



# United States Department of the Interior

BUREAU OF RECLAMATION  
Mid-Pacific Regional Office  
2800 Cottage Way  
Sacramento, California 95825-1898

IN REPLY  
REFER TO:

JUL 13 2010

MP-410  
WTR-1.10

## MEMORANDUM

To: Deputy Field Supervisor  
Attention: USFWS (JKnight)

From: Richard J. Woodley /s/ **RICHARD J. WOODLEY**  
Regional Resources Manager

Subject: Request for Concurrence that the American Recovery and Reinvestment Act of 2009 New Wells Project – Region 4 Is Not Likely to Adversely Affect Giant Garter Snake

The Bureau of Reclamation proposes to provide American Recovery and Reinvestment Act funding for the installation of up to six deep wells (800 feet deep) in the Grassland Water District (GWD) as described in the attached Biological Assessment (BA). The purpose of these wells is to supplement South of Delta Refuges with the greatest shortfall in Incremental Level 4 water supply in years when surface water allocation is constrained. Development of additional groundwater pumping capacity is expected to alleviate current and likely future drought impacts by helping provide alternative water supplies for refuges when Reclamation is not able to purchase water from willing sellers in order to satisfy critical refuge water needs. Based on implementation of the proposed avoidance and conservation measures described in the BA, Reclamation is requesting concurrence from the Service that the Proposed Action is not likely to adversely affect the federally-threatened giant garter snake (*Thamnopsis gigas*).

The water from each new deep well is intended to provide water for managed wetlands and refuges. The pumped groundwater would be delivered through the existing refuge conveyance facilities or GWD canals and/or pipelines. More information about the specific location of the wells, their associated infrastructure facilities, and location of use is provided below and in the Draft Environmental Assessment (Bureau of Reclamation 2010). No new irrigation delivery systems would be constructed for this project. The majority of pumping from these new wells would occur in May through February.

Reclamation has consulted with the Service on the following occasions:

- May 14, 2010—a species list from the US Fish Wildlife Service (USFWS) website was obtained for the San Luis Ranch, Los Banos, and Gustine USGS 7.5-minute quadrangles.

- June 15, 2010—Reclamation and USFWS met to discuss specifics of the Proposed Action. USFWS requested more detailed maps and additional information to evaluate potential effects.
- June 23, 2010—Reclamation received a memorandum from USFWS (81420-2-1 TA-0794) in response to the draft Environmental Assessment and Finding of No Significant Impact for the construction of up to six wells in the GWD, Merced County, California.

With the following avoidance and conservation measures, which have been incorporated into the project description, effects on giant garter snake from construction are extremely unlikely to occur and, are thus, discountable. The Proposed Action is not likely to adversely affect the giant garter snake.

- *Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements*
- *Measure 2: Install Erosion Control Measures near Aquatic Habitat*
- *Measure 3: Provide Escape Ramps or Cover Open Trenches at the End of Each Day to Avoid Entrapment of Giant Garter Snake*
- *Measure 4: Monitor Initial Ground-Disturbing Activities and Vegetation Removal in Suitable Habitat for Giant Garter Snake*
- *Measure 5: Avoid and Minimize Effects on Giant Garter Snake*
- *Measure 6: Restore Temporary Loss of Upland Habitat for Giant Garter Snake*

We appreciate the effort that has been expended by the Service in assisting us with this project. Please provide a letter of concurrence within two weeks of receipt of this letter. If you have any questions please contact Ms. Shelly Hatleberg, Natural Resources Specialist, at 916-978-5050 or [shatleberg@usbr.gov](mailto:shatleberg@usbr.gov) or Ms. Janice Pinero, Natural Resources Specialist, at 916-978-5041 or [jpinero@usbr.gov](mailto:jpinero@usbr.gov).

cc: Assistant Field Supervisor, USFWS, 2800 Cottage Way W-2605, Sacramento, CA 95825,  
Attn: Kathy Wood  
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# RECLAMATION

*Managing Water in the West*

## **Biological Assessment**

# **American Recovery and Reinvestment Act of 2009 New Wells Project—Region 4**



## **Mission Statements**

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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## Acronyms and Abbreviations

ARRA	American Recovery and Reinvestment Act of 2009
BA	biological assessment
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNDDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CWA	federal Clean Water Act
E	endangered
EA	Environmental Assessment
ESA	federal Endangered Species Act
FONSI	Finding of No Significant Impact
GGs	giant garter snake
GWD	Grassland Water District
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
SLDMWA	San Luis and Delta-Mendota Water Authority
T	threatened
USACE	U.S. Army Corps of Engineers
USC	U.S. Government Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

# Chapter 1 Introduction and Species Considered

## 1.1 Purpose of the Biological Assessment

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) proposes to provide funding under Title IV of the American Recovery and Reinvestment Act of 2009 (ARRA) for up to six wells in the Grassland Water District (GWD) as described in Chapter 2 (Figure 1-1). The purpose of these wells is to supplement South of Delta Refuges with the greatest shortfall in Incremental Level 4 water supply in years when surface water allocation is constrained. Development of additional groundwater pumping capacity is expected to alleviate current and likely future drought impacts by helping provide alternative water supplies for refuges when Reclamation is not able to purchase water from willing sellers in order to satisfy critical refuge water needs.

This biological assessment (BA) has been prepared in compliance with legal requirements set forth under Section 7 of the federal Endangered Species Act (ESA) of 1973 (U.S. Government Code [USC] Title 16, Section 1536 [16 USC 1536]).

## 1.2 Species Considered

An official list of federally listed endangered, threatened, and proposed threatened or endangered species that have the potential to occur in the vicinity of the Proposed Action was obtained from the Sacramento U.S. Fish and Wildlife Service (USFWS) website for the San Luis Ranch, Los Banos, and Gustine U.S. Geological Survey (USGS) 7.5-minute quadrangles (U.S. Fish and Wildlife Service 2010) (Appendix A). The following 16 endangered (E) and threatened (T) species were included on this list:

- Conservancy fairy shrimp (*Branchinecta conservatio*) (E)
- longhorn fairy shrimp (*Branchinecta longiantennae*) (E)
- vernal pool fairy shrimp (*Branchinecta lynchi*) (T)
- vernal pool tadpole shrimp (*Lepidurus packardi*) (E)
- valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) (T)
- green sturgeon (*Acipenser medirostris*) (T)
- delta smelt (*Hypomesus transpacificus*) (T)

- Central Valley steelhead (*Oncorhynchus mykiss*) (T)
- Central Valley spring-run Chinook salmon (*Oncorhynchus tshawytscha*) (T)
- winter-run Chinook salmon, Sacramento River (*Oncorhynchus tshawytscha*) (E)
- California tiger salamander, central population (*Ambystoma californiense*) (T)
- California red-legged frog (*Rana aurora draytonii*) (T)
- blunt-nosed leopard lizard (*Gambelia [= Crotaphytus] sila*) (E)
- giant garter snake (*Thamnophis gigas*) (T)
- San Joaquin kit fox (*Vulpes macrotis mutica*) (E)
- Fresno kangaroo rat (*Dipodomys nitratooides exilis*) (E)

Information collected during field surveys, review of existing documents and California Natural Diversity Database (CNDDDB) species occurrence records (California Natural Diversity Database 2010) (Appendix B), and presence of suitable habitat were used to determine potential presence of the above federally listed species evaluated in this BA.

