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# **CHAPTER IV O**

## *Kern National Wildlife Refuge Alternative Plans*



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

## CHAPTER IV O

### KERN NATIONAL WILDLIFE REFUGE

The Migratory Bird Conservation Commission created the 10,618 acre Kern National Wildlife Refuge (Refuge) in 1961. The Refuge was established to restore a small segment of the wetland habitat impacted by the drainage of Buena Vista, Kern, Goose, and Tulare lakes. As shown in Figure IV O-1, the Refuge is divided by the Goose Lake Canal which terminates in the Tulare Lake basin. The Refuge, located 35 miles northwest of Bakersfield, is managed by the Service.

Land uses at the Refuge can be classified as wetlands, croplands, and uplands. Approximately 2,260 acres has been set aside as a natural research area for desert plants and to provide a critical habitat for two endangered species, the blunt-nosed leopard lizard and the San Joaquin kit fox. Due to its strategic location along the Pacific Flyway, the Refuge serves as winter waterfowl habitat for the thousands of early migrant pintail ducks which concentrate in the Tulare Lake Basin during August and September. Major food plants grown on the Refuge include wild millet, alkali bulrush, and swamp timothy (USFWS, 1978). The plants are irrigated in the spring and summer and flooded with six to nine inches of water in the fall for waterfowl feeding (USFWS, 1978). Grazing by cattle is permitted when winter rains are sufficient to provide adequate forage from winter annual grasses (USBR, 1986a).

#### A. WATER RESOURCES

The Refuge does not have any firm water supplies. The Refuge has purchased water in the past from the Friant-Kern Canal (FKC) which has been delivered via Poso Creek. The Refuge also has purchased water from the Kern County Water Agency (KCWA). Groundwater has also been utilized.

##### 1. Surface Waters

The majority of water used by the Refuge has been surplus State Water Project water purchased from the KCWA. This water is delivered through the California Aqueduct to the Buena Vista Water Storage District (BVWSD) facilities. These contracts are renewed annually. The State Department of Water Resources has stated that no additional water is available, however the Refuge could continue to obtain surplus water from the KCWA through the California Aqueduct (USFWS, 1978). The existing surface water quality appears to be good for use on the Refuge.

Another source of water is from Poso Creek, an intermittent stream, which spills floodwaters onto the Refuge during wet years. No water is available for appropriation in Poso Creek from June

15 until the fall rains. Securing an appropriate right on these floodwaters would not give the Refuge a firm supply. It is unlikely that the State would issue a permit for diversion along the stream.

Poso Creek terminates on the Refuge and has caused flood control problems on the Refuge. The Service and the Pond-Poso Soil Conservation District have agreed to receive all floodwaters that reach the Refuge. When the volume of water does not spill over the levee, this agreement benefits both the farmers and the Refuge. However, in the winter of 1982-83, floodwaters significantly damaged refuge facilities (USBR, 1986a).

The Kern River, located 1.5 miles west of the Refuge, is considered a critical stream by the State Water Resources Control Board. Decision 1196 by the State Water Resources Control Board determined that no water is available for appropriation from Kern River at any time (USFWS, 1978). Therefore, this source of water has been removed from consideration.

## 2. Water Conveyance Facilities

The BVWSD conveys surplus water between January to mid-March from the California Aqueduct through the No. 1 North Lateral to the Main Drain Canal and the West Side Canal. The water is conveyed through the BVWSD Main Drain Canal and the BVWSD West Side Canal to the BVWSD Goose Lake Canal which delivers the water directly to the Refuge. The BVWSD Goose Lake Canal does not have additional capacity in the month of August. However, adequate capacity exists in the BVWSD facilities during the other months.

Water from the FKC is released to the Semitropic Water Storage District (SWSD) Poso Creek at a point 20 miles upstream from the Refuge. Both the FKC and Poso Creek have sufficient capacity to transport the water to the Refuge during the fall, winter, and spring months. However, during the summer irrigation season, capacity is not available in the FKC. High conveyance losses occur in Poso Creek due to percolation, evaporation, and diversions along the creek.

The Refuge's internal distribution system is generally in good condition, although minor improvements are needed.

## 3. Groundwater

The Refuge, located in the lake deposits of the Tulare Lake Basin, has nine groundwater wells. These wells were used to supply water until the early 1970's. At that time, three of the wells were abandoned due to a receding water table coupled with escalating energy costs (USFWS, 1986a).

