

ENVIRONMENTAL IMPACT STATEMENT

EIS NUMBER 01-81

MENDOTA POOL 10-YEAR EXCHANGE AGREEMENTS

FINAL

2004

**United States Department of the Interior
South-Central California Area Office
1243 “N” Street
Fresno, California 93721-1813**



**BUREAU OF RECLAMATION
UNITED STATES DEPARTMENT OF THE INTERIOR**

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Fresno County, California**

Abstract: This environmental impact statement evaluates the proposed exchange of up to 25,000 acre-feet of water per year over a 10-year period between the U.S. Bureau of Reclamation (Reclamation) and the Mendota Pool Group (MPG). Reclamation's purpose in authorizing this action is to facilitate the efficient delivery and re-allocation of water to facilitate environmental and economic benefits as authorized by 34 U.S.C. §3408(d), Central Valley Project Improvement Act (CVPIA). The need for the proposed action is to facilitate improvements in the reliability of irrigation water delivery to the San Luis Canal without affecting CVP water deliveries at Mendota Pool. The proposed action will offset cutbacks in CVP irrigation water supplies as a more balanced distribution of water among competing uses is sought. The MPG proposes to pump non-CVP groundwater into the Mendota Pool and exchange it with water from the CVP. This exchanged water will be delivered to land owned by MPG members elsewhere within the CVP service area. The proposed action is the result of discussions since the early 1990s and includes a baseline pumping program, design constraints, a monitoring program, and an adaptive management approach. Two No Action alternatives also considered are the construction of new wells on MPG properties in Westlands Water District (WWD) and San Luis Water District (SLWD) and fallowing land in WWD and SLWD. Six primary resource areas are evaluated: groundwater levels, land subsidence, groundwater quality, surface water quality, sediment quality, and biological resources. Six other resource areas are also evaluated. The proposed action would have less-than-significant effects on all resource areas except groundwater quality. The project would result in a significant cumulative effect on groundwater quality adjacent to the Pool during the project. The two alternatives would significantly increase the cost of the water obtained and could affect groundwater and subsidence in WWD and SLWD.

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EXECUTIVE SUMMARY

This environmental impact statement (EIS) evaluates the proposed exchange of up to 25,000 acre-feet of water per year over a 10-year period between the U.S. Bureau of Reclamation (Reclamation) and the farmers comprising an unincorporated association known as the Mendota Pool Group (MPG). Reclamation's purpose in authorizing this action is to facilitate the efficient delivery and re-allocation of water to achieve environmental and economic benefits as authorized by the Central Valley Project Improvement Act (CVPIA). The need for the proposed authorization is to facilitate improvements in the reliability of irrigation water delivery to the San Luis Canal (SLC) [at Check 13 on the Delta Mendota Canal (DMC)] without affecting Central Valley Project (CVP) water deliveries at Mendota Pool. The proposed action will offset cutbacks in CVP irrigation water supplies as a more balanced distribution of water among competing uses is sought.

Since 1989, water supplies to CVP agricultural users have been drastically reduced in a mandatory effort to balance competing nonagricultural benefits of the CVP. Between 1980 and 1989, water deliveries to Wetlands Water District (WWD) averaged 103% of the District's entitlements. However, since that time, deliveries have averaged 63.8%. This reduction in water deliveries from the CVP has required that agricultural users obtain a large portion of their water requirements from supplemental sources such as groundwater. Groundwater has long been an important water source for farmers within the WWD and San Luis Water District (SLWD) service area. Prior to the construction of the CVP in 1963, groundwater was the primary source of irrigation water (WWD 1999). To make up for the shortfall in surface irrigation water since 1989, landowners and water users within the districts have drilled wells to obtain supplemental water.

MPG members own approximately 50,000 acres of historically irrigated farmland in WWD and SLWD. These lands are not adjacent to the Pool and depend on deliveries from the SLC (California Aqueduct) to WWD and SLWD for irrigation water. There are no other supplemental sources of surface water that can be used for these lands.

The MPG proposes to pump non-CVP groundwater from their wells into the Mendota Pool and exchange it for water from the CVP, which is administered by Reclamation. This exchanged water will be delivered to land owned by MPG members elsewhere within the CVP service area. The objective of the proposed action is to enable the MPG to maintain production on historically irrigated lands by obtaining sufficient water at cost-effective prices to offset cutbacks in CVP deliveries. The proposed action is not intended to increase

the amount of water for farming activities but would replace water allocated for other CVP purposes.

This EIS analyzes the environmental effects of the 10-year proposed action and two No Action alternatives on the quantity and quality of groundwater and surface water resources in the vicinity of the Mendota Pool, given existing conditions in the project vicinity. The EIS does not evaluate factors that resulted in the current environmental conditions. Since the project proposed by the project proponents (MPG) includes the federal proposed action and other components, the EIS evaluates the combined effects of all pumping by the MPG into the Pool.

The following definitions are used throughout this EIS:

- The federal “proposed action” is the exchange with Reclamation of up to 25,000 acre-feet per year of non-CVP groundwater for CVP water delivered via the San Luis Canal.
- The term “transfer pumping” refers to all water pumped by the MPG into the Mendota Pool for delivery to WWD, exchange with Reclamation (i.e., the proposed action), or trade with other users around the Mendota Pool.
- Under the terms of the Settlement Agreement, the MPG may also pump up to 14,000 acre-feet per year to irrigate overlying/adjacent lands. This is referred to as “adjacent use” pumpage.

Section 1 of this EIS describes the purpose and need for the proposed exchange. The proposed action and alternatives are described in detail in Section 2. Section 3 of this document describes the environmental setting and includes a detailed summary of monitoring data collected between 1999 and 2002. Section 4 evaluates the potential for effects of the proposed action and alternatives on the environmental resources in the action vicinity.

