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# **CHAPTER IV N**

## *Pixley National Wildlife Refuge Alternative Plans*



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

## CHAPTER IV N

### PIXLEY NATIONAL WILDLIFE REFUGE

The Pixley National Wildlife Refuge, was established in 1959 when reverted homestead tracts were transferred to the Service from the Department of Food and Agriculture. The refuge boundary has since expanded and currently consists of 8,800 acres of land within the boundaries. Approximately 5,200 acres are controlled by the Service, 800 acres controlled by the U.S. Forest Service, and the remainder owned by private land owners. The refuge is managed by the Service. The refuge is located in southwest Tulare County, approximately 12 miles northeast of the Kern NWR and 5 miles southwest of the community of Pixley. Portions of the refuge lie within the historic Tulare Lake Bed. The refuge is shown on Figure IV N-1.

#### A. WATER RESOURCES

The refuge does not have a water supply and is therefore, usually dry. Vegetation is of the Valley grassland association with some riparian plants along Deer Creek. Approximately 2,600 acres, set aside as habitat for the endangered blunt-nosed leopard lizard, and is also currently used for agriculture, namely livestock grazing. The primary objective of Pixley NWR is to restore wildlife habitat, particularly for migratory waterfowl and endangered species (USFWS, 1978). Estimated annual water requirements and water currently delivered for the Pixley NWR are 6,000 acre-feet and 0 acre-feet, respectively.

##### 1. Surface Water

Pixley NWR has not had a dependable supply of water for irrigating crops or flooding ponds for migratory waterfowl since 1969. The refuge does not have water rights, riparian or appropriative. The refuge receives less than 5 percent of the water needed for full development. Through negotiation with Pixley Irrigation District (PID), about 200-acres of wetlands within two cells on the refuge are maintained for groundwater recharge (USFWS, 1986). Current water deliveries are presented in Table IV N-1.

Deer Creek, which traverses the western half of the refuge, is an intermittent stream which carries flood flows during wet years (USFWS, 1978). Table IV N-1 displays the amount of water delivered to the refuge during these floods. Deer Creek flows from east to west along the south boundary of the Main Tract and continues to the north and bisects the refuge, as dis-