The six operating wells are located along the southern boundary of the Refuge and along the Goose Lake Canal. These wells are

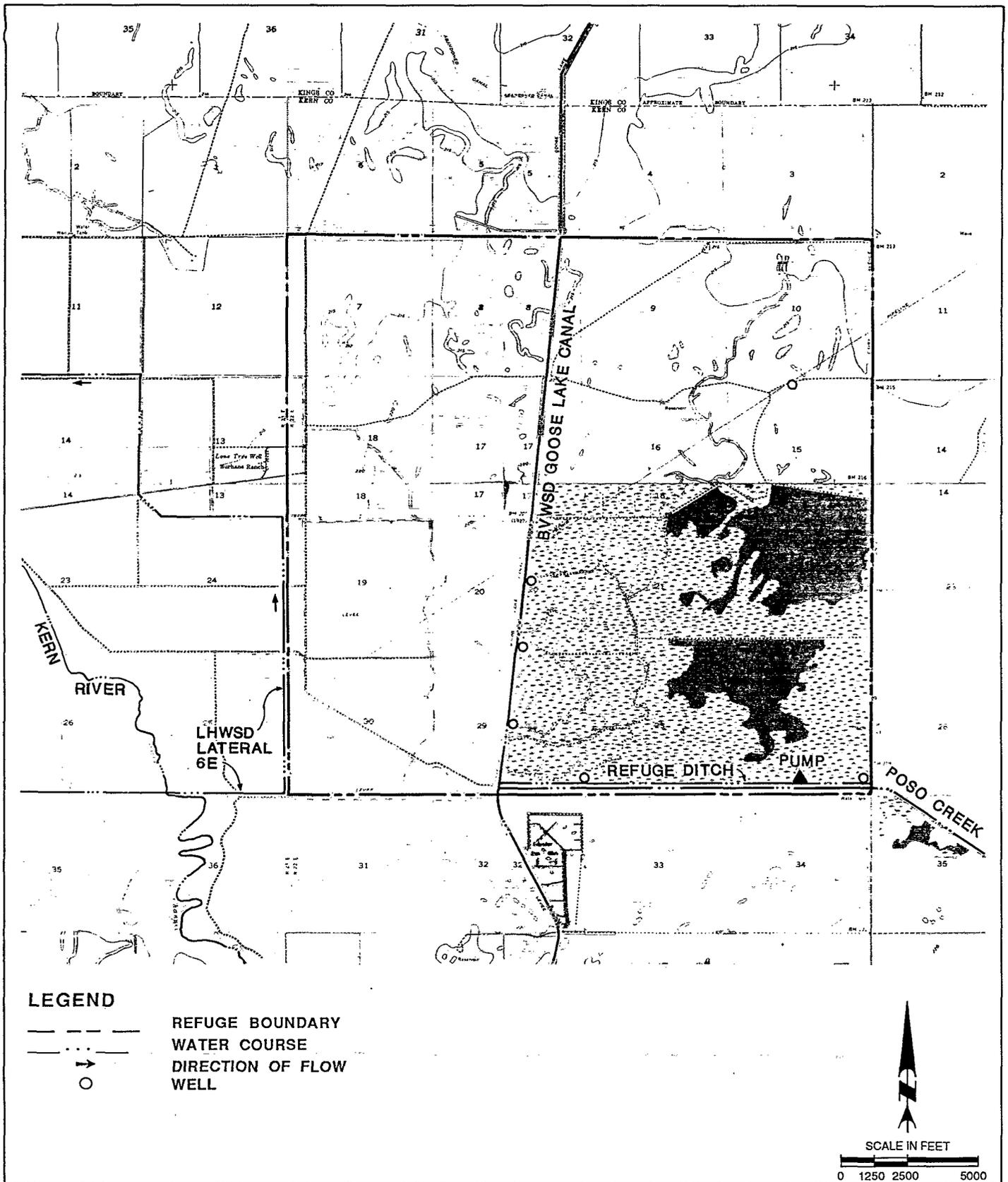


FIGURE IV 0-1  
KERN NATIONAL WILDLIFE REFUGE  
 EXISTING WATER SUPPLY FACILITIES



used on an as-needed basis in conjunction with surface water. The irrigation wells are 800 to 1,200 feet deep. Water levels in these wells were at least 280 feet below the surface in 1977. Reclamation estimates that the safe yield of the Refuge is 5,500 acre-feet.