ES.1 PROPOSED ACTION

The proposed action that is the subject of this EIS is the exchange of up to 25,000 acre-feet per year of non-CVP groundwater for CVP water at Check 13 on the DMC. The proposed project is the result of ongoing discussions between the project proponents (i.e., the MPG), Reclamation, local water districts, the Regional Water Quality Control Board (RWQCB), Fresno and Madera Counties, the City of Madera, U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Game (CDFG), and adjacent landowners since the early 1990s. Throughout these discussions, numerous

potential impacts have been identified, and mitigation actions have been proposed. The mitigation actions are included in the proposed pumping program as design constraints. As described in this EIS, the proposed action includes a baseline pumping program, numerous design constraints, a monitoring program, and an adaptive management approach to implementation of the pumping program based on the results of the monitoring program.

Five primary resource areas were identified in previous environmental documents: groundwater levels, land subsidence, groundwater quality, surface water quality, and biological resources. This EIS addresses those five resource areas and includes an evaluation of potential impacts to sediments and historical and societal resources. Resource areas evaluated in this EIS for potential impacts include:

- Groundwater levels
- Land subsidence
- Groundwater quality
- Surface water quality
- Sediment quality
- Biological resources
- Central Valley Project operations
- Archaeological and cultural resources
- Land use and traffic
- Air quality
- Noise
- Environmental justice
- Socioeconomics

The primary area of interest for this EIS includes portions of western Fresno County and southwestern Madera County. Because the No Action alternatives would take place in WWD and SLWD, these regions are also considered relative to the No Action alternatives. The area of interest for the evaluation of potential effects is dependent on which primary environmental issue of concern is being addressed and which action alternative is being evaluated.

The project proponents propose to pump a maximum of 269,600 acre-feet of groundwater for transfer over a ten-year period from wells located adjacent to the Mendota Pool into the Mendota Pool. The maximum allowable quantity of

water to be pumped in a given year would depend on whether the year is classified as wet (0 acre-feet per year), normal (up to 31,600 acre-feet per year), or dry (up to 40,000 acre-feet per year). However, no more than 25,000 acre-feet of water would be exchanged with Reclamation each year; the remaining water would be exchanged with other users around the Pool. The MPG will determine the classification of each year during the spring, based primarily on the April 15 estimate of agricultural water allocations made by Reclamation each year. The constraints of the Settlement Agreement will be superimposed upon these determinations. Furthermore, the quantity of water to be pumped may be further limited based on existing hydrologic and water quality conditions.

Transfer pumping would be conducted over a maximum of nine months each year, between March 1 and November 30. The annual pumping programs would consist of three seasonal components: spring, summer, and fall. During the spring (March through May), both shallow (< 130 feet deep) and deep (> 130 feet deep and above Corcoran Clay) wells would be pumped. During the summer (June through mid-September), only shallow wells would be pumped. However, during years when the program does not begin until after April 1, deep wells may be pumped during the month of June. During the fall (mid-September through November), both shallow and deep wells would be pumped.

The groundwater pumping program will be adaptively managed to minimize environmental impacts. Pumping programs will be developed and reviewed on an annual basis to allow for year-to-year variations in hydrologic conditions and will be defined in the spring, prior to the start of pumping. Each pumping program would be based on consideration of several factors including the design constraints (e.g., water quality at Exchange Contractor's canal intakes or at Mendota Wildlife Area (MWA); see Section ES.3), the results of the previous year's monitoring program, the extent of groundwater level recovery, hydrologic conditions, and any Reclamation contractor's rescheduling of CVP deliveries from the previous water year.

Adjustments will be made to the pumping program if the monitoring program indicates that actions need to be taken to prevent significant impacts such as overdraft, subsidence, or water quality degradation in the Mendota Pool. The results of the annual monitoring programs will be used as input to a series of groundwater and surface water models that will be used to forecast subsidence and water quality impacts, design the subsequent year's pumping program, and ensure that all design constraints are met. The models will be periodically reviewed and improved as more data become available.

ES.2 ALTERNATIVES

This EIS evaluates two No Action alternatives to the proposed action. These alternatives were identified as the most probable alternatives should the proposed action not be implemented. These alternatives assume that Reclamation does not allow the proposed exchange of groundwater pumped into the Mendota Pool for water taken from the DMC at Check 13. Therefore, the MPG would not be able to obtain supplemental (i.e., exchanged) water via the SLC for delivery to their farmlands in WWD and SLWD. The No Action alternatives assume the continuation of efforts to secure water transfers and implement water conservation programs. The current level of groundwater pumping for local use by farmers and others in the Mendota region would remain without the action.

Should Reclamation decide not to implement the Proposed Action, then the MPG members would independently seek to obtain water from other sources in order to maintain agricultural production to the fullest extent possible. This EIS considers two options that are the most feasible and could be implemented by the MPG. These options are:

- New Well Construction – To provide 25,000 acre-feet of groundwater per year between 75 and 125 new wells would need to be drilled on MPG lands.
- Land Fallowing – To compensate for the 25,000 acre-feet of water that would not be obtained through this exchange, approximately 10,000 acres of land would have to be taken out of production (approximately 20 percent of MPG lands). This land would be taken from non-permanent crops and would be removed on a rotating basis.

In addition to these alternatives, the MPG would continue to pump up to 9,000 acre-feet per year into the Mendota Pool for exchange or trade with other users around the Mendota Pool or conveyed to WWD via Laterals 6 or 7. The amount of water traded would depend on the amount of water available from existing Reclamation CVP contractors receiving CVP water at the Mendota Pool, cropping patterns, availability of conveyance capacity, and amount of land fallowed. This action would not require any State or federal permits.

In the analysis presented in this EIS, the New Well Construction and Land Fallowing options are treated as independent actions. In reality, individual members of the MPG may choose either of these options or choose some combination of the two.

