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## **CHAPTER IV I**

### *Los Banos Wildlife Management Area Alternative Plans*



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

## CHAPTER IV I

### LOS BANOS WILDLIFE MANAGEMENT AREA

Los Banos Wildlife Management Area (Refuge) was purchased in 1929 and originally called the Los Banos State Game Refuge. The 5,586 acre refuge was the first in a series of waterfowl refuges established throughout California. The DFG manages the Refuge which is located approximately four miles northeast of the City of Los Banos. The Refuge is centrally located in the San Joaquin River floodplain and is included within the Grassland Resource Conservation District (GRCD), as discussed in Chapter IV G. The management of the Refuge is oriented toward the maintenance of native marsh habitat (USBR, 1986a).

#### A. WATER RESOURCES

The Refuge receives 6,200 acre-feet of CVP water through an exchange contract for water rights lost from the San Joaquin River. The Grassland Water District (GWD) delivers 2,200 acre-feet of firm water. The Refuge also receives 4000 acre-feet of CVP water through the San Luis Canal Company (SLCC). This water cannot be supplied when the Mendota Pool is dewatered for periodic maintenance.

The Refuge also can obtain up to 6,500 acre-feet of agricultural return flows when available in the GWD Boundary Drain. Water from the GWD Boundary Drain is of poorer quality than the CVP water supplies due to high salt content. Selenium has not been identified at high concentrations in the Boundary Drain.

The Refuge also has 2,000 acre-feet of riparian water rights on Mud Slough. Mud Slough is a natural drain that flows through the area joining the GWD Boundary Drain at the middle of the Refuge. At times, the Mud Slough has high flows and could be used to create ponds through the western sections of the Refuge. However, recent studies have shown high selenium levels in Mud Slough. Therefore, this water would not be used on the Refuge until the water quality improves (DFG, 1987d).

The Refuge purchased additional land in October 1987 and January 1988. Through these purchases, the Refuge obtained water rights on Salt Slough for 18 and 20 cfs. The Refuge also obtained a water contract through these purchases for 15 cfs of Salt Slough water. However, Salt Slough has unusable agricultural return flows north of the junction with Mud Slough. Because of the water contamination, water deliveries under the contracts only can be made during a limited period of time.

#### 1. Surface Waters

The GWD delivers the 2,200 acre-feet of water in the winter through the SLCC San Luis Canal, shown in Figure IV I-1.

Approximately 1,400 acre-feet of water is delivered between September 15 and November 1. The remaining 800 acre-feet is delivered between November 1 and December 31.

In the past, the SLCC San Luis Canal was used to convey poor quality agricultural return water. However, the Porter-Blake Bypass which was recently constructed, as described in Chapter IV G, allows freshwater deliveries to be made via the SLCC San Luis Canal into the Refuge.

In addition, SLCC delivers 4,000 acre-feet of exchange water through the SLCC San Pedro and West Delta Canals.

## 2. Water Conveyance Facilities

The main source of water to the west side of the Refuge is the San Luis Canal. Water is diverted at several points along the western boundary of the Refuge to supply the lakes and marsh areas west of Mud Slough. This system provides an adequate means for water delivery to the west side provided the water delivered is of acceptable quality.

The eastern area of the Refuge is served through the SLCC San Pedro and West Delta Canals and the GWD Boundary Drain. The water supply for the San Pedro and West Delta Canal is the SLCC Arroyo Canal which receives usable agricultural return flows from GWD. The San Pedro Canal can deliver 15 to 20 cfs, and the West Delta Canal can deliver approximately 10 cfs. The capacity of these facilities are less than required for maximum month flows. In addition, these 50-year old systems require extensive maintenance to maintain maximum capacity (DFG, 1987d).

The GWD Boundary Drain is a deep agricultural drain which enters the Refuge from the southeast. This is the primary water source for the east-central portion of the Refuge. The water is lifted by 20 cfs low-lift pumps and conveyed through a pipe across private land to the eastern area of the Refuge. At one time, water from the GWD Boundary Drain and Mud Slough was lifted into Ruth Lakes at the north end of Lower Ruth Lake. The water was then lifted from the lakes to supply water to the southeast area of the Refuge. However, SLCC has dredged the GWD Boundary Drain and Mud Slough system three feet deeper than the original depth, and removed all structures in the ditch. Therefore, water cannot always be backed up for diversion by the low-lift pumps (DFG, 1987d).