## B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

The Service estimates that 25,000 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 O-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) (0 acre-feet)

The Refuge has no firm water supply, therefore no alternatives were developed for Level 1.

### 2. Delivery Alternatives for Level 2 (9,900 acre-feet)

Alternatives 2A through 2C would provide a dependable source of surface water from the CVP or the State Water Project. Alternative 2D would provide wells to be used in a conjunctive use program.

**Alternative 2A - Transport CVP Water Through the Buena Vista Water Storage District Facilities.** A long-term contract would be negotiated with BVWSD to convey water from the California Aqueduct through the BVWSD No. 1 North Lateral to the BVWSD West Side Canal and the BVWSD Main Drain Canal which would flow into the BVWSD Goose Lake Canal. The BVWSD Goose Lake Canal would convey the water to the Refuge, as shown in Figure IV O-2. The Goose Lake Canal may not have sufficient capacity above the confluence with the Main Drain Canal and the West Side Canal in August when water is required for irrigation of cotton. The internal distribution system would be improved through the construction of two lift pumps and 8.5 miles of new levees. In addition, about eight miles of levees would be repaired.

**TABLE IV O-1**  
**DEPENDABLE WATER SUPPLY NEEDS**  
**ALTERNATIVE SUPPLY LEVELS FOR THE KERN NWR**

<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	0	0	0	1,000
February	0	0	0	1,000
March	0	0	0	0
April	0	0	0	400
May	0	1,900	2,900	1,200
June	0	850	1,250	1,800
July	0	0	0	1,600
August	0	0	0	5,500
September	0	2,400	3,600	4,000
October	0	1,200	1,800	3,500
November	0	1,800	2,800	3,000
December	0	1,800	2,700	2,000
<b>Total</b>	<b>0</b>	<b>9,950</b>	<b>15,050</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 management