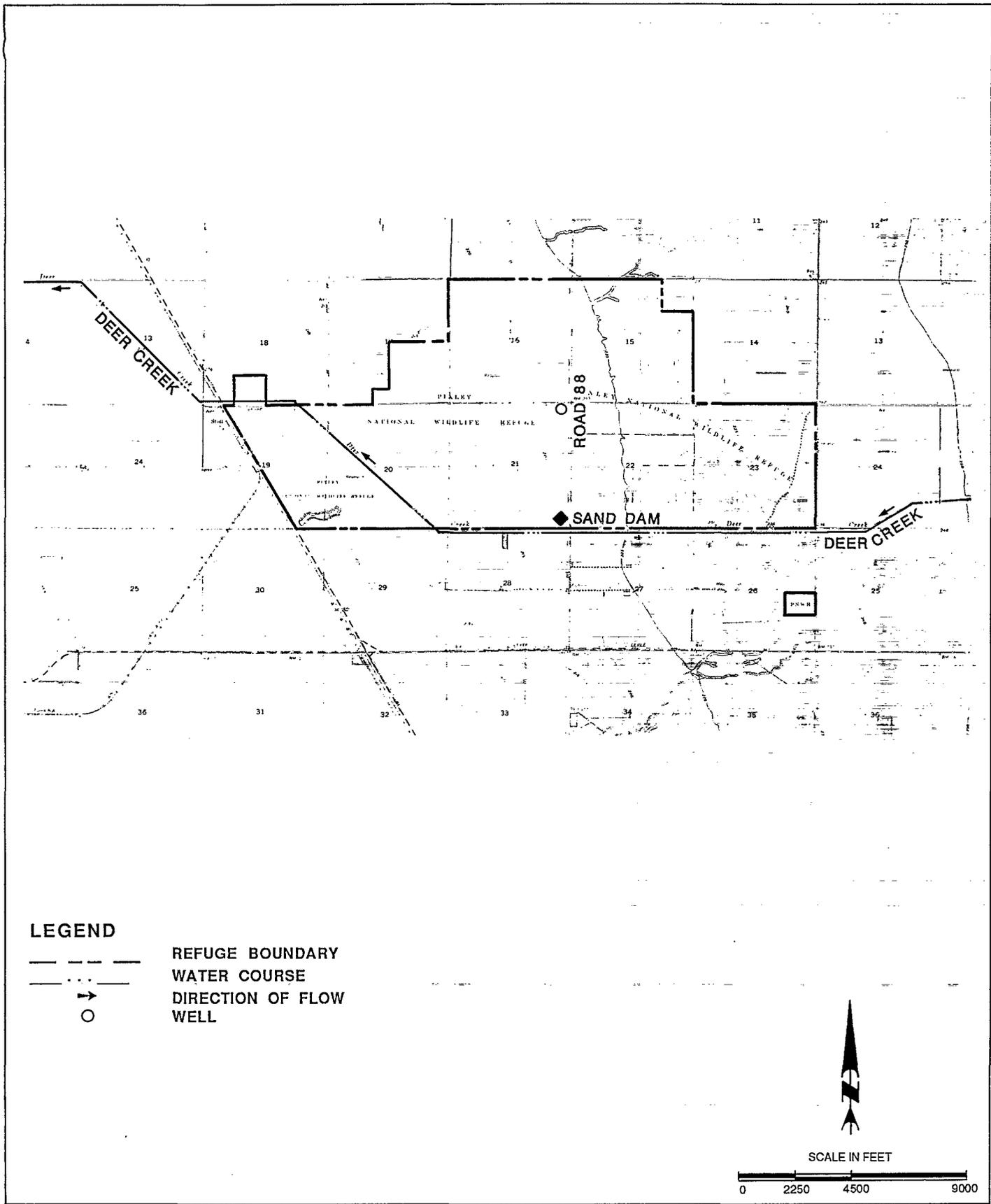


FIGURE IV N-1  
PIXLEY NATIONAL WILDLIFE REFUGE  
 EXISTING WATER SUPPLY FACILITIES



**TABLE IV N-1**  
**FLOODWATER DELIVERIES**  
**PIXLEY NWR**  
**(acre-feet)**

<b>Year</b>	<b>Deer Creek</b>
1977	0
1978	2,000
1979	4,000
1980	0
1981	581
1982	3,321
1983	942
1984	516
1985	471
1986	999

Sources: USBR, 1986a and USFWS, 1986j

displayed on Figure IV N-1. During wet years, upstream irrigation districts allow excess water to flow down Deer Creek to Pixley NWR. The quality of Deer Creek flood water is reported to be irrigation and waterfowl management.

## **2. Water Conveyance Facilities**

The Federal Friant-Kern Canal is the only principal water conveyance facility which could feasibly provide water to Pixley NWR. The Friant-Kern Canal crosses Deer Creek approximately 15 miles to the east.

Although a dependable supply of water is not presently supplied to the refuge, Pixley Irrigation District in the past has used Deer Creek as the conveyance system for delivering water to the area. The maximum turnout capacity at the Friant-Kern Canal and Deer Creek is 1,000 cfs. The major constraint of using this means of conveyance is potential conveyance losses due to percolation, evaporation, and diversions along Deer Creek. In addition capacity problems currently exist in the Friant-Kern Canal. Pixley NWR's internal conveyance system is generally in fair condition, however, minor improvements are needed for water distribution efficiency.

## **3. Groundwater**

Pixley NWR is located in the lower San Joaquin Valley which has had a serious groundwater overdraft problem in the past. The water level is 100 to 200 feet deep with considerable seasonal fluctuations. One well was drilled on the refuge in 1963. Use of this well was discontinued in 1969 because of a receding water table and escalating energy costs. Groundwater obtained from this well in 1969 was of poor quality for irrigation but suitable for waterfowl habitat management.

Reclamation had determined that there is no safe yield for the Pixley NWR. The ending of the regional overdraft during recent years may allow some additional groundwater development in the area, however, this could be very risky. Only a small portion (1,600 acre-feet/year) of the estimated water requirement of 6,000 acre-feet/year could reasonably be met with groundwater.

Groundwater use for Pixley NWR is not being considered at this time due to the marginal water quality, high energy costs, and high costs for construction of pumps with limited value (USBR, 1986a and 1986c).