## 3. Groundwater

Groundwater levels are generally within 25 feet of the land surface. The Refuge has similar geologic conditions to the GRCD, as described in Chapter IV G of this report.

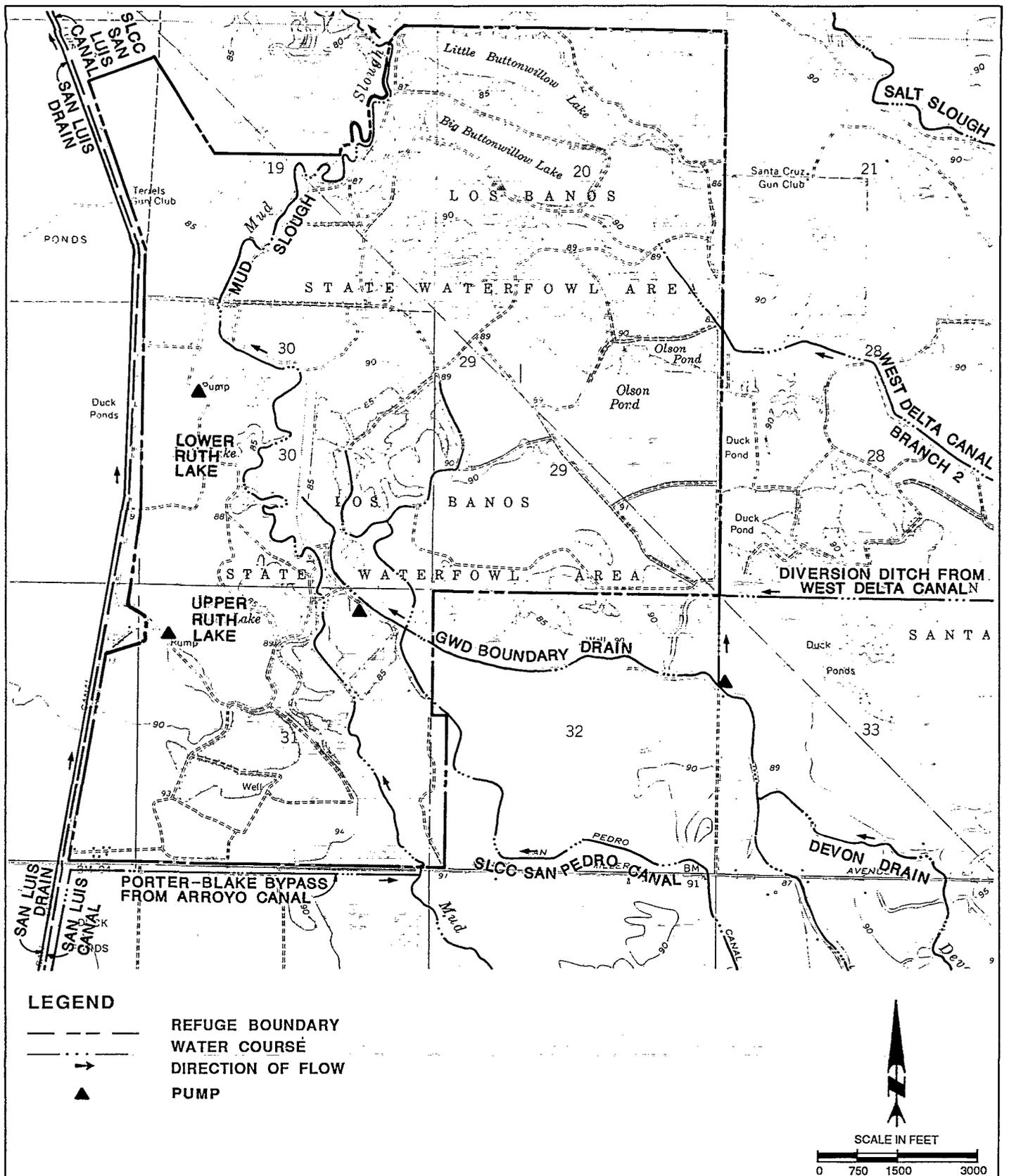


FIGURE IV I-1

**LOS BANOS WILDLIFE MANAGEMENT AREA  
EXISTING WATER SUPPLY FACILITIES**



In 1981, a small dam was removed from the GWD Boundary Drain which caused the groundwater level to drop due to decreased seepage. This lowering of the water level resulted in an increase in refuge water requirements (USBR, 1986a).