Sources: USBR, 1986a; USFWS, 1986d and 1986e

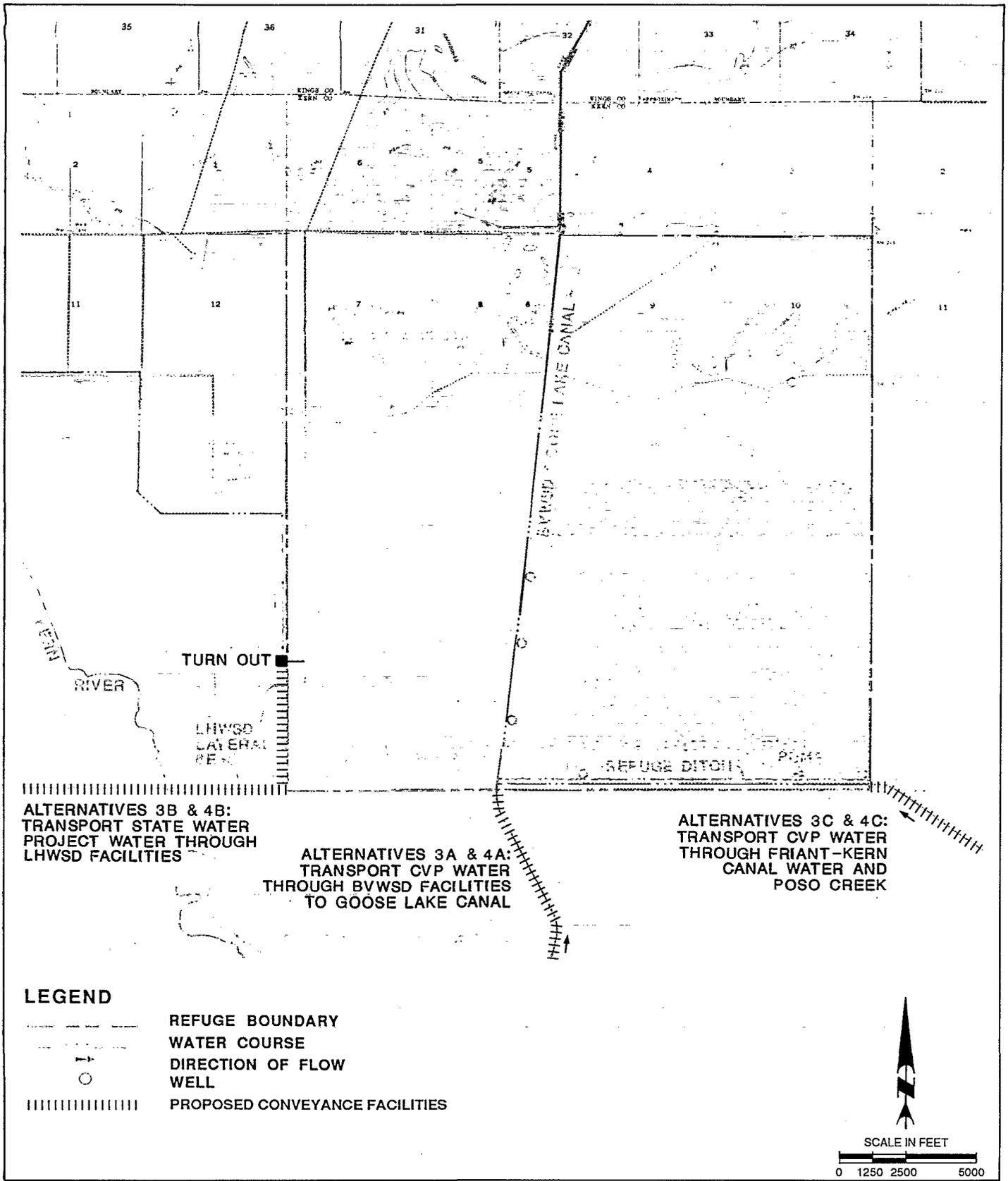


FIGURE IV 0-2

KERN NATIONAL WILDLIFE REFUGE

**ALTERNATIVE WATER SUPPLY FACILITIES**



**Alternative 2B - Transport State Water Project Water through the Lost Hills Water Storage District Facilities.** The Lost Hills Water Storage District (LHWSD) operates a lateral which terminates at the Refuge's western boundary. This lateral would be used to deliver water from the California Aqueduct to the Refuge. Under this alternative, a 150 cfs turnout would be constructed on the LHWSD lateral to divert water onto the Refuge. The internal distribution system would be improved through the construction of two lift pumps and 8.5 miles of new levees. In addition, about eight miles of levees would be repaired.

**Alternative 2C - Transport CVP Water Through the Friant-Kern Canal and Poso Creek.** Water from the FKC would be conveyed to the Refuge through Poso Creek. This alternative would require a long-term conveyance agreement with SWSD which operates Poso Creek. Pumping facilities currently exist to transfer the water from Poso Creek to the Refuge. Poso Creek has adequate capacity to convey the CVP water. However, the FKC has capacity limitations. The internal distribution system would be improved through the construction of two lift pumps and 8.5 miles of new levees. In addition, about eight miles of levees would be repaired.

**Alternative 2D - Implement a Conjunctive Use Plan.** Six additional 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. Implementation of this alternative also would require implementation of Alternatives 2A, 2B, or 2C.

### **3. Delivery Alternatives for Level 3 (15,050 acre-feet)**

Alternatives for Water Supply Level 3 would be similar to the alternatives developed for Level 2.

**Alternative 3A - Transport CVP Water Through the Buena Vista Water Storage District Facilities.** This alternative is identical to Alternative 2A.

**Alternative 3B - Transport State Water Project Water through the Lost Hills Water Storage District Facilities.** This alternative is identical to Alternative 2B.

**Alternative 3C - Transport CVP Water Through the Friant-Kern Canal and Poso Creek.** This alternative is identical to Alternative 2C.

**Alternative 3D - Implement a Conjunctive Use Plan.** Twelve additional wells would be constructed on the Refuge to deliver the

maximum month water demand. This alternative is similar to Alternative 2D. Implementation of this alternative would require implementation of Alternative 3A, 3B, or 3C.

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

Alternatives for Water Supply Level 4 would be similar to the alternatives developed for Level 3.

Alternative 4A - Transport CVP Water Through the Buena Vista Water Storage District Facilities. This alternative is identical to Alternative 2A.