ES.3 DESIGN CONSTRAINTS

The proposed action incorporates several design constraints intended to prevent adverse environmental effects. Some of these constraints were initially specified in the Settlement Agreement between the MPG, the San Joaquin River Exchange Contractors Water Authority (SJREC), and Newhall Land and Farming (NLF). Additional constraints were developed based on the results of previous monitoring efforts and to address concerns of other water users around the Mendota Pool. The constraints apply to the initial design of the annual pumping programs and to triggers based on the results of the annual monitoring program. These design constraints include:

- Pump MPG wells along the Fresno Slough only when flow in the Fresno Slough is to the south. Wells in Farmers Water District (FWD) could pump irrespective of flow direction.
- Shut off MPG wells if electrical conductivity (EC) measurements at the Exchange Contractors' canal intakes exceed that of the DMC by 90 $\mu\text{mhos/cm}$ for a period of three days or more. If the MPG wells were shut off for this reason, they would not be turned back on until the EC at the canal intakes returns to a level that is no more than 30 $\mu\text{mhos/cm}$ above the DMC inflow.
- Minimize deep zone drawdowns by reducing MPG deep zone transfer pumping during the summer months when the majority of non-MPG irrigation pumping occurs in the Mendota area.
- Limit total transfer pumping from the deep zone to 12,000 acre-feet per year to reduce subsidence, reduce water level impacts, and minimize the rate of groundwater quality degradation that would otherwise occur.
- Limit deep zone drawdowns throughout the pumping program to limit subsidence at the Yearout Ranch and Fordel extensometers caused by transfer pumping to less than an average of 0.005 foot per year over the ten-year period, with a maximum allowable compaction of 0.05 foot over the ten year period. Compaction data collected from the extensometers will be used along with model results to estimate the amount of subsidence cause by MPG pumping each year.
- Modify the pumping program based on the results of the surface water monitoring program to reduce overall surface water quality degradation, particularly with respect to salinity [total dissolved

solids (TDS) or EC]. This will ensure that the quality of water supplied to the MWA and other users in the southern portion of the Mendota Pool will meet applicable water quality criteria. Wells with TDS concentrations greater than 2,000 mg/L will not be pumped as part of the proposed action. During the fall pumping period, when there is reduced flow in the Mendota Pool and water quality at the MWA is most critical, wells with TDS higher than 1,200 mg/L will not be pumped for transfer.

- Shut off wells with selenium concentrations equal to or greater than the surface water quality criterion of 2 µg/L.
- Minimize groundwater quality degradation by modifying the pumping program based on the results of predictive modeling of the effects of the pumping program and the results of the groundwater monitoring program, and by minimizing drawdowns.
- Five MPG wells (Farmers Water District WL-1, WL-2, WL-3, EL-2, and EL-3) will not be pumped for transfer, and will not constitute part of the exchanged waters, as they are located in Madera County.
- Beginning with the 2001 irrigation season, the MPG has offered to compensate the other major groundwater pumpers in the Mendota area for increased power and other additional costs due to drawdowns estimated to have been caused by the MPG transfer pumping.

ES.4 MONITORING PROGRAM

The MPG has designed a surface water, groundwater, sediment, and subsidence monitoring program to assess the impacts of the proposed action. The current monitoring program was developed with input from the USFWS, the U.S. Geological Survey (USGS) and the CDFG. The monitoring program was initiated in 1999 and is planned to last for the duration of the proposed action. The complete monitoring program is described in Appendix B. The monitoring program consists of the following components:

- Monitor pumpage of the MPG wells on at least a monthly basis
- Measure groundwater levels on a bimonthly basis throughout the year
- Conduct continuous monitoring of Yearout and Fordel extensometers to estimate compaction and subsidence

- Sample groundwater quality on an annual basis
- Evaluate data from continuous EC recorders located at the DMC, the Exchange Contractors' intakes, and the MWA
- Conduct surface water quality sampling during the pumping season
- Conduct sediment sampling at eight locations in the fall of each year

A quality assurance/quality control program is in place to verify accuracy of monitoring data. The monitoring data are provided to Reclamation to verify full implementation of the pumping and monitoring plan. In addition, monitoring data are provided to USFWS, CDFG, SJREC, and NLF. Annual monitoring program reports will be provided to Reclamation and the parties to the Settlement Agreement.

ES.5 AFFECTED ENVIRONMENT

Since 1999, the MPG has accumulated and evaluated data on several components of the environment surrounding the Pool, including groundwater level and quality, surface water quality, subsidence, and sediment quality.

GROUNDWATER LEVELS AND SUBSIDENCE

Measured drawdowns available from the water level monitoring program in 1999 through 2002 provide an indication of what is likely to occur in future years. The 2000 drawdowns were quite similar to the 1999 drawdowns in both magnitude and timing. In most of the deep wells, the maximum drawdowns occurred during the peak of the irrigation season (July or August). The MPG pumping program was modified for 2001 and 2002 so that the deep MPG wells did not pump for transfer between July 1 and September 15. In NLF and portions of FWD, the maximum drawdowns in 2001 and 2002 still occurred in July but were much smaller than in previous years. West of the Fresno Slough, the maximum drawdowns for the majority of wells in 2001 and 2002 occurred in September and August, respectively. These drawdowns were also considerably smaller than in previous years.

Overdraft has been occurring in portions of western Madera County northeast of Mendota for decades, with many wells south of the Chowchilla area experiencing more than 100 feet of water level decline. Groundwater elevation contour maps of the deep aquifer in the Mendota area produced by Department of Water Resources (DWR) (1989-2000) and Luhdorff and Scalmanini Consulting Engineers (LSCE) and Kenneth D. Schmidt and Associates (KDSA) (2001 and 2002) indicate that groundwater flows into this

cone of depression from all directions. This results in lower groundwater levels in the surrounding area, including FWD.

Groundwater flow beneath the San Joaquin River into Madera County is not a natural condition but is induced by pumping in the overdrafted areas. The majority of the groundwater flow into western Madera County comes from the vicinity of the San Joaquin River upstream of Gravelly Ford and beneath the River downstream of Mendota Dam.