### 1.2.1 Species Eliminated from Consultation

Construction and operations of the Proposed Action do not have the potential to affect federally listed fish and wildlife species present in the San Joaquin River. As such, this BA focuses on the potential effects on listed terrestrial species that could occur in or around the area affected by construction of the physical structures (i.e., the well pads and associated water and transmission lines) that make up the Proposed Action.

The following species were eliminated from further consideration for the reasons described above (all fish species and wildlife species present in the San Joaquin River) or as indicated in Table 1-1.

- Conservancy fairy shrimp
- longhorn fairy shrimp
- vernal pool fairy shrimp
- vernal pool tadpole shrimp
- valley elderberry longhorn beetle
- California tiger salamander
- California red-legged frog
- blunt-nosed leopard lizard

- San Joaquin kit fox
- Fresno kangaroo rat
- green sturgeon
- delta smelt
- Central Valley steelhead
- Central Valley spring-run Chinook salmon
- winter-run Chinook salmon, Sacramento River

Only one federally listed plant species was identified as having the potential to occur in the action area (Table 1-2). After conducting the field survey and reviewing existing species lists and databases for the geographic region (USFWS lists, CNDDDB, California Native Plant Society [CNPS] Inventory of Rare and Endangered Vascular Plants of California), it was determined that the action area has low potential to support this species because suitable habitat is not present on the sites. In addition, no special-status plants have been recorded on or near the well sites and none were observed during the field surveys conducted in May 2010 (California Natural Diversity Database 2010). Therefore, this analysis assumes that no federally listed special-status plants occur in the action area and none will be affected by the Proposed Action.

### **1.2.2 Species Requiring Consultation**

Of the 16 federally listed species considered for inclusion in this BA, only giant garter snake has the potential to occur in the action area and may be affected by the Proposed Action; accordingly, this species is the subject of this BA.

## **1.3 Critical Habitat**

There is no designated critical habitat for any species in the Proposed Action area.

## **1.4 Consultation to Date**

- May 14, 2010—a species list from the USFWS website was obtained for the San Luis Ranch, Los Banos, and Gustine USGS 7.5-minute quadrangles.
- June 15, 2010—Reclamation and USFWS met to discuss specifics of the Proposed Action. USFWS requested more detailed maps and additional information to evaluate potential effects.
- June 23, 2010—Reclamation received a memorandum from USFWS (81420-2-1—TA-0794) in response to the draft Environmental

Assessment and Finding of No Significant Impact (FONSI) for the  
construction of up to six wells in the GWD, Merced County, California.

**Table 1-1.** Federally Listed Wildlife Identified as Having Potential to Occur in the Action Area

Common and Scientific Name	Status <sup>1</sup>		Geographic Distribution	Habitat Requirements	Effect Determination
	Federal/State				
<b>Invertebrates</b>					
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	T/-		Streamside habitats below 3,000 feet throughout the Central Valley.	Riparian and oak savanna habitats with elderberry shrubs; elderberries are the host plant.	No effect—no elderberry shrubs in study area.
Conservancy fairy shrimp <i>Branchinecta conservatio</i>	E/-		Disjunct occurrences in Solano, Merced, Tehama, Ventura, Butte, and Glenn Counties.	Large, deep vernal pools in annual grasslands.	No effect—known to occur in study area; however, seasonal wetlands in the Proposed Action area are managed for waterfowl with fluctuating water levels making them unsuitable for shrimp.
Longhorn fairy shrimp <i>Branchinecta longiantennae</i>	E/-		Eastern margin of central Coast Ranges from Contra Costa County to San Luis Obispo County; disjunct population in Madera County.	Small, clear pools in sandstone rock outcrops of clear to moderately turbid clay- or grass-bottomed pools.	No effect—known to occur in study area; however, seasonal wetlands in the Proposed Action area are managed for waterfowl with fluctuating water levels making them unsuitable for shrimp.
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	E/-		Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County. Isolated populations also in Riverside County.	Common in vernal pools; also found in sandstone rock outcrop pools.	No effect—known to occur in study area; however, seasonal wetlands in the Proposed Action area are managed for waterfowl with fluctuating water levels making them unsuitable for shrimp.
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	E/-		Shasta County south to Merced County.	Vernal pools and ephemeral stock ponds.	No effect—study area outside species range.

Common and Scientific Name	Status <sup>1</sup>		Geographic Distribution	Habitat Requirements	Effect Determination
	Federal/	State			
<b>Amphibians</b>					
California tiger salamander <i>Ambystoma californiense</i>	T/T		Central Valley, including Sierra Nevada foothills, up to approximately 1,000 feet, and coastal region from Butte County south to northeastern San Luis Obispo County.	Small ponds, lakes, or vernal pools in grasslands and oak woodlands for larvae; rodent burrows, rock crevices, or fallen logs for cover for adults and for summer dormancy.	No effect—no suitable habitat in study area.
California red-legged frog <i>Rana draytonii</i>	T/SSC		Found along the coast and coastal mountain ranges of California from Marin County to San Diego County and in the Sierra Nevada from Tehama County to Fresno County.	Permanent and semipermanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation. May aestivate in rodent burrows or cracks during dry periods.	No effect—study area outside species range.
<b>Reptiles</b>					
Blunt-nosed leopard lizard <i>Gambelia (=Crotaphytus) sila</i>	E/E		Presently known from Merced County south through Kern County and along the eastern edges of San Luis Obispo and San Benito Counties	Open habitats with scattered low bushes on alkali flats, and low foothills, canyon floors, plains, washes, and arroyos; substrates may range from sandy or gravelly soils to hardpan	No effect—no suitable habitat in study area.
Giant garter snake <i>Thamnophis gigas</i>	T/T		Central Valley from the vicinity of Burrell in Fresno County north to near Chico in Butte County; has been extirpated from areas south of Fresno.	Sloughs, canals, low-gradient streams and freshwater marsh habitats where there is a prey base of small fish and amphibians; also found in irrigation ditches and rice fields; requires grassy banks and emergent vegetation for basking and areas of high ground protected from flooding during winter.	Not likely to adversely affect—aquatic habitat in canals and drainages and suitable upland within 200 feet of aquatic habitats.

Common and Scientific Name	Status <sup>1</sup>		Geographic Distribution	Habitat Requirements	Effect Determination
	Federal/ State				
<b>Mammals</b>					
Fresno kangaroo rat <i>Dipodomys nitratoides exilis</i>	E/-		Historical geographic range of the Fresno kangaroo rat encompassed an area from the Merced River, Merced County, on the north to the northern edge of the marshes surrounding Tulare Lake, Kings County, on the south, extending from the edge of the valley floor near Livingston, Madera, Fresno, and Selma, westward to the wetlands of Fresno Slough and the San Joaquin River.	Grassland and chenopod scrub communities on the San Joaquin Valley floor, topography is often nearly level, consisting of bare alkaline clay-based soils subject to seasonal inundation that are broken by slightly rising mounds of more crumbly soils, which often accumulate around shrubs or grasses.	No effect—no suitable habitat in study area and no known populations within the historical range.
San Joaquin kit fox <i>Vulpes macrotis mutica</i>	E/T		Occurs principally in the San Joaquin Valley and adjacent open foothills to the west; recent records from 17 counties extending from Kern County to Contra Costa County.	Saltbush scrub, grassland, oak, savanna, and freshwater scrub.	No effect—Known to occur in study area and suitable habitat present in the study area. Implementation of conservation measures as identified in the Environmental Assessment(Reclamation 2010) will ensure avoidance.