Alternative 4B - Transport State Water Project Water through the Lost Hills Water Storage District Facilities. This alternative is identical to Alternative 2B.

Alternative 4C - Transport CVP Water Through the Friant-Kern Canal and Poso Creek. This alternative is identical to Alternative 2C.

Alternative 4D - Implement a Conjunctive Use Plan. Twenty-one additional wells would be constructed on the Refuge to deliver the maximum month water demand. This alternative is similar to Alternative 2D. Implementation of this alternative would require implementation of Alternative 4A, 4B, or 4C.

#### 5. Summary of Alternatives

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

No alternatives were developed for Level 1 because the Refuge does not have a firm water supply.

Alternatives 2A, 3A, and 4A would require long-term agreements with the BVWSD. Alternatives 2B, 3B, and 4B would require long-term agreements with the LHWS. Alternatives 2C, 3C, and 4C would require long-term agreements with SWSD. Alternatives 2B, 3B, and 4B also would require construction of a turnout and a pump station. All of these alternatives would include construction of on-refuge improvements.

Alternatives 2D, 3D, and 4D would result in a groundwater overdraft because the water supply need in dry years would exceed the safe yield of the Refuge. These alternatives would require implementation of surface water alternatives (Alternatives 2A through 2D, Alternatives 3A through 3C, and Alternatives 4A through 4C).

#### 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 O-2. The construction costs include factors to cover engineering, contingencies, and overhead costs. Annual operation and maintenance (O&M) costs include only the local cost of delivering water. The annual O&M costs do not include costs to purchase CVP or State Water Project 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 Kern County during construction. The construction could be completed within one summer season by construction workers who reside in the area.

Currently, the annual public use at the Refuge is approximately 6,700 visits per year. If the additional water is provided, the attendance levels would increase.

#### D. WILDLIFE RESOURCES

The annual bird use on the Refuge is approximately 7,197,500 use-days. If the additional water is provided, wildlife-use days would increase. Wildlife and fishery resources associated with the Refuge are presented in Table IV O-3. The only listed threatened and endangered species associated with the Refuge are the peregrine falcon, Falco peregrine anatum; bald eagle, Haliaeetus leucocephalus; San Joaquin kit fox, Vulpes macrotis mutica; and the blunt-nosed leopard lizard, Gambelia silus. Numerous candidate species may occur in this area and are also presented in Table IV O-4.

Implementation of any of the alternative plans probably would not adversely affect the listed and candidate threatened and endangered species of wildlife, but would instead improve their habitat. Detailed field investigations would be completed during the advanced planning phase of the project. Implementation of the plan would result in overall beneficial environmental effects, as shown on Table IV O-5. The No Action Alternative would result in a loss of 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 facilities under any of the alternatives would be positive due to the potential increase in public use.

#### F. POWER ANALYSIS

Pacific Gas and Electric Company 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

TABLE IV O-3  
FISH AND WILDLIFE RESOURCES  
KERN NWR

Ducks

Pintail(a)	Cinnamon Teal(a)	Lesser Scaup(a)
Wigeon-American	Blue-winged Teal	Ring-necked Duck(a)
Shoveler(a)	Wood Duck	Bufflehead
Mallard(a)	Redhead(a)	Ruddy Duck(a)
Gadwall(a)	Canvasback(a)	Fulvous Tree Duck
Green-winged Teal	Greater Scaup	Common Goldeneye
		Common Merganser

Geese and Swans

Canada Goose	Snow Goose	White-fronted Goose
Ross' Goose		

Coots

American Coot(a)

Shore and Wading Birds

Western Grebe(a)	Snowy backed Egret(a)	Common Snipe(a)
Eared Grebe(a)	Green Heron	White-faced Ibis(a)
Pied-billed Grebe(a)	Black-crowned Night Heron(a)	American Avocet(a)
Double-crested Cormorant	Lesser Sandhill Crane	Black-necked Stilt(a)
White Pelican	Virginia Rail(a)	Killdeer(a)
American Bittern(a)	Sora	Long-billed Curlew
Great Blue Heron(a)	Common Gallinule(a)	Greater Yellowlegs
Great (Common) Egret(a)	Long-billed Dowitcher	Dunlins
Least Sandpipers	Wilson's Phalarope	Northern Phalarope
California Gull	Ring-billed Gull	Forster's Tern
Caspian Tern(a)	Common Snipe(a)	

**TABLE IV O-2**  
**SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES**  
**KERN NWR**

(Continued)

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Notes: Alternatives 2A, 3A, and 4A - Transport CVP Water through the Buena Vista Water Storage District Facilities  
Alternatives 2B, 3B, and 4B - Transport State Water Project through the Lost Hills Water Storage District Facilities.  
Alternatives 2C, 3C, and 4C - Transport CVP Water through the Friant-Kern Canal and Poso Creek.  
Alternatives 2D, 3D, and 4D - Implement a Conjunctive Use Plan.

