	217.1	19,000	314.4	19,000	314.4
Maximum	0	0.0	3,350	54.5	4,000	65.1	4,000	65.1

Notes:

- Alternative 1 Existing firm water supply
- Alternative 2 Current average annual water deliveries
- Alternative 3 Full use of existing development
- Alternative 4 Optimum management

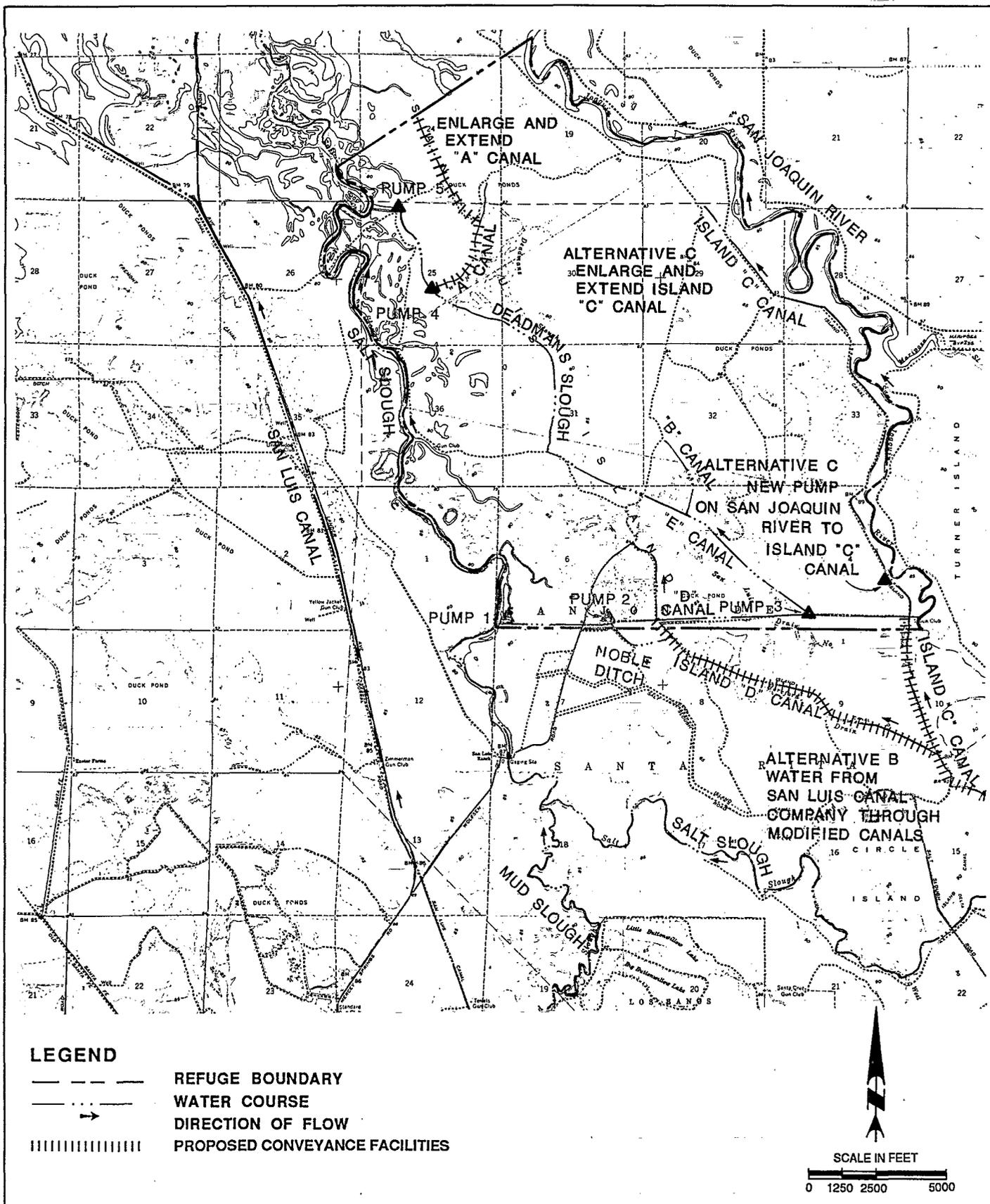
Source: USBR, 1986a; USFWS, 1986f, 1986g and 1987; USFWS Personal Communication