Historically the Refuge has used five wells. High power costs, well cave-ins, and poor water quality due to high boron content have caused the groundwater system to be abandoned. The Reclamation estimates that the safe yield of the Refuge is 6,800 acre-feet (USBR, 1986c).

**B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS**

The DFG estimates that 50,000 acre-feet of water would be required for full development and optimum management of the entire Refuge. For the purposes of assessing the impacts of water delivery alternatives, four levels of water supply have been identified, as presented in Table IV I-1. Each of the water supply levels provides a different volume of water, and are 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

**1. Delivery Alternative for Level 1 (No Action Alternative) (6,200 acre-feet)**

No new facilities would be required to deliver the existing firm water supply. However to ensure that good quality water is provided to the Refuge through the SLCC San Luis Canal, the Zahm-Sansoni-Nelson Plan would need to be implemented. The Zahm-Sansoni-Nelson Plan was described in Chapter IV G.

**2. Delivery Alternatives for Level 2 (16,700 acre-feet)**

Alternative 2A was developed to provide an additional diversion point and conveyance facilities for the southeastern portion of the Refuge. Alternative 2B would provide a conjunctive use program for the Refuge. Both of these alternatives assume that the Zahm-Sansoni-Nelson Plan would be implemented to provide good quality water to the Refuge.

**Alternative 2A - Reconstruct San Luis Canal Company Facilities.** An abandoned diversion ditch was used to convey water from the SLCC West Delta Canal to the southeast corner of the Refuge. Under this alternative, this 7,500-foot canal would be reconstructed, as shown

**TABLE IV I-1**  
**DEPENDABLE WATER SUPPLY NEEDS**  
**ALTERNATIVE SUPPLY LEVELS FOR THE LOS BANOS WMA**

<b>Month</b>	<b><u>Supply Level 1</u> ac-ft</b>	<b><u>Supply Level 2</u> ac-ft</b>	<b><u>Supply Level 3</u> ac-ft</b>	<b><u>Supply Level 4</u> ac-ft</b>
January	200	500	500	500
February	0	500	500	500
March	0	1,000	1,000	1,500
April	0	1,000	1,000	1,500
May	700	2,000	3,000	3,000
June	500	1,500	4,000	4,000
July	0	1,500	3,000	3,000
August	0	1,670	2,000	2,500
September	1,500	2,000	2,000	2,500
October	2,000	3,000	3,000	3,000
November	1,000	1,500	1,500	2,000
December	300	500	1,000	1,000
<b>Total</b>	<b>6,200</b>	<b>16,670</b>	<b>22,500</b>	<b>25,000</b>

**Notes:**

- Supply Level 1: Existing firm water supply
- Supply Level 2: Current average annual water deliveries
- Supply Level 3: Full use of existing development
- Supply Level 4: Optimum mangement