GROUNDWATER QUALITY

There has been groundwater quality degradation in the Mendota area for several decades, and water quality is already significantly degraded at some locations. Wells operated by the MPG and other entities including Central California Irrigation District (CCID), Firebaugh Canal Water District, and the City of Mendota have been removed previously from service as a result of water quality impacts due to the easterly movement of the saline front. Although northeasterly movement of the saline front is the primary cause of groundwater quality degradation in the Mendota area, wells operated by Spreckels Sugar Co. have been removed from service due to localized sources of contamination.

Arsenic was detected in 9 of 55 shallow and 6 of 39 deep production or monitoring wells tested in groundwater monitoring programs in the Mendota Pool area. Detected concentrations were generally at, or just above, the detection limit of 2 µg/L. The lowest water quality criteria for arsenic are 5 µg/L for Refuge Surface Water Quality and 10 µg/L for protection of aquatic life. Arsenic was not detected in any MPG production well in the most recent monitoring event at a level exceeding the Refuge Surface Water Quality target level.

Boron was detected in all wells tested. Boron levels in many of the MPG production wells along the Fresno Slough are 0.3 mg/L or higher; concentrations in 16 wells exceed the CDFG unacceptable level of 0.6 mg/L. However, wells with the highest boron concentrations are either excluded from the proposed action or would only be pumped for a limited time each year because of TDS levels greater than 1,200 mg/L.

The most recent molybdenum concentrations measured in shallow wells ranged from 1.6 to 58.4 µg/L. The lowest average molybdenum concentration was in the northern Fresno Slough shallow wells, while the highest concentration was observed in a shallow monitoring well west of the Fresno Slough. Molybdenum concentrations in deep wells ranged from 1.8 to 37 µg/L. The lowest water quality criteria for molybdenum are the target levels

of 10 µg/L for both Refuge Surface Water Supply and aquatic life protection. Only 2 of the 23 deep production wells had molybdenum concentrations greater than 10 µg/L. However, 30 of 44 shallow production wells exceeded 10 µg/L molybdenum. The majority of these shallow wells are located in the central and southern Fresno Slough regions. Many of these wells also have high TDS levels and will not be included in the MPG pumping program, or pumping from these wells will be limited.

Selenium was detected in only 3 of 73 samples from shallow or deep MPG production wells along either arm of the Pool in 2001 or 2002. When detected, selenium was present at concentrations between 0.4 µg/L and 1 µg/L.

SURFACE WATER QUALITY

TDS concentrations in the Pool (either measured directly or estimated from EC data) vary widely, with the highest concentrations seen in samples collected from the southern portion of the Pool. The TDS concentrations are related to the concentrations in the DMC and inputs from the MPG wells.

Design constraints that would be incorporated into each annual pumping program under the proposed action include basing the selection of MPG wells to be pumped each month on water quality criteria and eliminating all pumping from wells with TDS concentrations greater than 2,000 mg/L. During the fall, when water quality at the MWA is most critical, wells with TDS higher than 1,200 mg/L would not be pumped for transfer.

Data collected at nine surface water sampling locations indicate that molybdenum levels in the Pool were 10 µg/L or less. These concentrations are less than the criterion for aquatic life protection of 19 µg/L. However, the highest detected level, 10 µg/L, is at the target level recommended by CDFG for the MWA.

Few samples from the northern portion of the Fresno Slough and no samples from the southern Fresno Slough had selenium concentrations exceeding the target level of 2 µg/L in 2001 or 2002. The criterion for protection of aquatic life and the CDFG recommended target level for the MWA are both 2 µg/L. Selenium was either non-detect or present at low concentrations in Mendota Pool surface water samples collected in 2001 and 2002. The highest selenium levels were detected during the spring in samples from the northern portion of the Fresno Slough. The highest concentrations were reported for samples collected at the DMC terminus (3.32 µg/L in 2001 and 2.3 µg/L in 2002). The lowest selenium levels were reported in samples from the southern portion of the Fresno Slough. Selenium concentrations ranged from <0.4 µg/L to 1.16 µg/L at the MWA, from <0.4 µg/L to 0.9 µg/L at the Lateral 6 & 7 intake, and

from <0.4 µg/L to 0.95 µg/L at James ID. The criterion for protection of aquatic life and the CDFG recommended target level for the MWA are both 2 µg/L. Few samples from the northern portion of the Fresno Slough and no samples from the southern Fresno Slough had selenium concentrations exceeding this target level in 2001 or 2002.

SEDIMENTS

A sediment quality monitoring program in the Mendota Pool was implemented in August 2001. The monitoring program was designed to allow assessment of spatial distribution of selected parameters (EC, arsenic, boron, molybdenum, and selenium) in the sediment. The sampling locations allow estimation of trace analyte inputs from the San Joaquin River, the DMC, and the James Bypass.

Arsenic and boron were detected in almost all of the October 2001 and 2002 samples. However, one boron result was less than the detection limit and 14 of the 48 boron results were between the method detection limit and the reporting limit. Arsenic ranged from 1.4 mg/kg to 10.9 mg/kg (dry weight). Boron ranged from <2.3 to 52.8 mg/kg (dry weight). Only 28 of the 48 samples contained molybdenum at concentrations greater than the detection limit of 0.8 mg/kg (dry weight). Only one (2.4 mg/kg) of these samples contained molybdenum exceeding 1.8 mg/kg (dry weight). Selenium was detected in only two of the sediment samples from October 2001 and 2002, with detection limits ranging from 0.9 mg/kg to 1.2 mg/kg (dry weight).

The sediment quality data from the October 2001 and October 2002 sampling events were statistically analyzed to determine whether they could be associated with MPG pumping. The available data show no indication that the spatial distribution of salinity or trace analytes in the sediment samples is associated with inflow from the MPG wells. Sediments in the San Joaquin River arm of the Pool (i.e., Columbia Canal station) have the lowest trace analyte and salt concentrations; whereas, sediments from near the DMC typically have the highest concentrations. Sediment conditions in the southern Pool (south of Whitesbridge Road) vary depending on which analyte is being considered and between years.