Notes:

Species listed in table are generated from the U.S. Fish and Wildlife Service project species list (U.S. Fish and Wildlife Service 2010) and California Natural Diversity Database records (California Natural Diversity Database 2010).

<sup>1</sup> Status:

**Federal**

E = Listed as endangered under the federal Endangered Species Act (ESA).

T = Listed as threatened under ESA.

**State**

E = Listed as endangered under the California Endangered Species Act (CESA).

T = Listed as threatened under CESA.

SSC = California species of special concern.

- = No state status.

**Table 1-2.** Federally Listed Plants Identified as Having Potential to Occur in the Action Area

Common and Scientific Name	Status <sup>a</sup>		Geographic Distribution/ Floristic Province	Habitat Requirements	Blooming Period	Effect Determination
	Federal/ State					
Hoover's spurge <i>Chamaesyce hooveri</i>	T/-		Central Valley from Butte County to Tulare County	Below the high-water marks of large northern hardpan and volcanic vernal pools, below 800 feet (25–250 meters)	July–August	No effect. Suitable habitat not present within study area.
Delta button-celery <i>Eryngium racemosum</i>	-/E/		Northern San Joaquin Valley, adjacent Sierra Nevada foothills	Riparian scrub in vernal mesic clay depressions; 10–98 feet (3–30 meters)	June–September	No effect. Suitable habitat not present within study area.

Notes:

<sup>a</sup> Status explanations:

**Federal**

T = listed as threatened under the federal Endangered Species Act.

- = no listing.

**State**

E = listed as endangered under the California Endangered Species Act.

- = no listing.

# **Chapter 2 Proposed Action and Avoidance/Conservation Measures**

## **2.1 Location**

GWD is located west of the San Joaquin River on relatively flat terrain at low elevations ranging from 70 to 130 feet (Quinn et al. 2004) (Figure 1-1). As a result of its low elevation and position near the San Joaquin River, the region historically has supported and continues to support a large number of wetlands (along with pasture and cropland). In fact, much of the water delivered to the region is used for wetland habitat, and the region is a major stopping point for birds migrating along the Pacific Flyway. The region contains several natural creeks (Los Banos Creek, Mud Slough, and Salt Slough) and many canals. Average annual rainfall near Los Banos is about nine inches (AECOM 2009).

## **2.2 Action Area**

USFWS defines action area as “all areas to be affected directly or indirectly by the federal action” (50 Code of Federal Regulations [CFR] 402.02). For the purposes of this BA, the action area is defined as the project construction area, consisting of the well pad site, water and transmission lines, and associated staging areas (Figures 2-1 through 2-6).

## **2.3 Description of the Proposed Action**

### **2.3.1 Overview**

Reclamation proposes to fund up to six new wells in the GWD. The water from each new well is intended to provide water for managed wetlands and refuges. The pumped groundwater would be delivered through the existing refuge conveyance facilities or GWD canals and/or pipelines. More information about the specific location of the wells, their associated infrastructure facilities, and location of use is provided below and in the Draft Environmental Assessment (Bureau of Reclamation 2010). No new irrigation delivery systems would be constructed for this project. The majority of pumping from these new wells would occur in May through February.

### **2.3.2 Well Locations and Facilities**

The Proposed Action would involve the construction and operation of up to six new wells with conveyance connections and appurtenant structures. The aboveground facilities at each well site would occupy an area of no more than approximately 30 feet by 30 feet (well pad), and it is expected that the actual footprint would be substantially less. The features of each well would include:

- A new 16-inch-diameter well that would be operated for 10 months per year.
- An aboveground electric pump to operate the well. Power to the pump motors would come from an adjacent overhead power line.
- A discharge pipe connecting the well to an existing irrigation system adjacent to the well. An integrated flow meter would be installed on the discharge pipe to record pumping use.

Table 2-1 identifies each of the new wells and their specific characteristics. The general locations of each well are shown in Figure 1-1. Figures 2-1 to 2-6 show detailed maps (scale of one inch:3,200 feet) using USGS 1:24,000 topographic sheets as the base map for each individual well location and the connection to power and water conveyance.

**Table 2-1.** Locations and Well Characteristics for New ARRA Wells in Region 4

Well ID Number	District	Anticipated Well Depth (feet)	Casing Diameter (inches)	Above/ Below Corcoran Clay	Estimated Annual Production (AF)	Required Power (HP)	Estimated Distance to Power Lines	Estimated Number of Power Poles
G-1	GWD	800	16	Below	1,100	125	20 feet	1
G-2	GWD	800	16	Below	1,100	125	60 feet	2
G-3	GWD	800	16	Below	1,100	125	30 feet	2
G-4	GWD	800	16	Below	1,100	125	150 feet	2
G-5	GWD	800	16	Below	1,100	125	75 feet	2
G-6	GWD	800	16	Below	1,100	125	20 feet	1

The proposed new wells would discharge to adjacent water delivery canals operated by GWD for distribution throughout the area, or directly to adjacent wetlands. Wells that would discharge to water delivery canals would be connected with an aboveground or belowground pipeline, installed in trenches and backfilled where the discharge pipelines cross levee roads. Wells that would discharge to adjacent wetlands would pump into the wetlands using a short discharge pipe.

### **2.3.3 Construction Activities**

Construction activities would include the well construction and connection (i.e., trench for pipeline) to the water distribution canal or pipeline and the connection to the power supply. In addition, construction activities would involve vegetation removal, soil excavation and trenching, grading, stockpiling and spreading of excavated material, installation of well and pipeline facilities, constructing a temporary percolation pond, and backfilling materials into excavated areas. These activities would result in the temporary disturbance of up to 10,000 square feet at each well location, plus minor additional disturbance associated with the construction of power and water connections. As described above, the actual area of disturbance would likely be much less.

A temporary settling pond up to approximately 50 feet by 50 feet in size would be constructed at each well site by creating earthen berms around the pond area. It is likely that the settling ponds would be much smaller than 50 feet by 50 feet. The purpose of the pond would be to store water and sediment discharged from the well during the drilling and development activities. Sediment and well drilling debris would remain in the pond. Water generated from the well drilling would be discharged to the pond and would percolate from the pond to the shallow groundwater. Clean water from well testing would be discharged into the pond or to an adjacent irrigation system.

Another option would be to use above ground storage tanks to store the water and sediment discharged from the well. If a pond is constructed within 200 feet of giant garter snake habitat exclusion fencing will be installed to ensure snakes do not enter the aquatic habitat. Either the pond or above ground storage tank option will be at the discretion of the contractor with the caveat of avoiding all sensitive resources, including wetlands.

The well discharge pipeline would connect to either an onsite private distribution system or to a district facility through an underground pipeline. The pipeline would be installed by excavating a small trench, generally 12 to 16 inches wide, to a depth of approximately 42 inches. A trencher or small excavator would be used to dig the trench, and materials would be stockpiled alongside the trench. Bedding material, such as gravel or engineered fill, would be laid at the bottom of the trench. The pipe would be laid on top of the bedding material and covered with additional bedding material and with excavated material. Excess material

excavated from the trench would be disposed of on site. Storage of pipeline materials would occur at the well construction site.