Source: USBR, 1986a; CDFG, 1986c; USFWS, 1986g

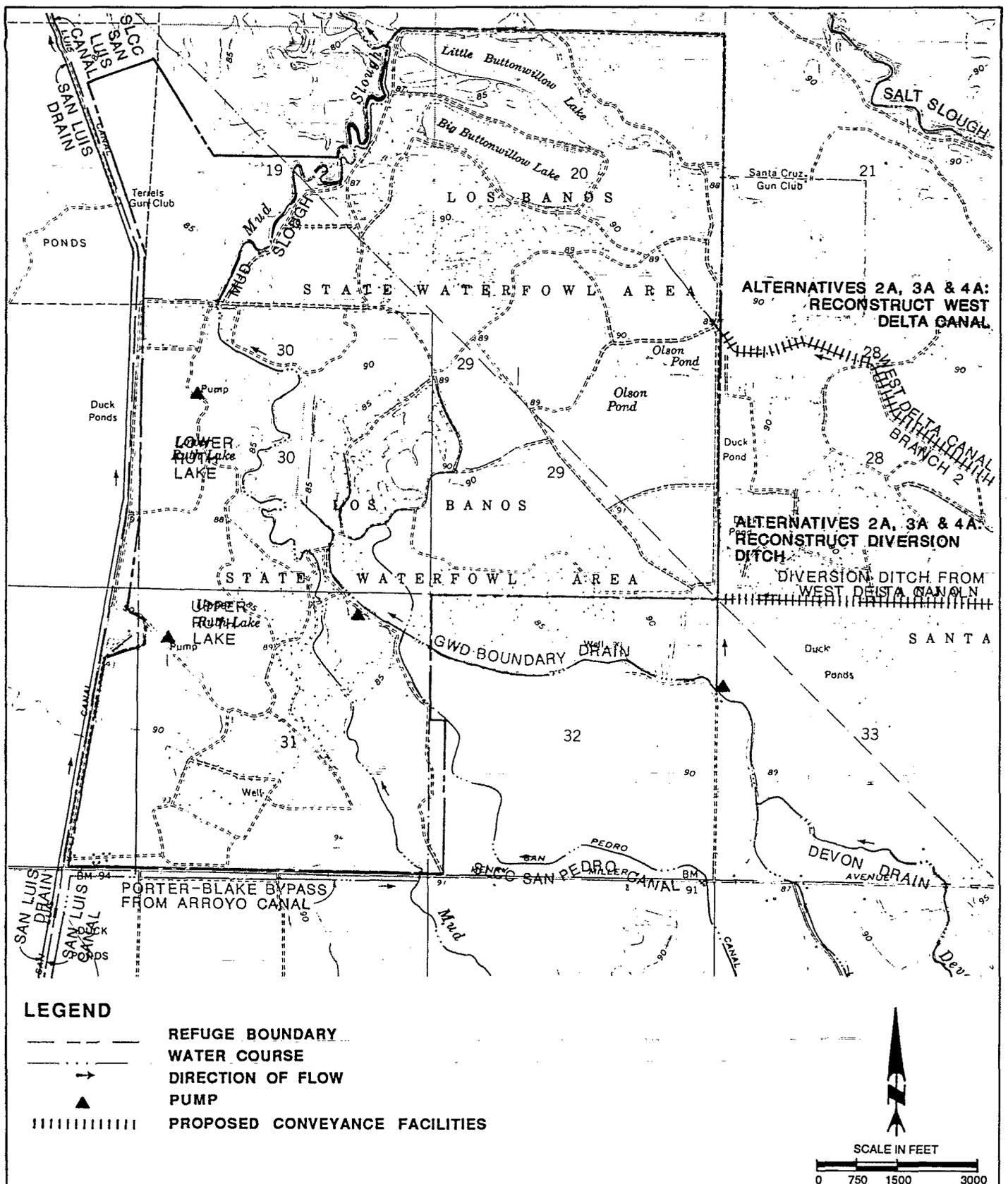


FIGURE IV I-2

**LOS BANOS WILDLIFE MANAGEMENT AREA**  
**ALTERNATIVE WATER SUPPLY FACILITIES**



in Figure IV I-2. Portions of the the West Delta Canal also would be rehabilitated to reduce maintenance, increase capacity, and improve reliability.

**Alternative 2B - Implement a Conjunctive Use Program.** Eight wells would be constructed on the Refuge to deliver the maximum month water demand. The exact locations of the wells would be determined in a future study. The wells would be developed as part of a conjunctive use program. During dry years, water demands would be supplied by wells, as discussed in Chapter III. During wet years, the wells would probably not be needed if CVP water is provided. Adequate surface water would need to be provided when groundwater is used to dilute the boron concentrations. Implementation of this alternative also would require implementation of Alternative 2A and the Zahm-Sansoni-Nelson Plan.