BIOLOGICAL RESOURCES

Although the area in the vicinity of the proposed action is highly agricultural, several areas in the vicinity could support plant and wildlife species. These areas include the MWA, the Mendota Pool, and fallowed or idled agricultural lands. The 12,425-acre MWA is the largest publicly owned and managed wetland in the San Joaquin Valley. The refuge is bisected by the Fresno

Slough and is adjacent to the 900-acre Alkali Sink Ecological Reserve. The MWA supports approximately 10 to 20 million waterfowl use-days per year, as well as a wide variety of nongame species (Huddleston 2002).

A list of federal and State threatened, endangered, proposed listed, candidate, rare, species of concern, and/or species of special concern that may occur in the study area was requested from the USFWS on August 29, 2001. On October 24, 2001, the USFWS provided a list of protected species in the eleven 7.5-minute USGS quadrangles in the vicinity of the proposed action. Also, a list of state endangered, threatened, proposed listed, candidate, rare, and species of special concern was obtained from a query of the California Natural Diversity Database (CNDDB) for those same 11 quadrangles. In addition, a letter from W. Loudermilk, Regional Manager San Joaquin Valley and Southern Sierra Region CDFG, dated July 13, 2001, identified protected species in the vicinity of the proposed action.

Several special-status wildlife species have been recorded at MWA: giant garter snakes, white-faced ibis, Swainson's hawks, and tricolored blackbirds. Fresno kangaroo rats have been recorded at the adjacent Alkali Sink Ecological Reserve. Palmate-bracted bird's-beak is a special-status plant that has been recorded at MWA and also occurs at the Alkali Sink Ecological Reserve, along with the rare plants heartscale and Hoover's eriastrum.

The Mendota Pool is formed by a dam that is owned, operated, and maintained by CCID. The dam backs up water in the Fresno Slough to the James Bypass and in the San Joaquin River almost to San Mateo Avenue. The Mendota Pool is surrounded by areas of intensive agriculture and consequently has limited wildlife habitat value. The margins of the Mendota Pool support some areas of emergent vegetation dominated by cattails and tules; a few cottonwoods and willows grow above the water line. Open water habitat may attract migratory ducks such as mallards, gadwalls, and ruddy ducks. Emergent vegetation provides limited habitat for marsh-dwelling species such as rails, herons, and various songbirds. Several special-status wildlife species have been recorded near the Mendota Pool, including giant garter snakes, Swainson's hawks, yellow-billed cuckoos, and bank swallows (Jones and Stokes 1995). Sanford's arrowhead is apparently the only special-status plant species that has been recorded near the Mendota Pool (Jones and Stokes 1995).

A variety of row, orchard, and vine crops are produced on agricultural lands in the action vicinity; the proportions represented by different crops vary each year. Similarly, the amount of fallow land varies annually, and may range from 16,340 acres (as in 1984) to 125,082 acres (as in 1991) in WWD. Fallow lands are temporarily removed from production and are a normal part of

agricultural processes in the San Joaquin Valley. While it is true that land idled near native habitat may become occupied by threatened or endangered species, it is also true that land is idled or fallowed and subsequently brought back into agricultural production for reasons not related to this action. Fallowed land is routinely disced for weed control, and idled land is usually brought back into production in years when water is abundant.

Numerous special-status wildlife species have been observed near agricultural lands in the vicinity of the proposed action, including Swainson's hawks, prairie falcons, burrowing owls, San Joaquin antelope squirrels, San Joaquin pocket mice, giant kangaroo rats, Fresno kangaroo rats, Tipton kangaroo rats, San Joaquin kit foxes, and blunt-nosed leopard lizards (Jones and Stokes 1995). Many of these sightings were made in remnant habitat areas along levees and along the margins of roads and fields.

ES.6 ENVIRONMENTAL CONSEQUENCES

Potential effects on the primary resource areas are closely interrelated. Pumping by the MPG wells and nearby non-project wells would result in a localized lowering of the groundwater levels (drawdown) and the formation of a seasonal "cone of depression" in one or both of the shallow or deep layers of the upper aquifer. These lower groundwater elevations result in increased pumping costs in nearby non-project wells. When the groundwater elevations in the aquifer are depressed, inelastic compaction of the clay layers may occur and result in land subsidence. Drawdown due to pumping would also result in an increase in the hydraulic gradient, thereby increasing the flow of groundwater from outlying areas toward the Mendota Pool. If the outlying areas have poorer water quality than that present near the Mendota Pool, then water quality degradation would occur. Finally, if the groundwater quality is poorer than the surface water quality, then pumping of this water into the Mendota Pool may result in a degradation of the surface water quality, which may ultimately affect biological resources.

GROUNDWATER LEVELS

Analytical groundwater models of the shallow and deep zones have been used since 1999 to predict drawdown and assess short-term impacts of transfer pumping at nearby wells (LSCE and KDSA 2001, 2002, 2003). These models are used to predict water level impacts within the study area during each year of the 10-year proposed action.

Drawdowns during the 10-year program are expected to be smaller than in the past because future MPG deep zone pumping would be less and the deep MPG wells are scheduled to be off for a longer period during the summer.

Also, pumping would be distributed over a longer period than during previous pumping programs, thereby resulting in less drawdown. Data collected through 2002 indicate that although overdraft is occurring in the northeastern portion of the study area, it is not occurring near the MPG wells. If overdraft were to occur due to the proposed action, it would be most apparent near the MPG wells where water level impacts are largest. The Settlement Agreement states that MPG transfer pumping would be reduced if there were evidence that the pumping is causing long-term overdraft.