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

Most wildlife areas have relied upon surplus surface water, agricultural return water, and groundwater for meeting water

TABLE IV N-2  
DEPENDABLE WATER SUPPLY NEEDS  
ALTERNATIVE SUPPLY LEVELS FOR THE PIXLEY 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	n/a	n/a	100	1.6	200	3.3
February	0	0.0	n/a	n/a	50	0.9	100	1.8
March	0	0.0	n/a	n/a	0	0.0	0	0.0
April	0	0.0	n/a	n/a	150	2.5	300	5.0
May	0	0.0	n/a	n/a	300	4.9	600	9.8
June	0	0.0	n/a	n/a	400	6.7	800	13.4
July	0	0.0	n/a	n/a	450	7.3	900	14.6
August	0	0.0	n/a	n/a	150	2.4	300	4.9
September	0	0.0	n/a	n/a	400	6.7	800	13.4
October	0	0.0	n/a	n/a	500	8.1	1,000	16.3
November	0	0.0	n/a	n/a	350	5.9	700	11.8
December	0	0.0	n/a	n/a	150	2.4	300	4.9
Total	0	0.0	n/a	n/a	3,000	49.6	6,000	99.2
Maximum	0	0.0	n/a	n/a	500	8.1	1,000	16.3

## Notes:

n/a Not applicable for this refuge, flood waters are not measured.

Alternative 1 Existing firm water supply

Alternative 2 Average annual amount of flood water (0 - 3,300 ac-ft/year)

Alternative 3 Full use of existing development

Alternative 4 Optimum management

Source: USBR, 1986a

needs. 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 N-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 supply levels. Based on the results of the Water Contracting EIS's, water supply 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 Supply Levels 1,3,4, and 5 is presented in Table IV N-3.

The following delivery alternatives have been developed, as shown on Figure IV N-2, to convey four of the identified levels of water supply described above. The internal distribution system improvements apply to all of the firm water supply conveyance alternatives and include a lift pump at Deer Creek, one mile of delivery ditch, six miles of new dikes, three miles of dike repairs, and 16 control structures.

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

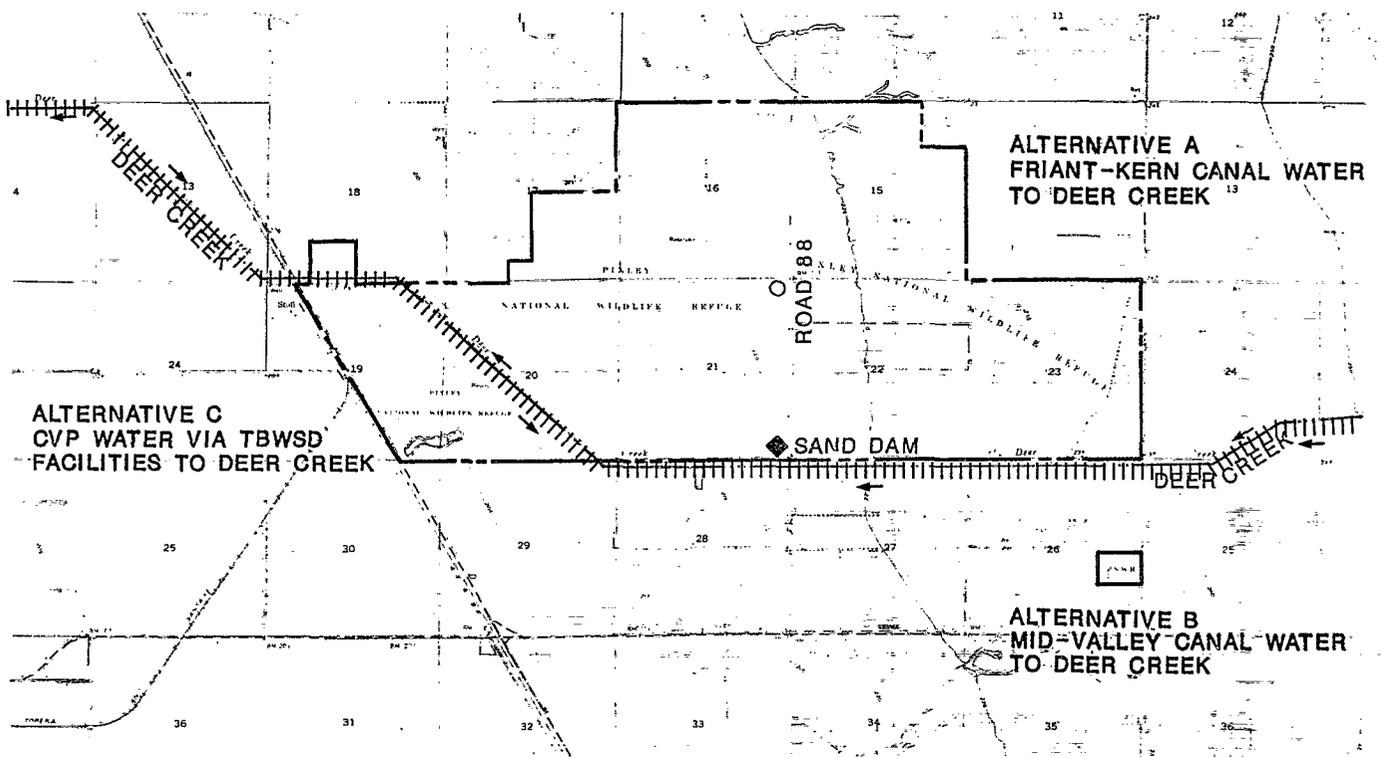
The existing limited supply is not dependable. Groundwater pumping would exacerbate the current overdraft situation in the southern San Joaquin Valley. Although the energy requirements would not be significant, the energy costs would be.