### **3. Delivery Alternatives for Level 3 (22,500 acre-feet)**

The alternatives considered for Water Level 3 are similar to those considered for Water Level 2.

**Alternative 3A - Reconstruct San Luis Canal Company Facilities.** This alternative is identical to Alternative 2A.

**Alternative 3B - Implement a Conjunctive Use Program.** This alternative would be similar to Alternative 2B, except that 13 wells would be constructed on the Refuge. The exact locations of the wells would be determined in a future study. Implementation of this alternative also would require implementation of Alternative 3A and the Zahm-Sansoni-Nelson Plan.

### **4. Delivery Alternatives for Level 4 (25,000 acre-feet)**

The alternatives considered for Water Level 4 are similar to those considered for Water Level 2.

**Alternative 4A - Reconstruct San Luis Canal Company Facilities.** This alternative is identical to Alternative 2A.

**Alternative 4B - Implement a Conjunctive Use Program.** This alternative would be similar to Alternative 2B, except that 13 wells would be constructed on the Refuge. The exact locations of the wells would be determined in a future study. Implementation of this alternative also would require implementation of Alternative 4A and the Zahm-Sansoni-Nelson Plan.

### **5. Summary of Alternatives**

The beneficial and adverse effects of each alternative were compared with respect to the criteria listed in Chapter III.

There are no alternatives for Level 1; however to ensure that good quality water is provided, the Zahm-Sansoni-Nelson Plan described in Chapter IV G would need to be implemented.

Alternatives 2A, 3A, and 4A would improve operations and decrease maintenance of existing facilities, as well as increasing operational flexibility.

Alternatives 2B, 3B, and 4B would provide a conjunctive use program. Implementation of a conjunctive use program would result in a groundwater overdraft because the amount of water needed during dry years will exceed the safe yield of the Refuge. During dry years when groundwater is used, adequate surface water is needed to dilute the boron concentrations. These alternatives would require implementation of Alternatives 2A, 3A, and 4A to deliver surface water during the wet years.

#### C. COSTS AND ECONOMIC ANALYSIS

Costs for the alternative plans to provide adequate water supplies under Water Supply Levels 2, 3, and 4 are presented in Table IV I-2. The construction costs include factors to cover engineering, contingencies, and overhead. Annual operation and maintenance (O&M) costs include only the local costs of delivering water. The annual O&M costs do not include costs to purchase CVP water. During the advanced planning phase, these costs will be refined further.

Construction of the facilities under all of the alternatives would result in additional money being spent in Merced County during construction. The construction could be completed within one summer season by construction workers who reside in Merced, Madera or Fresno County.

Currently (Level 2), the annual public use at the Refuge is about 34,400 visits per year. If additional water is provided, the attendance levels would increase. If the water supply is decreased to Level 1, public use would decrease significantly.

#### D. WILDLIFE RESOURCES

The annual bird use in the Refuge is approximately 23,768,000 use-days. Wildlife and fishery resources associated with the Refuge are presented in Table IV I-3. There are no listed threatened or endangered species at the Refuge. Numerous candidate species may occur in this area and are summarized in Table IV I-4.

The alternative plans would provide additional water to improve habitat in the Refuge. The improved habitat would increase the number of wildlife-use days and recreational benefits as presented in Table IV I-5.