Of the non-MPG wells included in the monitoring program, the NLF wells near the San Joaquin River would experience the most drawdown due to the proposed action. Several NLF wells near the River are predicted to experience a seasonal maximum of about 25 feet of drawdown due to transfer pumping. This would decrease to about 10 feet for NLF wells located approximately one mile north of the River and to less than 5 feet for most wells east of the Chowchilla Bypass. The residual drawdown (lack of full recovery) that has occurred in several deep wells in NLF near the San Joaquin River since 1999 is partially attributable to MPG pumping. Residual drawdowns in other NLF wells near the northern and eastern boundaries of NLF are caused by pumping within NLF and in the historically overdrafted portions of Madera County (north and east of NLF), rather than by MPG pumping. Residual drawdowns in NLF due to MPG pumping are not anticipated in the future because transfer pumpage will be reduced considerably to minimize water level and subsidence impacts.

As part of the Settlement Agreement, the MPG agreed to pay compensation to well owners in the SJREC and NLF service areas as mitigation for increased power and other costs incurred due to drawdowns caused by the MPG transfer pumping. With this mitigation, the proposed action would result in less-than-significant short-term economic impacts due to drawdowns in the Mendota area.

SUBSIDENCE

Subsidence occurs in the San Joaquin Valley primarily as a result of inelastic compaction of lacustrine deposits and Coast Range alluvium in the western and southern parts of the Valley due to pumping from the lower aquifer below the Corcoran Clay. Much less compaction occurs in coarser-grain sediments such as the Sierran sands in the eastern half of the Valley. Compaction in the Sierran sands is primarily elastic and is much less likely to cause irreversible subsidence.

Subsistence is monitored at the Yearout Ranch and Fordel extensometers. In the Phase II report (KDSA and LSCE 2000b), a subsidence threshold of an

average of 0.005 foot per year at the Yearout Ranch extensometer was identified (a maximum of 0.05 foot over 10 years). This criterion was selected for three reasons: 1) it is the minimum subsidence that could be detected over the given period, 2) the Yearout Ranch extensometer is located near FWD and Spreckels Sugar Co. in an area that has historically experienced relatively large drawdowns, and 3) the Yearout Ranch extensometer has a relatively long dataset with which to compare current and historic subsidence rates. This criterion is also applied to compaction measured at the Fordel extensometer west of the Fresno Slough.

In the Mendota area, historical compaction data indicate that compaction in the Sierran sands above the Corcoran Clay is primarily elastic. The amount of subsidence attributed to MPG transfer pumping at the Yearout Ranch extensometer during the 3-year period of record (2000-2002) was 0.014 foot. This is slightly less than the criterion specified in the Settlement Agreement (average of 0.005 foot per year). Because transfer pumpage would be reduced as necessary to ensure that this criterion is not exceeded over the 10-year period, the proposed action would result in less-than-significant subsidence in the Mendota Area.

GROUNDWATER QUALITY

MPG pumping as specified in the proposed action would contribute to groundwater quality degradation primarily as a result of the following three factors:

1. Pumping of MPG wells along the Fresno Slough (especially deep wells) would create a steeper horizontal gradient, which would accelerate lateral flow of groundwater west of the Slough toward the MPG well field. The northeasterly gradient exists both with and without MPG pumping. However, the pumping steepens the gradient and increases the rate of flow from the west and southwest.
2. Pumping of deep MPG wells along the Fresno Slough would increase vertical (downward) gradients. This would accelerate the downward flow of groundwater through the A-clay to the deeper water-bearing zones of the upper aquifer system. Near both branches of the Pool, the quality of the shallow groundwater is good due to recharge from the Pool. In areas west of the Slough, however, the quality of the shallow groundwater is poor, and this downward flow increases water quality degradation below the A-clay.
3. Pumping of MPG wells (especially shallow wells along the Fresno Slough) removes some of the good quality groundwater that originates

as seepage from the Pool. In the absence of MPG pumping, the seepage from the Pool would help maintain water levels in the shallow, unconfined aquifer above the A-clay, improve groundwater quality near the Pool, and counteract some of the degradation caused by lateral flow of lower quality groundwater from the west.

Deep zone transfer pumping would be conducted primarily in the spring and fall so as not to increase the maximum drawdown in the area, which typically occurs during the peak of the irrigation season (July or August). The effect of this action would be to mitigate increases in the horizontal and vertical gradients in the deep zone, which would slow the rate of salinity increases in the groundwater.

An increased rate of groundwater quality degradation due to the proposed action was predicted at all MPG wells along the Fresno Slough with the groundwater quality model. The model results show a predicted average annual TDS increase over the 10-year period due to the regional gradient, nontransfer pumpage, and transfer pumpage. At the start of the 10-year simulation, 66 wells were included in the MPG pumping programs for transfer or adjacent use. Over the future 10-year period of the proposed action, only one additional well was removed from the pumping program because it was predicted to exceed the TDS constraint of 2,000 mg/L. Estimated pumpage from other wells was reduced, especially during the fall, to maintain surface water quality. The effects of the pumping program on groundwater quality at non-MPG wells were indicated primarily in deep wells west of Fresno Slough. The average predicted annual TDS increase due to transfer pumpage at the shallow MPG wells ranges from 13 to 43 mg/L, and for all wells the annual average was 27 mg/L per year. Wells in the southern half of the MPG well field along the Fresno Slough generally had higher degradation rates than wells located further north. Water quality in shallow MPG wells is anticipated to recover after the 10-year program has ended.

SURFACE WATER QUALITY

The proposed action includes several design constraints that limit impacts to surface water quality. The planned quantity and quality of groundwater pumped into the Pool would be adjusted during each year of the proposed action to ensure that the surface water quality criteria for salinity and trace elements (arsenic, boron, molybdenum, and selenium) would be met. The surface water mixing models would be used in conjunction with analytical results from groundwater samples to facilitate the decision making process regarding annual adjustments to the pumping program. The surface water mixing models would be updated each year as new surface and groundwater data are obtained, and the pumping program would be adjusted to minimize

salinity impacts. Selection of the wells to be pumped for transfer each year would be based on groundwater quality in order to limit the total mass of salt and trace analytes introduced into the Pool. The measured water quality of the DMC and the San Joaquin River used in the mixing models would be updated as appropriate. By updating the models as new surface water and groundwater data become available, the MPG annual pumping program would protect water quality at the MWA and the northern portion of Mendota Pool throughout the 10-year duration of the proposed action.