TABLE IV N-3  
 SUMMARY COMPARISON OF WATER DELIVERY ALTERNATIVES  
 PIXLEY NWR

	Supply Levels 3 & 4		
	Alternative A	Alternative B	Alternative C
Availability of Water Supply	Maybe	Maybe	Yes
Ability to Convey Water	Yes	Maybe	Yes
Need New Water	Yes	Yes	Yes
Need New Conveyance Agreements	Yes	Yes	Yes
Type of Water Supply	Fresh Water	Fresh Water	Fresh Water
Operational Flexibility	Some	Unknown	Some
Wildlife Habitat	Improve	Improve	Improve
Public Use	Increase	Increase	Increase
Total Annual Costs \$( <sup>a</sup> )	25,500	87,690	133,530

Notes: Alternative A: Friant-Kern Water via Deer Creek  
 Alternative B: Mid-Valley Canal Water via Deer Creek  
 Alternative C: CVP Water via TBWSD Facilities

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



**LEGEND**

- — — — — REFUGE BOUNDARY
- · — · — WATER COURSE
- DIRECTION OF FLOW
- WELL
- ||||| PROPOSED CONVEYANCE FACILITIES



SCALE IN FEET

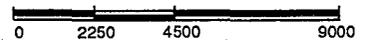


FIGURE IV N-2

PIXLEY NATIONAL WILDLIFE REFUGE

**PROPOSED WATER SUPPLY FACILITIES  
ALTERNATIVES A, B, & C**



## **2. Delivery Alternative for Level 2**

Since this level represents the current average annual water supplied, additional facilities would not be necessary.

## **3. Delivery Alternative for Level 3**

Under this level, construction and/or the use of the existing conveyance facilities may be required to fully serve the existing refuge with an increase in water supplied.

**Alternative A - Utilize Friant-Kern Canal Water Via Deer Creek.** A dependable supply of water could be obtained from the Federal Friant-Kern Canal. This water could be conveyed to the Pixley NWR, by the Lower Tule and the Pixley Irrigation Districts, by diverting water from the Friant-Kern Canal to Deer Creek at a point 15 miles upstream from the refuge.

The Friant-Kern Canal has some capacity limitations in the reach between Highway 198 and Deer Creek. During the most restricted month of 1983, 900 cfs of capacity was available. Approximately 1,668 cfs was available in August of that same year (Candlish, USBR, 1985). A sand dam, displayed in Figure IV N-2, currently backs up water for use in the refuge. This sand dam needs to be maintained to prevent sand inundation or wash-out during flooding events.

Conveyance losses would result from the utilization of Deer Creek due to percolation, evaporation, and diversions. Capacity limitations during the summer months in the Friant-Kern Canal are the principal deterrent as discussed above.

**Alternative B - Utilize Mid-Valley Canal Water Via Deer Creek.** If the proposed Mid-Valley Canal is constructed by Reclamation, CVP water could be delivered through the Canal to Deer Creek. The Canal would cross Deer Creek approximately seven miles upstream of the refuge. Alternative B is not being considered at this time because the Mid-Valley Canal has not been authorized for construction. If it is constructed, this alternative should be considered to supply Pixley NWR with water, due to the lack of capacity limitations and the lack of conveyance losses.