The power line for each well would require the installation of new wooden poles, each approximately 30 to 45 feet high. No on-the-ground structural features would be required at the tie-in points, and equipment required for conductor pulling at each end of the power line would use existing access areas. The power poles would be installed in augered holes using truck-mounted equipment. The number of poles for each well is shown in Table 2-1.

Equipment expected to be used during construction would include:

- a drill rig,
- a backhoe,
- a pipe trailer,
- a pump setting rig,
- welding equipment for well casing construction, and
- semitrailer trucks for material delivery.

Chemicals associated with maintaining drill rig operation (lubrication oil, diesel, gasoline, etc.) would be stored on the site. During drilling, bentonite (drilling mud) and additives (e.g., soda ash, polymers) would be stored and used at the site and disposed of in the temporary pond. After well construction is completed, the temporary earthen berms used to form the temporary settling pond would be filled back into the pond area. Five construction workers would be at the project site throughout the eight-week project construction period. During the six-week well drilling, construction, and development period, it is expected that no more than 20 material and equipment deliveries would occur. After the well is constructed, an additional five deliveries would be made over a two-week period to test the well, install the permanent pump, and connect the well to the water distribution system.

### ***Construction Schedule***

Construction of the Proposed Action is anticipated to begin no earlier than September 2010. Installation of each well is expected to take no more than two months. Construction of multiple wells can occur simultaneously, however, it is anticipated that construction activities could continue for up to two years. Well installation consists of the following phases.

- Site clearing and percolation pond excavation (two days).
- Well drilling and well construction (4 weeks). Drilling would occur seven days a week, 24 hours a day for two weeks, and well construction would occur seven days a week, 12 hours a day for two weeks.

- Well development and pumping tests (two weeks). Well development and pumping tests are expected to occur for 12 hours each day, then for two 24-hour days.
- Installation of the permanent pump and startup testing (one week). Installation of the permanent pump and startup testing would occur during the day only.
- Connection of the new well to the water delivery system (one week). The pipe construction (with welding) would occur during the day only.

### ***Well Operation***

Each new well would supplement existing water supplies and would be operated in years when Reclamation is not able to purchase water from willing sellers in order to satisfy critical refuge water needs. Water extracted from the new wells will meet water quality standards suitable for managed wetlands. The anticipated water production for each well is listed in Table 2-1. The general operational constraints for these wells are described below.

- Pumping would occur May through February.
- Operation of the new wells would be consistent with existing groundwater management plans for the district.
- All new wells would be metered and records would be provided by GWD and/or landowners to the San Luis and Delta-Mendota Water Authority (SLDMWA) and/or Reclamation for groundwater monitoring and planning efforts. Access to the well site would be provided to SLDMWA and/or Reclamation staff for periodic water-level and water-quality monitoring. At a minimum, the monitoring would consist of groundwater levels, electrical conductivity, selenium, and boron.

## **2.4 Avoidance and Conservation Measures**

Reclamation incorporated the following avoidance and conservation measures into the Proposed Action project description as environmental commitments to avoid and minimize effects on federally listed species. These measures also will be included in the project specifications.

### ***Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements***

Before any ground-disturbing work (including vegetation clearing and grading) occurs in the construction area, a USFWS-approved biologist will conduct mandatory biological resources awareness training for all construction personnel regarding giant garter snake. The training will include the natural history,

representative photographs, and legal status. Proof of personnel attendance will be provided to USFWS within one week of the training. If new construction personnel are added to the project, the contractor will ensure that the new personnel receive the mandatory training before starting work. The subsequent training of personnel can include videotape of the initial training and/or the use of written materials rather than in-person training by a biologist. Requirements that will be followed by construction personnel are listed below.

- The contractor will clearly delineate the construction limits through the use of survey tape, pin flags, orange barrier fencing, or other means, and prohibit any construction-related traffic outside these boundaries.
- Construction speed limits of 15 miles per hour will be enforced within the construction area to minimize potential for increased traffic volumes to result in increased incidence of road-kill of giant garter snake during project construction. Speed limits would be posted on project-controlled roads leading to the construction area. These signs would alert drivers to the potential presence of snakes. Additionally, the worker awareness training would inform all workers of the need to watch for and avoid snakes that may be present along roadways.
- Project-related vehicles and construction equipment will restrict off-road travel to the designated construction areas.
- The contractor will provide closed garbage containers for the disposal of all food-related trash items (e.g., wrappers, cans, bottles, food scraps). All garbage will be collected daily from the action area and placed in a closed container that will be emptied weekly at an approved off-site location. Construction personnel will not feed or otherwise attract fish or wildlife.
- No debris, soil, etc., other than that already present within the well shall be allowed to enter the water.
- No equipment shall be operated in stream channels.
- No intentional harassment, killing, or collection of plants or animals at or around the work sites is allowed.
- No pets will be allowed in the action area.
- No firearms will be allowed in the action area.
- If vehicle or equipment maintenance is necessary, it will be performed in the designated staging areas.
- Storage of hazardous material, such as fuel, oil, etc. shall not be allowed within 150 feet of waterways. Any chemical spills must be cleaned up immediately and reported to the Service as soon as possible.

Any worker who inadvertently injures or kills a giant garter snake or finds one dead, injured, or entrapped will immediately report the incident to the construction foreman or biological monitor. The construction foreman or monitor

will immediately notify Reclamation, who will immediately notify the USFWS Endangered Species Office in Sacramento (917-414-6600) and California Department of Fish and Game (DFG). Reclamation will follow up with written notification to USFWS within five working days of the incident. The biological monitor will also independently and immediately notify USFWS of any unanticipated harm to giant garter snake associated with the Proposed Action. All observations of giant garter snake will be recorded on CNDDDB field sheets and sent to DFG by Reclamation or representative biological monitor.

***Measure 2: Install Erosion Control Measures near Aquatic Habitat***

Erosion control measures will be installed adjacent to suitable habitats for giant garter snake to prevent soil or other materials from entering aquatic habitat. Erosion control features will be placed in areas that are upslope of or within 200 feet of suitable aquatic habitat to prevent any soil or other materials from entering aquatic habitat. The locations of erosion control features will be reviewed by a qualified biologist and identified on the final grading plans and construction specifications. Natural/biodegradable erosion control measures (e.g., coir rolls, straw wattles, hay bales) will be used. Plastic monofilament netting (erosion control matting) will not be allowed because snakes can become caught in this type of erosion control material.

***Measure 3: Provide Escape Ramps or Cover Open Trenches at the End of Each Day to Avoid Entrapment of Giant Garter Snake***

To avoid entrapment of giant garter snake and thereby preventing injury or mortality of species resulting from falling into trenches, all excavated areas more than one foot deep will be provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each workday. If escape ramps cannot be provided, holes or trenches will be covered with plywood or other hard material. The biological monitor or construction personnel designated by the monitor will be responsible for thoroughly inspecting trenches for the presence of giant garter snake at the beginning of each workday (see Conservation Measure 4). If any individuals have become trapped, a USFWS-approved biologist will be contacted to relocate the animal and no work will occur in that area until approved by the biologist.

***Measure 4: Monitor Initial Ground-Disturbing Activities and Vegetation Removal in Suitable Habitat for Giant Garter Snake***

A USFWS-approved biological monitor will remain on site during initial ground-disturbing activities (grading, excavation, and vegetation removal activities). During construction, the biological monitor will make periodic visits to the construction site to ensure that fences around aquatic habitats are in good working order and that holes are not being left uncovered overnight. The construction area

will be resurveyed whenever there is a lapse in construction activity of two weeks or more.