TABLE IV K-3
SUMMARY COMPARISON OF WATER DELIVERY ALTERNATIVES
SAN LUIS NWR

	Supply Levels 2, 3 and 4			
	Alternative A	Alternative B	Alternative C	Alternative D
Availability of Water Supply	Yes	Yes	Maybe	Yes
Ability to Convey Water	Most of Year	Most of Year	Maybe	Most of Year
Need New Water	Yes	Yes	Yes	Yes
Need New Conveyance Agreements	Yes	Yes	Yes	No
Type of Water Supply	Fresh Water	Fresh Water	Fresh Water Blended with Ag. Return Flows	Groundwater and Fresh Water
Operational Flexibility	Yes	Yes	Some	Yes
Wildlife Habitat	Improve	Improve	Improve	Improve
Public Use	Increase	Increase	Increase	Increase
Total Annual Costs (\$) ^(a)	98,200	317,910	70,030	263,980

Notes: Alternative A: Zahm-Sansoni Plan
Alternative B: CVP Water via SLCC Facilities
Alternative C: San Joaquin River Conveyance
Alternative D: Conjunctive Use Plan

(a) Total Annual Costs includes annualized construction cost, annual operation and maintenance cost, annual power and wheelage cost.



2. Delivery Alternative for Level 2

This level represents the current average annual water supplied. Additional facilities are needed to convey a fresh source of water to the refuge.

Alternative A - Convey Water Under the Zahm-Sansoni Plan. The Zahm-Sansoni plan is based on usage of the San Luis Drain as a conduit to deliver fresh water to the Grassland Resource Conservation District (GRCD). This plan has been described in detail in Chapter IV G of this report. The water quality in Salt Slough would be improved and would be utilized to supply water to the San Luis NWR.

Alternative B - Line SLCC Ditches. Water could be supplied to the refuge from the Delta-Mendota Canal via the SLCC facilities. The current problem with the SLCC facilities is that the unlined canals seep onto surrounding farmlands which have serious drainage problems. The SLCC drains the canals during the non-irrigation season to relieve this problem and to do maintenance on their canals. Under this alternative, the canals would be lined to minimize the seepage problem and maintenance could be coordinated with the refuge water supply needs.

Alternative C - Construct Lift Pump to Utilize San Joaquin River Water. Water rights must be obtained to utilize the San Joaquin River to convey water into the Island "C" Canal. The capacity of Island "C" Canal would be increased from 20 cfs to 40 cfs by replacing three existing pipes with larger pipes, or an additional pipe. A 40 cfs pump is required under this alternative. Internal conveyances would be changed to accommodate the water delivery from the east instead of the west. An additional water source will be required for this alternative.

Alternative D - Implement a Conjunctive Use Plan. Groundwater could be used in conjunction with surface water for meeting San Luis NWR water supply needs during drought years. Eleven wells would be located along the existing conveyance facilities, namely the Island "C" Canal, and would deliver 1,700 acre-feet per year per well. Underground powerlines will be necessary.

3. Delivery Alternative for Level 3

Under this level, construction and/or the use of existing conveyance facilities would be required to fully serve the existing refuge with an increase in water supplied. Both the Gallo property and the existing refuge lands are managed more intensively. An increase in permanent water and watergrass is expected. Some flushing and flow through water is used to improve salt balance. Food is increased as well as cover and diversity. Water Level 3 can be accommodated with the delivery alternatives for Level 2.

4. Delivery Alternative for Level 4

Under this level, construction and/or the use of existing conveyance facilities may be required to fully serve the already developed areas as well as areas which have not yet been developed within the refuge. Under this level of water supply some permanent water, flow through water for marsh circulation, and additional riparian water is available. In addition, more heavily intensive food production, a longer flooding duration, and flushing would occur. Water Level 4 can be accommodated with the delivery alternatives for Level 3.

5. Summary of Alternatives

There are no alternatives for Level 1. Alternatives A, B, C, and D have been considered for implementation of Levels 2, 3, and 4. Alternative A provides for water delivered under the Zahm-Sansoni Plan as discussed in Chapter IV G of this report. Alternative B would require long-term conveyance agreements with the SLCC as well as extensive construction costs to line the canals. Alternative C would require obtaining water rights on the San Joaquin River and conveyance agreements with the SLCC. Costs would be high with this alternative due to the pumping and capital costs. Alternative D would require new wells to be constructed which would increase the refuge's operating costs. Groundwater quality is uncertain.

C. COSTS AND ECONOMIC ANALYSIS

Costs for the alternative plans to provide adequate water supplies under Water Delivery Levels 1,2,3, and 4 are presented in Table IV K-4 and the Cost Estimating Appendix. The construction costs include factors to cover engineering, contingencies, and refuge overhead. During the advanced planning phase, these costs will be refined further.