**Alternative C - Utilize Federal Water via the California Aqueduct.** An alternative method of supplying water to Pixley NWR is by a wheeling agreement to transport Federal water through the California Aqueduct to Lateral B of the Tulare Basin Water Storage District. This water could then be lifted up through Bull Slough and then through the Homeland/Lakeland Canal.

The water would then utilize Deer Creek, in reverse of its natural direction. Energy costs would be high, due to the facilities required to pump the water from the canal into the refuge facilities.

#### **4. Alternative Delivery 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. The Level 4 plan would provide for a dependable supply of 6,000 acre-feet of water to improve habitat in the refuge. Water is required for the irrigation of plants and waterfowl food crops as well as for maintaining the wetlands for waterfowl/waterbird use. Water would be used in a 950 acre wetland unit, 320 acre grain unit, 300 acre pasture, and for riparian plants. Water Level 4 can be accommodated with the delivery alternatives for Level 3.

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

Because Pixley NWR does not have a firm supply of water, water contracts or rights must be obtained with all alternatives. Alternatives A, B, and C are considered for implementation of Levels 3 and 4. There are no alternatives for Levels 1 and 2. Alternative A utilizes the existing creek and requires minimal additional facilities. Capacity limitations in the Friant-Kern Canal may be a deterrent. Alternative B may be considered in the future if the Mid-Valley Conveyance facilities are authorized. Alternative C would require extensive operation costs due to the pumping requirements. Long-term conveyance agreements with the Tulare Basin Water Storage District would be required.

#### **C. COSTS AND ECONOMICS ANALYSIS**

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

Construction of the improvements under the selected plan to provide water deliveries will result in additional money being spent in Tulare County during construction. The construction could be completed within one summer season by construction workers who reside in Tulare, Kings, or Kern County.

**TABLE IV N-4**  
**SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES**  
**PIXLEY NWR**

Items	Water Delivery Level 3 Alternatives			Water Delivery Level 4 Alternatives		
	A	B	C	A	B	C
Total Construction Costs	0	\$617,000	\$767,000	0	\$621,500	\$ 925,500
Power Costs (\$/acre-foot)	0.00	0.00	1.75	0.00	0.00	2.20
Water Wheeling Costs (\$/acre-foot)	4.25	4.25	4.25	4.25	4.25	4.25
Annualized Construction Costs (8.875%, 30 years)	0	59,360	73,790	0	59,790	89,030
Annual Operations & Maintenance Costs	0	1,000	3,300	0	2,400	5,800
Annual Power Costs	0	0	5,250	0	0	13,200
Annual Wheelage Costs	12,750	12,750	12,750	25,500	25,500	25,500
Total Annual Costs	\$12,750	\$ 73,110	\$ 95,090	\$25,500	\$ 87,690	\$ 133,530

Alternative A - Utilize Friant-Kern Canal Water via Deer Creek

Alternative B - Utilize Mid-Valley Canal Water via Deer Creek

Alternative C - Utilize Federal Water via the TBWSD Facilities

Currently (Level 2), the annual public use to Pixley NWR is about 50 non-consumptive visits per year. If additional water is provided under Level 4, the attendance levels would increase to approximately 1,300 visitors (USFWS, 1986).

#### **D. WILDLIFE RESOURCES**

The annual wildlife use on Pixley NWR is limited to wetland dependent endangered, candidate, and sensitive species. The Service estimates that the refuge receives approximately 6,000 wildlife use days annually. Wildlife and fishery resources associated with the refuge are presented in Table IV N-5. The listed threatened and endangered species associated with Pixley NWR are the 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 presented in Table IV N-6.

Implementation of the alternative plans would not adversely effect the listed and candidate threatened and endangered species of birds and may improve habitat that could be used by the San Joaquin kit fox and the blunt-nosed leopard lizard. Table IV N-7 describes the increase in wildlife resources as a result of the various water supply levels. Detailed field investigations will be necessary during the advanced planning phase of the project. The No Action Plan would result in the management of the refuge under 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 operating the selected plans and the construction activities associated with the preferred 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 Pixley 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-uses power and wheeling agreements is provided in the Power Analysis section of Chapter IV B.