**TABLE IV I-2**  
**SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES**  
**LOS BANOS WMA**

Items	Alternatives					
	2A	2B	3A	3B	4A	4B
<b>Additional Water (ac-ft)</b>	10,500	10,500	16,300	16,300	18,800	18,800
<b>Construction Costs</b>						
Wells	\$ --	\$424,000 <sup>(b)</sup>	\$ --	\$689,000 <sup>(d)</sup>	\$ --	\$689,000 <sup>(d)</sup>
Pipelines/Canals	15,300 <sup>(a)</sup>	--	15,300 <sup>(a)</sup>	--	15,300 <sup>(a)</sup>	--
Subtotal	\$ 15,300	\$424,000	\$ 15,300	\$689,000	\$ 15,300	\$689,000
Other Costs	--	15,300 <sup>(c)</sup>	--	15,300 <sup>(c)</sup>	--	15,300
Total (e)	\$ 15,300	\$439,300	\$ 15,300	\$704,300	\$ 15,300	\$704,300
<b>Annualized Construction Cost (8.87%, 30 yrs)</b>	\$ 1,480	\$ 42,260	\$ 1,480	\$ 67,760	\$ 1,480	\$ 67,760
<b>Additional Annual Cost</b>						
Operation & Maintenance <sup>(f)</sup>	\$ 1,000	\$ 14,400	\$ 1,000	\$ 23,400	\$ 1,000	\$ 23,400
Power	--	48,570 <sup>(g,h)</sup>	--	75,390 <sup>(g,h)</sup>	--	86,950 <sup>(g,h)</sup>
Local Conveyance Cost <sup>(i)</sup>	105,000	--	163,000	--	188,000	--
Subtotal	\$106,000	\$ 62,970	\$164,000	\$ 98,790	\$189,000	\$110,350
Other Costs	--	53,000 <sup>(c,h)</sup>	--	82,000 <sup>(c,h)</sup>	--	94,500 <sup>(c,h)</sup>
Total (e)	\$106,000	\$115,970	\$164,000	\$180,790	\$189,000	\$204,850
<b>Total Annual Costs</b>	\$107,480	\$158,230	\$165,480	\$248,550	\$190,480	\$272,610
<b>Cost/Additional Acre-Foot</b>	\$ 7.00	\$ 15.10	\$ 10.20	\$ 15.30	\$ 10.20	\$ 14.50

**TABLE IV I-2**  
**SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES**  
**LOS BANOS WMA**  
**(Continued)**

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Notes: Alternatives 2A, 3A, and 4A - Reconstruct San Luis Canal Company Facilities.  
Alternatives 2B, 3B, and 4B - Implement a Conjunctive Use Plan.

- (a) Reconstruct 7,500 feet of unlined canal and portions of West Canal.
- (b) 8 wells, 500 feet deep, 80-foot lift.
- (c) Alternative 2B would require implementation of Alternative 2A, Alternative 3B would require implementation of Alternative 3A, and Alternative 4B would require implementation of Alternative 4A.
- (d) 13 wells, 500 feet deep, 80-foot lift.
- (e) Does not include cost for Zahm-Sansoni-Nelson Plan which is discussed in Chapter IVG.
- (f) Basis for O&M costs are discussed in Appendix F.
- (g) Unit Pumping Cost = \$9.25/af.
- (h) Values multiplied by 0.5 because facilities are assumed to be used only 5 out of 10 years.
- (i) Unit Conveyance Cost = \$10/af.

## TABLE IV I-3

## FISH AND WILDLIFE RESOURCES

## LOS BANOS WMA

## Ducks

Pintail(a)  
Gadwall(a)  
Ring-necked Duck

Mallard(a)  
Shoveler(a)  
Canvasback

Green-winged Teal  
Cinnamon Teal(a)  
Ruddy Duck(a)  
Widgeon

## Geese and Swans

Ross' Goose  
Snow Goose

Cackling Goose  
Tundra Swan

White-fronted Goose

## Coots

American Coot(a)

## Shore and Wading Birds

Pied-billed Grebe  
White-faced Ibis  
Lesser Sandhill Crane  
Common Snipe  
Long-billed Curlew  
Great Blue Heron  
Common Egret

Snowy Egret  
American Bittern  
Black-crowned Night Herons  
American Avocet  
Black-necked Stilt(a)  
Dowitchers

Great Yellowlegs  
Sandpiper  
Killdeer(a)  
Rail(a)  
Sora(a)  
Gallinule(a)

## Upland Game

Ring-necked Pheasant(a)  
Cottontail Rabbits

Black-tailed Jackrabbits  
Dove

**TABLE IV I-3**  
**FISH AND WILDLIFE RESOURCES**

**LOS BANOS WMA**  
**(Continued)**

**Raptorial Birds**

Northern Harrier <sup>(a)</sup>	Red-tailed Hawk <sup>(a)</sup>	American Kestrel
Black-Shouldered Kite <sup>(a)</sup>	Cooper's Hawk	Turkey Vulture
Sparrow Hawk <sup>(a)</sup>	Golden Eagle	