Construction of the improvements under the various water delivery alternatives would result in additional money being spent in Merced County during construction. The construction would likely take 2-4 years by construction workers who reside in Merced County.

Currently, the annual public use to San Luis NWR averages 12,000 non-consumptive and 9,000 consumptive visitors per year. If additional water is provided to the refuge, the attendance levels would increase.

F. WILDLIFE RESOURCES

The annual waterbird use on the San Luis NWR is approximately 16,495,350 use-days. Approximately 84 and 0.14 percent of the waterfowl use are by ducks and geese, respectively. Goose use is 2 percent and water related birds comprise 14 percent of total use days. Wildlife and fishery resources associated with

TABLE IV K-4
SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES
SAN LUIS NWR

Items	Water Delivery Level 2, 3 and 4 Alternatives			
	A	B	C	D
Total Construction Costs	\$1,000,000	\$2,207,500	\$252,810	\$583,000
Power Costs (\$/acre-feet)	0.00	0.00	2.20	10.00
Water Wheeling Costs (\$/Ac-Ft)	0.00	5.00	0.00	0.00
Annualized Construction Costs (8.875%, 30 Years)	96,200	212,360	24,320	56,080
Annual Operations & Maintenance Costs	2,000	10,550	3,910	20,900
Annual Power Costs	0	0	41,800	187,000
Annual Water Wheelage Costs	0	95,000	0	0
Total Annual Costs	\$ 98,200	\$ 317,910	\$ 70,030	\$263,980

Alternative A - Convey Water under the Zahm-Sansoni Plan (Siphon Construction)

Alternative B - Line SLCC Ditches

Alternative C - Construct Lift Pump to Utilize San Joaquin River

Alternative D - Conjunctive Use

the refuge are presented in Table IV K-5. The listed threatened and endangered species associated with San Luis NWR are the San Joaquin kit fox, Vulpes macrotis mutica, the bald eagle, Haliaeetus leucocephalus; the American peregrine falcon, Falco peregrinus anatum, the Valley elderberry longhorn beetle, Desmocerus californicus dimorphus and the Aleutian Canada goose, Branta canadensis leucopareia. Numerous candidate species may occur in this area and are also presented in Table IV K-6.

Any of the Alternative Plans habitat would increase the habitat quality, the number of nesting pairs of waterfowl, watering birds, and upland birds, as indicated in Table IV K-7, but more importantly, the number of wildlife use days and the recreational benefit also would increase for this portion of the refuge.

Implementation of any of the alternative plans for Levels 2, 3, or 4 would not adversely effect the listed and candidate threatened and endangered species but would improve their habitat. Detailed field investigations will be necessary during the advanced planning phase of the project. Implementation of the plan would result in overall beneficial environmental effects. The No Action Plan would result in the management under the current water supply and existing conditions. The results of the preliminary environmental analysis for the selected plans are presented in the Environmental Appendix. Additional environmental analyses will be completed as part of the Water Contracting EIS's.

E. SOCIAL ANALYSIS

The social consequences of constructing and operating the selected plan would be positive due to the potential increase in public use. The local social environment is discussed in the Social Appendix.

F. POWER ANALYSIS

PG&E serves the San Luis NWR under the PA-1 rate schedule for agricultural users. A facility must be an authorized function of the CVP to receive project-use power. The authority to deliver CVP power to the refuge is currently being examined and will be detailed in the Refuge Water Supply Planning Report. A more detailed discussion of project-use power and wheeling agreements is provided in the Power Analysis section of Chapter IV B.

G. PERMITS

Construction activities would require several permits. Merced County would issue permits for well construction and approvals to ensure that the existing drainage facilities would not be adversely effected. Construction of improvements would require permits from the County also. If water is transferred through the SLCC, or the CCID facilities, their approval is recommended.

TABLE IV K-5
WILDLIFE RESOURCES
SAN LUIS NWR

Ducks

Mallard ^(a)	Northern Shoveler ^(a)	Bufflehead
Gadwall ^(a)	Northern Pintail ^(a)	Wood Duck ^(a)
American Wigeon ^(a)	Canvasback ^(a)	Lesser Scaup
Green-winged (Cinn) Teal ^(a)	Ring-necked Duck	Redhead ^(a)
Blue-winged Teal	Ruddy Duck ^(a)	
Cinnamon Teal ^(a)		

Geese and Swans

White-Fronted Goose	Cackling Canada Goose	Tundra Swan
Canada Goose		Snow Goose
Ross Goose		