Once all initial ground-disturbing activities are completed, the biological monitor will perform spot checks of the site at least once a month for the duration of construction in order to ensure that construction barrier fences are in good order, trenches are being covered, project personnel are conducting checks beneath parked vehicles prior to their movement, and that all other required biological protection measures are being complied with. The biological monitor will document the results of monitoring on construction monitoring log sheets, which will be provided to USFWS within one week of each monitoring visit.

### ***Measure 5: Avoid and Minimize Effects on Giant Garter Snake***

Reclamation will implement the following measures to avoid and minimize direct effects on giant garter snake during project construction and implementation.

- All construction activity within giant garter snake upland habitat in and around agricultural ditches will be conducted during the active period for giant garter snake, in order to reduce direct impacts on the species by allowing snakes to move out of the way of construction activities. The active period is generally between May 1 and October 1.
- Flag and designate giant garter snake habitat to be avoided within or adjacent to the project area as Environmentally Sensitive Areas. This area should be avoided by all construction personnel.
- Install exclusion fencing for giant garter snake from neonate to adult body size such as silt fencing that would prohibit entry or perhaps accidental entrapment of the giant garter snake in the temporary settling ponds.
- Cuttings from well construction shall not be placed in an area that may impact giant garter snake individuals, their aquatic or upland habitat (i.e., within 200 feet of aquatic habitat).

### ***Measure 6: Restore Temporary Loss of Upland Habitat for Giant Garter Snake***

Construction activities would involve vegetation removal, soil excavation and trenching, grading, stockpiling and spreading of excavated material, installation of well and pipeline facilities, constructing a temporary percolation pond, and backfilling materials into excavated areas. These activities would result in the temporary disturbance of up to approximately 10,000 square feet (0.23 acre) of upland habitat at each well location, plus minor additional disturbance associated with the construction of power and water connections. As described above, the actual amount of disturbance is expected to be much less.

Reclamation will restore the 1.4 acres of temporarily disturbed annual grassland upon completion of construction activities with a noninvasive native and naturalized grass and forb seed mix within GWD. Grassland restoration will be performed by the construction contractor according to the construction documents (i.e., plans and specifications). The construction documents will describe the process for restoration, which will include stockpiling the topsoil and replacing soil layers in the same order they were removed, restoring the grade, and reseeded with a noninvasive native and naturalized grass and forb seed mix. Restoring grassland in this manner will replace the habitat value that was temporarily lost as a result of construction activities. The restoration plan will be provided to USFWS and DFG at least four weeks prior to the planned project implementation date to allow for review and approval prior to the start date.

# Chapter 3 Land Cover Types, Species Accounts, and Status of Species in the Action Area

## 3.1 Methodology

### 3.1.1 Prefield Research

Pertinent life history and distribution information for each species addressed in the BA was reviewed and compiled in the preparation of this chapter. In addition to general species information, a review of the CNDDDB (2010) was conducted.

### 3.1.2 Field Surveys

Biological field surveys were conducted in the action area (as defined above) on April 29, May 24, and June 11, 2010. Biologists also met with Steve Miyamoto, DFG wildlife manager for the North Grasslands Wildlife Management Area, on May 21, 2010. Mr. Miyamoto provided access and background information for two well sites: G-1, which is in the Gadwall Unit, and G-6, which is in the China Island Unit. The team used a combination of aerial photograph interpretation, pedestrian surveys at select well and water and power tie-ins, and driving along access roads to these project elements. In general, the purpose of the field surveys was to:

- Characterize existing conditions, habitat types, and wildlife habitat uses.
- Evaluate the potential for occurrence of special-status species and locate special-status species or signs of those species that may have been identifiable during the field visits.
- Determine the need for additional field surveys (e.g., return botanical surveys to identify late-blooming special-status species).
- Identify and map areas that may qualify as waters of the United States and subject to regulation by the U.S. Army Corps of Engineers (USACE) under Section 404 of the federal Clean Water Act (CWA).

## 3.2 Land Cover Types

The action area is dominated by natural and managed wetland systems that are associated with private wetlands and the DFG's North Grasslands Wildlife Management Area. The four primary habitat types found in the Proposed Action

study area and described below are annual grassland, agriculture, wetlands, and irrigation ditches and canals. Wetlands occur in the Proposed Action study area but not within the direct impact area. As described under Avoidance and Conservation Measures, wetlands that occur adjacent to the well pads and water and power tie-ins will be avoided as part of the Proposed Action.

### 3.2.1 Annual Grassland

Annual grassland occurs in upland inclusions with managed wetland areas, fallow fields, canals, and along public and private agricultural roads in the action area. Annual grasses are the dominant species and consist of soft chess (*Bromus hordeaceus*), ripgut brome (*Bromus diandrus*), slender wild oat (*Avena barbata*), and Italian ryegrass (*Lolium multiflorum*). Other nonnative annual grasses observed were foxtail barley (*Hordeum murinum* spp. *leporinum*) and rattail fescue (*Vulpia myuros* var. *myuros*). Nonnative forbs that tend to colonize disturbed area quickly also were well represented, and species observed were yellow star-thistle (*Centaurea solstitialis*), stinkweed (*Dittrichia graveolens*), Russian thistle (*Salsola tragus*), black mustard (*Brassica nigra*), prickly lettuce (*Lactuca serriola*), bristly ox-tongue (*Picris echioides*), and Mediterranean mustard (*Hirschfeldia incana*).

Annual grasslands provide breeding and foraging habitat for small mammals, birds, amphibians, and reptiles. Annual grasslands also provide foraging habitat for coyote (*Canis latrans*) and many birds, including red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), great horned owl (*Bubo virginianus*), and western meadowlark (*Sternella neglecta*). Grasslands near open water also may be used by a wide variety of waterfowl and wading birds that require resting, breeding, and foraging areas close to water. Annual grassland provides habitat for special-status wildlife, including northern harrier (*Circus cyaneus*), San Joaquin kit fox (*Vulpes macrotis mutica*), and American badger (*Taxidea taxus*).

### 3.2.2 Agriculture

Agricultural lands occur adjacent to the action area and include alfalfa, orchards, and fallow fields. Many species of rodents and birds have adapted to agricultural lands, but they are often controlled by fencing, trapping, and poisoning to prevent excessive crop losses. However, certain agricultural lands have become important habitats for wintering waterfowl and breeding and wintering raptors.

Wildlife species associated with agricultural lands include mourning dove (*Zenaida macroura*), American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), sandhill crane (*Grus canadensis*), various raptor species, egrets, and many species of rodents (Mayer and Laudenslayer 1988). Special-status wildlife that may forage in alfalfa fields in the study area

includes northern harrier (*Circus cyaneus*), Swainson's hawk (*Buteo swainsoni*) and San Joaquin kit fox.