**Fish**

Brown Bullhead	Channel Catfish	Striped Bass
Carp	Large Mouth Bass	

**Furbearers**

Coyotes	Muskrats	Raccoon
Opossum	Striped Skunk	Grey Fox
Beaver	Mink	Badger
Spotted Skunk		

Notes:

(a) Birds nesting on refuge

Source: Environmental Assessment Reports, Los Banos Wildlife Area, and Refuge records

TABLE IV I-4

FEDERAL LISTED, PROPOSED, & CANDIDATE, THREATENED & ENDANGERED SPECIES

LOS BANOS WMA

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 spearscale, 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 I-5**  
**WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS**  
**LOS BANOS WMA**

	No Action Alternative	Alternatives					
		2A	2B	3A	3B	4A	4B
<b>Habitat Acres</b>							
Permanent Water	100	484	484	484	484	600	600
Watergrass	--	500	500	700	700	850	850
Aquatics	--	--	--	200	200	300	300
Native Marsh	--	1,500	1,500	1,200	1,200	1,000	1,000
Un-irrigated Native Marsh	1,000	--	--	--	--	--	--
Uplands	2,108	724	724	624	624	458	458
<b>Bird Use Days</b>							
Coots	200,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Ducks	4,000,000	12,000,000	12,000,000	12,000,000	12,000,000	14,500,000	14,500,000
Geese	1,000,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000	2,500,000
Cranes	1,000	18,000	18,000	19,000	19,000	19,000	19,000
Wading Birds	80,000	250,000	250,000	300,000	300,000	350,000	350,000
Shorebirds	<u>2,000,000</u>	<u>8,000,000</u>	<u>8,000,000</u>	<u>8,500,000</u>	<u>8,500,000</u>	<u>8,500,000</u>	<u>8,500,000</u>
Total	7,281,000	23,768,000	23,768,000	24,319,000	24,319,000	26,869,000	26,869,000
<b>Public Use Days</b>							
Consumptive	2,200	3,400	3,400	3,800	3,800	4,200	4,200
Non-Consumptive	<u>11,600</u>	<u>31,000</u>	<u>31,000</u>	<u>33,000</u>	<u>33,000</u>	<u>35,000</u>	<u>35,000</u>
Total	13,800	34,400	34,400	36,800	36,800	39,200	39,200
<b>Total Annual Cost</b>	\$ --	\$ 116,480	\$ 162,730	\$ 165,480	\$ 248,550	\$ 190,480	\$ 272,610
<b>Incremental Cost/Additional 1000 Bird Use Days</b>	N/A	\$ 7.10	\$ 9.90	\$ 9.70	14.60	\$ 9.70	\$ 13.90
<b>Incremental Cost/Additional Public Use Day</b>	N/A	\$ 5.70	\$ 7.90	\$ 7.20	\$ 10.80	\$ 7.50	\$ 10.70

Notes: Alternatives 2A, 3A, and 4A - Reconstruct San Luis Canal Company Facilities.  
 Alternatives 2B, 3B, and 4B - Implement a Conjunctive Use Plan.

Implementation of any of the alternative plans probably would not adversely affect the candidate threatened and endangered species. Detailed field investigations would be necessary during the advanced planning phase of the project. Implementation of a plan would result in overall beneficial environmental effects. The No Action Alternative would result in loss of marsh habitat. Additional regional environmental analyses would be completed as part of the Water Contracting EIS's.

#### **E. SOCIAL ANALYSIS**

The social consequences of constructing and operating the alternatives would be positive due to the potential increase in wildlife use and subsequently public use.

#### **F. POWER ANALYSIS**

The Pacific Gas and Electric serves the Refuge 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 project-use 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 II.

#### **G. PERMITS**

Construction under any of the alternatives would require several permits. Merced County would issue approvals for construction along roads and drainage courses to ensure that the existing drainage facilities would not be adversely affected. In addition, Merced County would issue permits for wells. Stream Alteration Permits would be required from the DFG for Alternatives 2A, 3A, and 4A. An Army Corps of Engineers permit would be required for construction activities in wetlands or riparian corridors under Alternatives 2A, 3A, and 4A.