Coots and Grebes

Pied-Billed Grebe ^(a)	American Coot	
Eareel Grebe		

Shore and Wading Birds

Snowy Egret ^(a)	Common Moorhen ^(a)	Western Sandpiper
American Avocet ^(a)	Marbled Godwit	Black-crowned Night Heron ^(a)
Lesser Sandhill Crane	Black-necked Stilt ^(a)	Greater Yellowlegs
Greater Sandhill Crane	Common Snipe	Willet
Virginia Rail	Long-billed Dowitcher	Long-billed Curlew
Great Blue Heron ^(a)	White-Faced Ibis	Egret ^(a)
American Bittern ^(a)	Dunlin	Great
Green-Backed Heron		Sora
		Lesser Yellowlegs

Upland Game

Mourning Dove ^(a)	California Quail ^(a)
Ring-Necked Pheasant ^(a)	
	Cottontail Rabbit
	Black-Tailed Jack Rabbit

TABLE IV K-5
WILDLIFE RESOURCES

SAN LUIS NWR
(Continued)

Raptorial Birds

Black-shouldered Kite ^(a)	Northern Harrier ^(a)	Sharp-shinned Hawk
Cooper's Hawk	Red-tailed Hawk ^(a)	Swainson's Hawk ^(a)
Rough-legged Hawk	Am. Kestrel (Sparrow Hawk) ^(a)	Barn Owl ^(a)
Short-eared Owl ^(a)	Great Horned Owl ^(a)	Burrowing Owl ^(a)
Golden Eagle	Screech Owl ^(a)	Red-shouldered Hawk ^(a)
Turkey Vulture		

Fish

Bass	Catfish
Carp	Striped Bass
Crappie	Sacramento Blackfish
Bluegill	

Furbearers

Muskrats	Coyote	Raccoon
Long-tailed Weasel	Skunk	Badger
Gray Fox	Mink	
Beaver	River Otter	

Others

Tule Elk

Notes:

(a) Birds nesting on refuge

Source: Birds on San Luis, Merced and Kesterson National Wildlife Refuges (RF 11660-3. August 1984).
NWRS Public Use Report (1)) and refuge records.

TABLE IV K-6

LISTED, PROPOSED, & CANDIDATE, THREATENED & ENDANGERED SPECIES

SAN LUIS NWR

Listed Species

Mammals

San Joaquin kit fox, Vulpes macrotis mutica (E)

Birds

Bald eagle, Haliaeetus Leucocephalus (E)

American peregrine falcon, Falco peregrinus anatum (E)

Aleutian Canada goose, Branta canadensis leucopareia (E)

Invertebrates

Valley elderberry longhorn beetle, Desmocerus californicus dimorphus
(T)

Proposed Species

None

Candidate Species

Birds

Swainson's hawk, Buteo swainsoni (2)

White-faced ibis, Plegadis chihi (2)

Western snowy plover, Charadrius alexandrinus nivosus (2)

Tricolored blackbird, Agelaius tricolor (2)

Reptiles

Giant garter snake, Thamnophis couchi gigas (2)

California tiger salamander, Ambystoma tigrinum californiense (2)

Invertebrates

Molestan blister beetle, Lytta molesta (2)

Plants

Hispid bird's-beak, Cordylanthus mollis subsp. hispidus (2)

Delta coyote-thistle, Eryngium racemosum (1)

Bearded allocarya, Plagiobothrys hystriculus (2)

Valley sparscale, Atriplex patula subsp. spicata (2)

Source: USFWS, June 4, 1987

(E)--Endangered

(T)--Threatened

(CH)--Critical Habitat

(1)--Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2)--Category 2: Taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

TABLE IV K-7
WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS
SAN LUIS NWR

Item	Water Delivery Levels			
	Level 1	Level 2	Level 3	Level 4
Habitat Acres				
Permanent Water	0	80	120	150
Seasonal Marsh	0	2,950	3,400	3,400
Bird Use Days				
Ducks	0	10,702,000	12,828,000	15,630,000
Geese	0	270,000	325,000	800,000
Shorebirds & Wading	0	2,380,000	2,860,000	3,483,000
Endangered Species	0	10,130	12,140	14,200
Public Use Days				
Consumptive	0	9,000	9,000	9,000
Non-Consumptive	0	12,000	16,000	20,000
Annual Recreational Benefits	0	\$ 601,920	\$ 688,560	\$ 775,200

If water rights are to be obtained, the State Water Resources Control Board would be granting the permits. Stream Alteration Permits would be required from the DFG, and a Corps of Engineers permit may be required for construction activities in wetlands or riparian corridors.

IV K-8

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