### 3.2.3 Wetlands

A variety of natural and managed wetland systems occur adjacent to the Proposed Action study area. Wetland systems were delineated within the study areas for Wells G-2, G-3, G-4, and G-6. Most of these wetlands appear to be alkali wetlands; occur in low-lying, seasonally inundated areas; and are dominated by a variety of seasonal and perennial plant species. Alkali wetland areas typically have a high groundwater table, and the soil surface is often covered with a salty crust. Species associations vary at each of the well sites and include species that can tolerate the high salt content found in the region's soils. Typical species include saltgrass (*Distichlis spicata*), pickleweed (*Salicornia* spp.), alkali heath (*Frankenia salina*), alkali mallow (*Malvella leprosa*), alkali cordgrass (*Spartina gracilis*), alkali sacaton (*Sporobolus airoides*), Mediterranean barley (*Hordeum marrinum* ssp. *gussoneanum*), common spikeweed (*Centromadia pungens*), large-flowered sand spurry (*Spergularia macrotheca*), and iodine bush (*Allenrolfea occidentalis*).

Seasonal wetlands provide unique habitat for a variety of aquatic invertebrates that in turn provide food for other wildlife species, including great blue heron (*Ardea herodias*), killdeer (*Charadrius vociferus*), American avocet (*Recurvirostra americana*) black-necked stilt (*Recurvirostra americana*), and greater yellowlegs (*Tringa melanoleuca*) (Zeiner et al. 1990a: 32, 192, 200, 202). In addition, amphibians such as Pacific tree frog (*Hyla regilla*) and western toad (*Bufo boreas*) use seasonal wetlands for breeding and feeding (Zeiner et al. 1988: 64, 78). Seasonal wetlands provide suitable habitat for special-status wildlife, including vernal pool fairy shrimp (*Branchinecta lynchi*), longhorn fairy shrimp (*Branchinecta longiantennae*) and Conservancy fairy shrimp (*Branchinecta conservatio*). However, seasonal wetlands within the Proposed Action area are managed for waterfowl with fluctuating water levels that make them unsuitable for federally listed shrimp species or giant garter snakes. Fairy shrimp have seasonal water requirements for water including a dry down time in late spring through fall. Refuges water management is strictly for wintering waterfowl and is not usually consistent with shrimp requirements; the water is applied and drained too early. Giant garter snakes are active and require water starting in spring and continuing through the summer which is when the wetlands are typically dried down.

### 3.2.4 Irrigation Ditches and Canals

The Proposed Action study area contains a variety of irrigation ditches and large water conveyance systems. All of the wells are within 200 feet of irrigation ditches that support emergent wetland habitat along their banks. Dominant species

include cattail (*Typha* spp.), tule (*Scirpus* spp.), poison hemlock (*Conium maculatum*), and rabbit's foot grass (*Polypogon monspeliensi*). Open water portions of irrigation ditches and canals provide foraging habitat for aquatic bird species such as double-crested cormorant (*Phalacrocorax auritus*) and grebes (Podicepsidae), and waterfowl. Open-water habitat also may provide foraging habitat for other bird species, including belted kingfisher (*Ceryle alcyon*), swallows (Hirundinidae), and black phoebe (*Sayornis nigricans*). Emergent wetlands associated with open-water habitat provide potential breeding habitat for Pacific tree frog and other amphibians. Emergent wetlands also provide foraging habitat for passerine and wading birds, and small mammals. Emergent wetlands provide habitat for special-status wildlife, including giant garter snake, tricolored blackbird (nesting), and western pond turtle.

### 3.3 Species Accounts

#### 3.3.1 Giant Garter Snake

The giant garter snake was federally listed as threatened on October 20, 1993, and a draft recovery plan was published in 1999 (U.S. Fish and Wildlife Service 1999). A final recovery plan has not been completed, and critical habitat has not been designated for this species.

Giant garter snake occurs in the Central Valley of California from Fresno County in the south to Butte County in the north. Although giant garter snake historically ranged throughout the Central Valley, recent sightings of giant garter snake in the San Joaquin Valley are rare, and the species has likely been extirpated from habitats south of Fresno County.

The USFWS determined in a 2006 5-year review that the abundance and distribution of giant garter snake had not changed significantly since the time of listing (U.S. Fish and Wildlife Service 2006). This report indicates that the most serious threat to the species is loss and fragmentation of habitat from urban and agricultural development and loss of habitat associated with changes in rice production.

#### ***Habitat Characteristics***

Giant garter snakes inhabit marshes, ponds, sloughs, small lakes, low gradient streams, and other waterways and agricultural wetlands, including irrigation and drainage canals, rice fields, and adjacent uplands. Their habitat requirements include: (1) adequate water during the snake's active season (early spring through mid-fall) to provide food and cover; (2) emergent herbaceous wetland vegetation for escape cover and foraging habitat during the active season; (3) basking habitat of grassy banks and openings in waterside vegetation; and (4) higher elevation

uplands for cover and refuge from floodwaters during the snake's dormant season. (USFWS 2006b)

### ***Occurrence in the Action Area***

Giant garter snakes currently occur in the northern and central San Joaquin Basin within the northern and southern Grassland Wetlands. The Grassland Wetlands is a complex of protected lands in Merced County, which includes private lands managed under conservation easements, lands under the management of the Grassland Water District, and State- and federally-owned and managed lands. Giant garter snakes have been detected in Los Banos Creek west of Kesterson National Wildlife Refuges and in Volta State Wildlife Area in Merced County. (USFWS 2006) Irrigation ditches and canals and their associated emergent wetlands provide suitable aquatic habitat for giant garter snake foraging, cover, and dispersal. Seasonal wetlands in the Proposed Action area do not provide suitable aquatic habitat for giant garter snake because they are managed as wintering habitat for migratory waterfowl and water birds and are flooded from late August and dried in spring with no water available during the snake's active period. Suitable upland habitat within the action area includes annual grassland and irrigation ditch and canal banks that are located within 200 feet of aquatic habitat and provide burrows or other refugia adequate for giant garter snake hibernation. Figures 2-1 through 2-6 shows the locations of aquatic and upland habitat in the action area.

### ***Critical Habitat***

Critical habitat has not been designated for giant garter snake.

# Chapter 4 Effects of the Proposed Action

## 4.1 Effects on Listed Species

Temporary habitat loss from construction activities would involve vegetation removal, soil excavation and trenching, grading, stockpiling and spreading of excavated material, installation of well and pipeline facilities, constructing a temporary percolation pond, and backfilling materials into excavated areas. Other temporary effects such as dust and degradation of aquatic habitat from water runoff from construction areas could occur in portions of the action area.

Temporary effects from construction of the transmission line would result from temporary staging and stockpiling areas. Existing paved, dirt, and gravel roads would be used for access to the construction area and for water and power line installation.

Minor permanent loss of upland habitat would occur during construction activities, which involve the well construction and connection (i.e., trench for pipeline) to the water distribution canal or pipeline and the connection to the power supply. Effects on habitat for giant garter snake are summarized in Table 4-1.

**Table 4-1.** Effects on Habitat for Federally Listed Species from the Proposed Action

		Temporary Effects (acres)	Permanent Effects (acres)
GGS (aquatic)	Irrigation ditches and canals and associated wetlands	0	0
GGS (upland)	Annual grassland, ditch and canal banks	1.4	0.12

GGS = giant garter snake.

### 4.1.1 Giant Garter Snake

Suitable aquatic habitat and upland habitat for giant garter snake is present at each of the six well sites.

### ***Direct Effects***

In the action area, canals, drainages, and seasonal and perennial wetlands provide suitable aquatic habitat for giant garter snake. Upland habitat within the action area includes ruderal annual grassland and ditch and canal levees at Wells G-1 through G-6 that are located within 200 feet of suitable aquatic habitat.