- (a) 44,880 feet of new levees, and 42,240 feet of repaired levees.
  - (b) Two 30 cfs, 10-foot lift pump.
  - (c) 6 wells, 800-foot deep, 450-foot lift.
  - (d) 150 cfs, 78-inch diameter turnout.
  - (e) 550-foot, 150 cfs unlined canal.
  - (f) 800-foot, 60 cfs turnout.
  - (g) 800-foot, 90 cfs unlined canal.
  - (h) 12 wells, 800-foot deep, 450-foot lift.
  - (i) Alternatives 2D, 3D, and 4D assume implementation of Alternatives 2C, 3C, and 4C, respectively.
  - (j) 21 wells, 800-foot deep, 450-foot lift.
  - (k) Basis for costs for O&M are discussed in Appendix F.
  - (l) Unit Pumping Cost = \$1/af.
  - (m) Unit Conveyance Cost = \$4.25/af.
  - (n) Unit Pumping Cost = \$58.50/af.
  - (o) Values multiplied by 0.5 because facilities are assumed to be used 5 out of 10 years.
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TABLE IV O-4

FEDERALLY LISTED, PROPOSED, & CANDIDATE THREATENED & ENDANGERED SPECIES

KERN NWR

Listed Species

Birds

American Peregrine Falcon, Falco peregrines auatum (E)  
Bald Eagle, Haliaeetus leucocephalus (E)

Mammals

San Joaquin kit fox, Vulpes macrotis mutica (E)

Reptiles

Blunt-nosed leopard lizard, Gambelia silus (E)

Proposed Species

None

Candidate Species

Mammals

Tipton kangaroo rat, Dipodomys n. nitratoides (2)

Birds

White-faced ibis, Plegadis chihi (2)  
Tricolored blackbird, Agelaius tricolor (2)  
Swainson's Hawk, Buteo swainsoni (2)  
Mountain Plover, Eopoda montana (3)  
Ferruginous Hawk, Buteo regalis (2)  
Long-Billed Curlew, Numerius americanus (2)

Invertebrates

Hopping's blister beetle, Lytta hoppingi (2)  
Moestan blister beetle, Lytta moesta (2)  
Morrison's blister beetle, Lytta morrisoni (2)  
A land snail, Helminoglypta callistoderma (2)

Plants

Lost Hills saltbush, Atriplex vallicola (2)  
Hispid bird's-beak, Cordylanthus mollis subsp. hispidus (2)  
California jewelflower, Caulanthus californicus (2)  
Congdon's wooly-threads, Lembetia congdonii (2R)  
Hoover's wooly-star, Eriastrum hooveri (2)

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

**KERN NWR**  
**(Continued)**

**Upland Game**

Mourning Dove <sup>(a)</sup>	Ring-necked Pheasant <sup>(a)</sup>	
California Quail	Cotton Tail Rabbits	

**Raptorial Birds**

Turkey Vulture	Black shouldered Kite <sup>(a)</sup>	Northern Harrier
Sharp-shinned Hawk <sup>(a)</sup>	Cooper's Hawk <sup>(a)</sup>	Red-tailed (Harlan) Hawk <sup>(a)</sup>
Rough-legged Hawk	Ferruginous Hawk	American Kestrel <sup>(a)</sup>
Barn Owl <sup>(a)</sup>	Short-eared Owl <sup>(a)</sup>	Great Horned Owl <sup>(a)</sup>
Burrowing Owl <sup>(a)</sup>	Swainson's Hawk	Prairie Falcon
Merlin	Golden Eagle	Peregrine Falcon
	Bald Eagle	

**Fish**

Carp	Goldfish	Bluegill
Largemouth Bass	Threadfin Shad	Crappie
Catfish	Striped Bass	

**Furbearers**

Raccoon	Skunk	Long-tailed Weasel
Badger	Muskrat	Coyote
		San Joaquin Kit Fox

**Others**

Blunt-nosed Leopard Lizard

**Notes:**

(a) Birds nesting on refuge

Source: USFWS computerized annual printout for NWR Birds, Department of Interior, USFWS (RF11650-2 9-79) (July 1973 to June 1974, NWRS Public Use Report (1)) and refuge records.