The water quality in the northern Fresno Slough is primarily influenced by the quality of the water that is introduced by the DMC. Design constraints have been implemented to preclude the MPG wells along the Fresno Slough from influencing water quality in the northern Slough.

The predicted effect of the proposed action and the cumulative effect during the first pumping year (Year 2 of the proposed action) and the final (tenth) year on TDS concentrations were modeled as part of this analysis. These results account for the predicted groundwater quality degradation and associated modifications to the pumping program. The model indicates that transfer pumpage would result in an average TDS increase in surface waters during the pumping months of 96 mg/L in Year 2 and 109 mg/L in Year 10 of the proposed action.

Boron was detected in all wells tested. The average boron concentration of MPG wells along the Fresno Slough included in the transfer pumping program is 0.4 mg/L, which is slightly higher on average than the concentrations in the DMC inflow. The results of the surface water mixing model for boron indicate that MPG transfer pumpage would result in an average boron concentration increase of 0.04 mg/L during months when pumping would occur (March through November).

Because the concentrations of arsenic and selenium are typically below detection limits in MPG wells, the proposed pumping program will not adversely affect surface water quality with respect to these constituents. Molybdenum concentrations in all MPG wells included in the transfer pumping program are below the lowest applicable water quality criterion of 10 µg/L. Therefore, the pumping program will not result in exceedances of surface water quality criteria for molybdenum.

The pumping program design constraints and adaptive management measures would effectively mitigate the effect of the proposed action on surface water quality in Mendota Pool. The surface water mixing models would be updated annually with the most recent data from the groundwater and surface water monitoring programs to design annual pumping programs that would not have

a significant effect on beneficial uses of Mendota Pool water. Assuming that water from the DMC is of comparable quality to that of recent years, the model results would indicate whether the proposed pumping program for each year would meet surface water criteria for irrigation use, protection of aquatic life, and refuge water supply. The pumping program (i.e., specification of wells to be pumped for both transfer and adjacent use during each month and the volumes to be pumped) would be adjusted if the model results indicate exceedance of water quality criteria. The small quantity of MPG water that would flow north out of the Mendota Pool and into the San Joaquin River would be pumped into the Pool by the FWD wells. On average, these wells have slightly lower TDS and boron concentrations than water from the DMC. Therefore, the proposed action would not add to the salt and boron loads in the River below Mendota Dam.

SEDIMENT QUALITY

Sediment quality criteria for arsenic and selenium are not exceeded in Pool sediments. Corresponding criteria are not available for boron, molybdenum, or salts (TDS or EC). Sediment quality data from October 2001 and 2002 indicate that arsenic, boron, and EC are generally highest near the outfall from the DMC and lowest in the San Joaquin arm. No consistent pattern in the concentration of trace analytes is evident in other portions of the Pool.

The MPG production wells are not currently contributing elevated concentrations of arsenic, molybdenum, or selenium to surface waters in the Pool. Therefore, it is unlikely that MPG inputs would increase concentrations of these analytes in the sediments. Boron is present in groundwater at concentrations near the lowest applicable water quality criterion. Modeling does not indicate that MPG pumping would result in exceedance of water quality criteria for boron in surface water in the Pool. Salts are added to surface water in the Pool from groundwater. However, as the salts are highly soluble, it is unlikely that they would accumulate in the sediments.

None of the available lines of evidence suggest that MPG pumping has contributed, or would contribute, to accumulation of salts and trace analytes in the sediments. Maintenance of surface water quality would serve to maintain sediment quality.

BIOLOGICAL RESOURCES

The potential effects of the proposed action on biological resources were evaluated relative to habitat modification, irrigation water quality, and aquatic toxicity. The pumping project may decrease the amount of fallowed land (agricultural land that has been disced, irrigated, mowed or otherwise

manipulated to control weeds) over the No Action alternatives. Practices used to maintain fallowed land generally reduce the growth of vegetation, which reduces the amount of potential cover from predators and severely limits the habitat value of fallowed land for species such as the San Joaquin antelope squirrel, giant kangaroo rat, and burrowing owl. Therefore, biological impacts (habitat modification) on terrestrial species present on fallowed lands are not expected to occur.

The sodium adsorption ratio (SAR) is an indication of the potential for irrigation water to increase salt loading in the soils to which it is applied. The evaluation of the SAR in conjunction with measured salinity indicates that surface waters in the Pool are currently slightly to moderately impaired for irrigation use. The proposed action would increase salinity in the Pool above that in the DMC but would maintain the salinity in the Pool below water quality criteria. The water quality would continue to be acceptable for agricultural uses.

It is unlikely that plants and wildlife in the Pool or the MWA, including special-status species, would be exposed to concentrations resulting in significant bioaccumulation of selenium or toxicity of arsenic, molybdenum, or boron in surface water as a result of the proposed action. Selenium and arsenic concentrations have been consistently below detection limits in groundwater samples. Molybdenum in groundwater is consistently below applicable water quality criteria. Although boron in groundwater exceeds the CDFG target concentration for refuge water supplies, no exceedances of the “unacceptable” level have been detected in surface waters of the Pool. The proposed action will not result in exceedances of the CDFG unacceptable level.

There are no indications that the proposed action would result in sediment quality criteria for selenium or arsenic being exceeded during the 10-year program. Analysis of the recent sediment data indicated that selenium concentrations did not exceed the 2 mg/kg (dry weight) criterion, with detection limits ranging from 0.9 to 1.2 mg/kg (dry weight).