TABLE IV N-5  
 WILDLIFE RESOURCES  
 PIXLEY NWR

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Ducks

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Pintail  
 Wigeon  
 Northern Shoveler

Mallard  
 Gadwall  
 Green-winged Teal

Cinnamon Teal  
 Wood Duck

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Geese and Swans

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Canada Goose  
 White-fronted Goose

Snow Goose  
 Ross Goose

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Coots

---

American Coot

---

Shore and Wading Birds

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Pied-billed Grebe<sup>(a)</sup>  
 American Bittern  
 Great Blue Heron  
 Long-billed Dowitcher  
 Black-crowned Night Heron  
 White-faced Ibis

American Avocet  
 Black-neck Silt  
 Common Snipe  
 Green-backed Heron  
 Western Sandpiper

Killdeer<sup>(a)</sup>  
 Long-billed Curlew  
 Snowy Egret  
 Least Sandpiper  
 Greater Sandhill Crane  
 Mountain Plover

**TABLE IV N-5**  
**WILDLIFE RESOURCES**

**PIXLEY NWR**  
**(Continued)**

**Upland Game**

Ring-necked Pheasant

Mourning Dove<sup>(a)</sup>

**Raptorial Birds**

Black-shouldered Kite  
Rough-legged Hawk  
Swainson's Hawk  
Ferruginous Hawk

Northern Harrier  
American Kestrel (Sparrow Hawk)<sup>(a)</sup>  
Prairie Falcon  
Merlin Furbearers

Red-tailed (Harlan) Hawk<sup>(a)</sup>  
Golden Eagle  
Burrowing Owl  
Sharp-shinned Hawk

Raccoon  
Coyote  
San Joaquin Kit Fox

Badger  
Long-tailed Weasel  
Skunks

**Notes:**

(a) Birds nesting on refuge

Source: Environmental Assessment Report, Mendota Wildlife Area, and checklist of the birds of the Mendota Wildlife Area.

TABLE IV N-6

LISTED, PROPOSED, & CANDIDATE, THREATENED & ENDANGERED SPECIES

PIXLEY NWR

Listed Species

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. nitratooides (2)

Nelson's Antelope Ground Squirrel, Ammospermophilus nelsoni (2)

Birds

White-faced ibis, Plegadis chihi (2)

Tricolored blackbird, Agelaius tricolor (2)

Mountain Plover, Charadrius montanensis (2)

Ferruginous Hawk, Buteo regalis (2)

Long-Billed Curlew, Numenius americanus (2)

Invertebrates

Hopping's blister beetle, Lytta hoppingi (2)

Moestan blister beetle, Lytta moesta (2)

Molestan blister beetle, Lytta molesta (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 woolly-threads, Lembetia congdonii (2R)

Hoover's woolly-star, Eriastrum hooveri (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.  
(2R)—Recommended addition to category 2.

**TABLE IV N-7**  
**WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS**  
**PIXLEY NWR**

Item	Water Delivery Levels			
	Level 1	Level 2	Level 3	Level 4
<b>Habitat Acres</b>				
Seasonal Marsh	0	0	400	550
Irrigated Marsh	0	0	400	400
Irrigated Crops	0	0	0	650
<b>Bird Use Days</b>				
Geese	0	0	133,600	267,200
Ducks	0	0	907,200	1,815,000
Waterbirds and Other Migratory Birds	0	0	405,600	811,200
Endangered Species	6,000	6,000	477,700	1,300,000
<b>Public Use Days</b>				
Consumptive	0	0	0	0
Non-consumptive	50	50	650	1,300
<b>Annual Recreational Benefits</b>	<b>\$ 1,080</b>	<b>\$ 1,080</b>	<b>\$ 14,080</b>	<b>\$ 28,160</b>

## G. PERMITS

Construction activities would require several permits. Tulare County would issue approvals to ensure that the existing drainage facilities would not be adversely effected. If additional water is transferred through the California Aqueduct, approvals from the State Department of Water Resources would be required. If water is transferred through the Pixley Irrigation District or the Tulare Basin Water Storage District facilities, their approval is required. If water rights are to be obtained, the State Water Resources Control Board would be granting the permits. For construction activities in wetlands or riparian corridors, Stream Alteration Permits would be required from the DFG and an Army Corps of Engineers permit would be required for construction on wetlands or riparian corridors.