TABLE IV O-5  
WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS  
KERN NWR

	No Action Alternative	Alternatives											
		2A	2B	2C	2D	3A	3B	3C	3D	4A	4B	4C	4D
<b>Habitat Acres</b>													
Seasonal Marsh	--	1,600	1,600	1,600	1,600	2,400	2,400	2,400	2,400	4,300	4,300	4,300	4,300
Irrigated Marsh	--	1,200	1,200	1,200	1,200	1,900	1,900	1,900	1,900	2,700	2,700	2,700	2,700
<b>Bird Use Days</b>													
Geese	--	14,000	14,000	14,000	14,000	21,500	21,500	21,500	21,500	35,000	35,000	35,000	35,000
Ducks	--	5,807,000	5,807,000	5,807,000	5,807,000	8,918,000	8,918,000	8,918,000	8,918,000	14,520,000	14,520,000	14,520,000	14,520,000
Waterbirds & Other Migratory Birds	--	715,700	715,700	715,700	715,700	1,099,100	1,099,100	1,099,100	1,099,100	1,789,200	1,789,200	1,789,200	1,789,200
Endangered Species	20,000	660,800	660,800	660,800	660,800	34,799,900	34,799,900	34,799,900	34,799,900	56,651,800	56,651,800	56,651,800	56,651,800
Total	20,000	7,197,500	7,197,500	7,197,500	7,197,500	44,838,500	44,838,500	44,838,500	44,838,500	72,996,000	72,996,000	72,996,000	72,996,000
<b>Public Use Days</b>													
Consumptive	--	1,900	1,900	1,900	1,900	2,500	2,500	2,500	2,500	3,100	3,100	3,100	3,100
Non-Consumptive	300	4,800	4,800	4,800	4,800	8,600	8,600	8,600	8,600	12,400	12,400	12,400	12,400
Total	300	6,700	6,700	6,700	6,700	11,100	11,100	11,100	11,100	15,500	15,500	15,500	15,500
Total Annual Cost	--	\$ 212,540	\$ 215,840	\$ 216,340	\$ 561,700	\$ 239,310	\$ 242,610	\$ 243,110	\$ 805,170	\$ 291,550	\$ 294,850	\$ 295,350	\$1,243,730
Incremental Cost/Additional Bird Use Day	N/A	\$ 29.60	\$ 30.10	\$ 30.10	\$ 78.30	\$ 5.30	\$ 5.40	\$ 5.40	\$ 18.00	\$ 4.00	\$ 4.00	\$ 4.00	\$ 17.00
Incremental Cost/Additional Public Use Day	N/A	\$ 33.20	\$ 33.70	\$ 33.80	\$ 87.80	\$ 22.20	\$ 22.50	\$ 22.50	\$ 74.60	\$ 19.20	\$ 19.40	\$ 19.40	\$ 81.80

Notes: Alternative 2A - Construct Improvements to Internal Conveyance System.  
Alternative 2B - Implement a Conjunctive Use Plan.  
Alternatives 3A and 4A - Transport CVP Water through the Buena Vista Water Storage District Facilities.  
Alternatives 3B and 4B - Transport State Water Project Water through the Lost Hills Water Storage District Facilities.  
Alternatives 3C and 4C - Transport CVP Water through the Friant-Kern Canal and Poso Creek.  
Alternatives 3D and 4D - Implement a Conjunctive Use Plan.

TABLE IV O-4

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

KERN NWR (Continued)

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.

(2R)—Recommended addition to Category 2.

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 activities would require several permits. Kern County would issue permits for construction of wells. Alternatives 3B and 4B would require approvals from LHWSD. Construction of internal conveyance improvements in streams and riparian corridors would require a Stream Alteration Permit from the DFG. An Army Corps of Engineers permit would be required for construction activities in wetlands or riparian corridors.