It is unlikely that special-status plants and wildlife in the Pool or the Mendota Wildlife Area would be exposed to concentrations resulting in significant bioaccumulation of selenium or toxicity of arsenic, molybdenum, or boron in surface water as a result of the proposed action. The cumulative effects of the pumping program on biological resources, including special-status species like the giant garter snake, in the Pool or MWA are considered to be less-than-significant because:

- Selenium and other constituents (arsenic, boron, and molybdenum) in surface water and in pumping wells do not exceed target values set by the USEPA and the USFWS.
- Increases in TDS concentrations in the Pool are minimized to target levels through application of design criteria.
- Introduction of groundwater from MPG production wells to the Pool does not reduce sediment quality.
- Potentially toxic concentrations of salts and trace elements will not be present in surface waters or sediments.

Because concentrations of some constituents (i.e., boron and salts) will increase in surface waters due to the proposed action but would remain below applicable water quality criteria, the proposed action may affect but is not likely to adversely affect special status species.

CENTRAL VALLEY PROJECT OPERATIONS

The MPG pumping program would not result in exceedance of either the available capacity in the SLC or the storage in the San Luis Reservoir (SLR). The MPG would not affect the availability of project or preference power to other users. Therefore, the proposed action would not have a significant effect on CVP operations.

ARCHAEOLOGICAL AND CULTURAL RESOURCES

Indian Trust Assets are legal interests in property or rights held in trust by the United States for Indian Tribes or individual Native Americans. The distribution of Indian reservations, rancherias, and public domain allotments throughout the action area was reviewed. No Indian lands of any type were found within the study area. There are no significant effects. There are no effects on archaeological or cultural resources for the action and any alternative.

LAND USE AND TRAFFIC

The proposed action does not propose any change to or conflict with current land use designations or zoning and would have no effect on land use. The proposed action does not propose any change to local or regional traffic circulation and would have no effect on the transportation in the action area.

AIR QUALITY

Assuming there is no change in farming operations and that existing pumps are electric, the proposed action would have no effect on air quality.

NOISE

Groundwater pumping by the MPG would increase to make-up for water needs not delivered by CVP. Their proposed locations would remain within agricultural areas and not in proximity to sensitive receptors. Therefore, there would be no effect on noise.

ENVIRONMENTAL JUSTICE

Without the exchanged water, some field crops may not be planted or may become stressed, which could lower production. The proposed action would help maintain agricultural production and local employment and would, therefore, result in a net benefit to the local population. The Land Fallowing alternative may result in reduction of the work force due to removal of lands from agricultural production.

SOCIOECONOMIC EFFECTS

Agriculture is a very important industry in Fresno and Madera counties. Agriculture takes on additional significance because it is generally considered a “primary” industry (along with mining and manufacturing). Changes in primary industry activity, therefore, usually precipitate additional changes in non-primary, or support, industries. The proposed action would help maintain current levels of employment.

SUMMARY

The proposed action would achieve the goals of the pumping program by providing supplemental water resources at a cost-effective rate. The proposed action is anticipated to have less-than-significant effects on the majority of resource areas considered in this analysis. The primary adverse effect of the proposed action is to increase the cumulative rate of groundwater degradation in wells west of the Pool. These wells are primarily MPG wells. This degradation of groundwater quality is not anticipated to be translated to a significant effect on surface water quality because of the adaptive management of surface water quality using modeling to forecast potential effects. This allows the annual pumping program to be adjusted prior to the start of the pumping season.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
af	Acre-feet
As	Arsenic
AWQC	Ambient Water Quality Criteria
B	Boron
CCC	Columbia Canal Company
CCID	Central California Irrigation District
CDFG	California Department of Fish and Game
CEC	Cation Exchange Capacity
CEQA	California Environmental Quality Act
cfs	Cubic feet per second
CIMIS	California Irrigation Management Information System
CNDDDB	California Natural Diversity Database
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVRWQCB	Central Valley Regional Water Quality Control Board
dBA	Decibels
DHS	California Department of Health Services
DMC	Delta-Mendota Canal
DWR	Department of Water Resources (California)
EA	Environmental Assessment
EC	Electrical Conductivity
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ER-L	Effects Range-Low
ESA	Endangered Species Act (Federal)
ET ₀	Reference Evaporation Rates
FCWD	Firebaugh Canal Water District
FEIR	Final Environmental Impact Report
FONSI	Finding of No Significant Impact
FWD	Farmers Water District
ID	Irrigation District
JID	James Irrigation District
Jones and Stokes	Jones and Stokes Associates, Inc.
KDSA	Kenneth D. Schmidt and Associates
L _{dn}	Average day/night sound level
L _{eq}	Equivalent sound level
LSCE	Luhdorff and Scalmanini, Consulting Engineers
µg/L	micrograms per Liter
mg/kg	milligram per kilogram
mg/L	milligrams per Liter
Mo	Molybdenum

MPG	Mendota Pool Group
MWA	Mendota Wildlife Area
NEPA	National Environmental Policy Act
NLF	Newhall Land and Farming
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
NOP	Notice of Preparation (of EIR)
Reclamation	U.S. Bureau of Reclamation
RWQCB	Regional Water Quality Control Board
SAR	Sodium Adsorption Ratio
Se	Selenium
Settlement Agreement	Settlement Agreement for Mendota Pool Transfer Pumping Project
SJREC	San Joaquin River Exchange Contractors Water Authority
SLC	San Luis Canal
SLCC	San Luis Canal Company
SLR	San Luis Reservoir
SLWD	San Luis Water District
SLDMWA	San Luis and Delta-Mendota Water Authority
SWAMP	Surface Water Ambient Monitoring Program
SWP	State Water Project
TDS	Total Dissolved Solids
TID	Tranquillity Irrigation District
TOC	Total Organic Carbon
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WRCC	Western Regional Climate Center
WWD	Westlands Water District