Activities associated with the Proposed Action include:

- construction of the five 0.02-acre well pads, which would result in the permanent conversion of 0.12 acre of potential giant garter snake upland habitat to non-habitat consisting of site facilities;
- preparation of the well pad site and utilities, including grubbing and grading during site preparation work;
- construction of temporary water and sediment holding ponds during well drilling;
- installation of underground water pipeline; and
- movement of construction equipment and temporary increase in traffic on access roads within suitable habitat areas.

Construction access to the project site would be provided primarily on existing paved and dirt public and private roads. There would be no additional impacts on giant garter snake upland habitat from road construction.

The action area occurs in a rural setting that supports relatively low traffic volumes. Construction associated with the Proposed Action would result in an increase in traffic from construction equipment and work crews entering and leaving the work area. An increase in vehicle trips potentially could result in giant garter snake vehicle strikes while snakes are moving between aquatic sites or basking on roadways adjacent to aquatic habitat. Avoidance measures (previously described and listed below) have been incorporated into the Proposed Action description to avoid take.

The Proposed Action would not remove or disturb suitable aquatic habitat for giant garter snake but would affect upland habitat where giant garter snakes may be present at Wells G-1 through G-6. Mortality or injury of giant garter snakes in upland habitat could occur if burrows containing individuals are crushed by construction equipment or are buried under spoils; individuals are displaced from burrows, exposing them to predators and desiccation; or individuals encounter construction equipment while migrating through the work area.

With the following avoidance and conservation measures, which have been incorporated into the project description, effects on giant garter snake from construction are extremely unlikely to occur and, are thus, discountable. The Proposed Action would not be likely to adversely affect the giant garter snake.

*Measure 1: Conduct Mandatory Biological Resources Awareness Training for All Project Personnel and Implement General Requirements*

*Measure 2: Install Erosion Control Measures near Aquatic Habitat*

*Measure 3: Provide Escape Ramps or Cover Open Trenches at the End of Each Day to Avoid Entrapment of Giant Garter Snake*

*Measure 4: Monitor Initial Ground-Disturbing Activities and Vegetation Removal in Suitable Habitat for Giant Garter Snake*

*Measure 5: Avoid and Minimize Effects on Giant Garter Snake*

*Measure 6: Compensate for the Temporary Loss of Upland Habitat for Giant Garter Snake*

#### **4.1.2 Indirect Effects**

Additional groundwater pumping associated with the project wells is not expected to significantly draw down the aquifer as a whole. All of the proposed wells would draw from the confined aquifer, which is separated from the unconfined aquifer and any surface wetlands by an impermeable clay layer. Water extracted from the new wells will meet water quality standards suitable for managed wetlands. No indirect effects would occur as a result of the Proposed Action.

## **4.2 Determinations**

### **4.2.1 Giant Garter Snake**

Effects from the Proposed Action are expected to be discountable and/or insignificant and no take is expected. Therefore the Proposed Action is not likely to adversely affect giant garter snake.

## Chapter 5 References Cited

- AECOM. 2009. Groundwater management plan for the southern agencies in the Delta-Mendota Canal service area. Draft.
- California Native Plant Society. 2010. Inventory of Rare and Endangered Plants of California. Available: <<http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi>>. Accessed: April 2010.
- California Natural Diversity Database. 2010. RareFind 3, Version 3.1 March 2010 update Sacramento, California: California Department of Fish and Game
- Mayer, K. E., and W. F. Laudenslayer, Jr. 1988. A guide to wildlife habitats of California. October. California Department of Forestry and Fire Protection. Sacramento, CA.
- Quinn, N. W. T., W. M. Hanna, J. S. Hanlon, J. R. Burns, C. M. Taylor, D. Marciochi, S. Lower, V. Woodruff, D. Wright, and T. Poole. 2004. Real-time water quality management in the Grassland Water District. Lawrence Berkeley National Laboratory. eScholarship, open access publishing for the University of California. Last revised: November 15, 2004. Available: <<http://www.escholarship.org/uc/item/7vh9w3sw>> Accessed May 11, 2004
- U.S. Department of the Interior, Bureau of Reclamation. 2010. Environmental Assessment for the American Recovery and Reinvestment Act of 2009 New Wells Project—Regions 4. July. Mid-Pacific Region, Sacramento, CA. Prepared by ICF International, Sacramento, CA.
- U.S. Fish and Wildlife Service. 1999. U.S. Fish and Wildlife Service standardized recommendations for protection of the San Joaquin kit fox prior to or during ground disturbance. Sacramento, CA.
- U.S. Fish and Wildlife Service. 2010. List of endangered, threatened, and candidate plant species for the Howard Ranch, Crows Landing, Patterson, Newman, Westley, Vernalis, Tracy, and Solyo USGS 7.5-minute quadrangles. May 14, 2010.
- U.S. Fish and Wildlife Service. 2006. *Giant garter snake (Thamnophis gigas) 5-year review: summary and evaluation*. Sacramento Fish and Wildlife Office, Sacramento, CA.
- Zeiner, D. C., W. F. Laudenslayer, Jr., and K. E. Mayer (eds.). 1988. *California's wildlife*. Volume 1: Amphibians and reptiles. California statewide wildlife habitat relationships system. Sacramento, CA: California Department of Fish and Game.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White. 1990.  
Mammals. Volume III in *California's Wildlife*. April. Sacramento, CA:  
California Department of Fish and Game.

# **Appendix A U.S. Fish and Wildlife Service Species List**

**U.S. Fish & Wildlife Service**  
**Sacramento Fish & Wildlife Office**  
**Federal Endangered and Threatened Species that Occur in**  
**or may be Affected by Projects in the Counties and/or**  
**U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 100514033407

Database Last Updated: April 29, 2010

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Quad Lists

Listed Species

Invertebrates

*Branchinecta conservatio*

Conservancy fairy shrimp (E)

Critical habitat, Conservancy fairy shrimp (X)

*Branchinecta longiantenna*

Critical habitat, longhorn fairy shrimp (X)

longhorn fairy shrimp (E)

*Branchinecta lynchi*

Critical habitat, vernal pool fairy shrimp (X)

vernal pool fairy shrimp (T)

*Desmocerus californicus dimorphus*

valley elderberry longhorn beetle (T)

*Lepidurus packardii*

Critical habitat, vernal pool tadpole shrimp (X)

vernal pool tadpole shrimp (E)

Fish

*Acipenser medirostris*

green sturgeon (T) (NMFS)

*Hypomesus transpacificus*

delta smelt (T)

*Oncorhynchus mykiss*

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

*Oncorhynchus tshawytscha*

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

*Ambystoma californiense*

California tiger salamander, central population (T)

*Rana draytonii*

California red-legged frog (T)

Reptiles

*Gambelia (=Crotaphytus) sila*

blunt-nosed leopard lizard (E)

*Thamnophis gigas*

giant garter snake (T)

#### Mammals

*Dipodomys nitratooides exilis*

Fresno kangaroo rat (E)

*Vulpes macrotis mutica*

San Joaquin kit fox (E)

#### Plants

*Chamaesyce hooveri*

Critical habitat, Hoover's spurge (X)

#### Quads Containing Listed, Proposed or Candidate Species:

SAN LUIS RANCH (403A)

LOS BANOS (403D)

GUSTINE (423C)

### County Lists

No county species lists requested.

#### Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.

*Critical Habitat* - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

### Important Information About Your Species List

#### How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

## Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

## Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

## Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

## Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

### Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

### Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

### Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

### Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be August 12, 2010.

# **Appendix B California Natural Diversity Database Species List**

California Department of Fish and Game  
Natural Diversity Database  
Selected Elements by Scientific Name - Portrait  
Region 4, 05/14/10

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 Actinemys marmorata western pond turtle	ARAAD02030			G3G4	S3	SC
2 Agelaius tricolor tricolored blackbird	ABPBXB0020			G2G3	S2	SC
3 Ambystoma californiense California tiger salamander	AAAAA01180	Threatened	unknown code...	G2G3	S2S3	SC
4 Antrozous pallidus pallid bat	AMACC10010			G5	S3	SC
5 Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1			G1T1	S1.1	1B.2
6 Atriplex cordulata heartscale	PDCHE040B0			G2?	S2.2?	1B.2
7 Atriplex depressa brittlescale	PDCHE042L0			G2Q	S2.2	1B.2
8 Atriplex joaquiniana San Joaquin spearscale	PDCHE041F3			G2	S2	1B.2
9 Atriplex persistens vernal pool smallscale	PDCHE042P0			G2	S2.2	1B.2
10 Branchinecta conservatio Conservancy fairy shrimp	ICBRA03010	Endangered		G1	S1	
11 Branchinecta longiantenna longhorn fairy shrimp	ICBRA03020	Endangered		G1	S1	
12 Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
13 Branta hutchinsii leucopareia cackling (=Aleutian Canada) goose	ABNJB05035	Delisted		G5T4	S2	
14 Buteo swainsoni Swainson's hawk	ABNKC19070		Threatened	G5	S2	
15 Circus cyaneus northern harrier	ABNKC11010			G5	S3	SC
16 Cismontane Alkali Marsh	CTT52310CA			G1	S1.1	
17 Coastal and Valley Freshwater Marsh	CTT52410CA			G3	S2.1	
18 Cordylanthus mollis ssp. hispidus hispid bird's-beak	PDSCR0J0D1			G2T2	S2.1	1B.1
19 Coturnicops noveboracensis yellow rail	ABNME01010			G4	S1S2	SC
20 Eryngium racemosum Delta button-celery	PDAPI0Z0S0		Endangered	G2Q	S2.1	1B.1
21 Lasiurus blossevillii western red bat	AMACC05060			G5	S3?	SC
22 Lasiurus cinereus hoary bat	AMACC05030			G5	S4?	
23 Lepidurus packardi vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
24 Linderiella occidentalis California linderiella	ICBRA06010			G3	S2S3	

California Department of Fish and Game  
 Natural Diversity Database  
 Selected Elements by Scientific Name - Portrait  
 Region 4, 05/14/10

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
25 Myotis yumanensis Yuma myotis	AMACC01020			G5	S4?	
26 Navarretia prostrata prostrate vernal pool navarretia	PDPLM0C0Q0			G2?	S2.1?	1B.1
27 Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0			G3	S3.2	1B.2
28 Spea hammondii western spadefoot	AAABF02020			G3	S3	SC
29 Taxidea taxus American badger	AMAJF04010			G5	S4	SC
30 Thamnophis gigas giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
31 Trichocoronis wrightii var. wrightii Wright's trichocoronis	PDAST9F031			G4T3	S1.1	2.1
32 Valley Sacaton Grassland	CTT42120CA			G1	S1.1	
33 Valley Sink Scrub	CTT36210CA			G1	S1.1	
34 Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	



United States Department of the Interior  
FISH AND WILDLIFE SERVICE  
Sacramento Fish and Wildlife Office  
2800 Cottage Way, Room W-2605  
Sacramento, California 95825-1846



In reply refer to:  
81420-2010-I-0715

**AUG 03 2010**

Memorandum

**To:** Regional Resources Manager, Mid-Pacific Regional Office, Bureau of Reclamation, Sacramento, California

**From:** Deputy Field Supervisor, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California *John Aubrey*

**Subject:** Request for Concurrence on the American Recovery and Reinvestment Act of 2009 New Wells Project – Region 4 (Project), Merced County, California

This is in response to the request from the U.S. Bureau of Reclamation (Reclamation) for a concurrence that Reclamation's proposed action of providing funding under the American Recovery and Reinvestment Act of 2009 for the construction and operation of up to six wells, may affect but is not likely to adversely affect the federally-listed giant garter snake (*Thamnophis gigas*). Reclamation's request, with an attached biological assessment, was received July 15, 2010 in the U.S. Fish and Wildlife Service's (Service) Sacramento Fish and Wildlife Office in a memorandum dated July 13, 2010. The well sites of the proposed Project are in the Grasslands Water District, and the California Department of Fish and Game's Gadwell and China Island units within Merced County, California. This response has been prepared in accordance with the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*), and in accordance with the regulations governing interagency consultations (50 CFR §402).

The Service has reviewed Reclamation's biological assessment and additional information provided via electronic mail dated July 30, 2010. The Service's review considered information about water quality projected at each proposed new well head; the avoidance and minimization measures to be implemented for the protection of the giant garter snake, including well and related construction during the snake's seasonal active period only; and the habitat conditions for the Hoover's spurge (*Chamaesyce hooveri*). With regard to water quality, it is the understanding of the Service that Reclamation intends to cease well construction at those proposed well sites where ground water quality testing reveals that selenium (Se) occurs at or greater than two parts per billion (2 ppb).

Based on our review, the Service concurs that the project as proposed is not likely to adversely affect the giant garter snake. The Service also agrees with Reclamation that habitat conditions have been altered to such an extent that Hoover's spurge is unlikely to occur at the proposed well sites. Should any of these six wells be completed and become operational, the Service expects to

2

Mr. Richard Woodley

review at a later date Reclamation's action to discharge water from them into the wetland and agriculture water conveyance channels and canals. Therefore, the Service provides no concurrence on that separate action at this time.

If you have questions regarding this memorandum, please contact the Sacramento Fish and Wildlife Office at 916 414-6600.

**Bragg, Carolyn**

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**From:** Pinero, Janice A  
**Sent:** Friday, July 30, 2010 11:00 AM  
**To:** Russell, Daniel  
**Cc:** Welsh, Dan; 'Jan\_Knight@fws.gov'; Owens, Maryann; Winckel, Joy; Maurer, Tom; Littlefield, Mark; Slavin, Tracy S; Clancy, Kevin M; Hatleberg, Shelly; Bragg, Carolyn; Grimes, Russell (Russ) W  
**Subject:** Request for concurrence on Region 4- ARRA New Wells Project  
**Attachments:** BAROID\_GRANULAR\_BENTONITE.PDF; Mendota\_B\_TDS.XLS; MendotaWellSummary.xlsx; Copy of Mendota\_Se.xls

Dear Dan,

The following revisions and additional information to the Biological Assessment submitted on July 15, 2010, are thereby incorporated into the project description for the American Recovery and Reinvestment Act of 2009 New Wells Project-Region 4. We would like to request your concurrence that the Proposed Action, as modified by the revisions described in this email, is not likely to adversely affect the giant garter snake (*Thamnophis gigas*).

Modifications/Additional Information:

- Prior to drilling the Proposed Wells, a pilot hole will be drilled and water quality samples will be collected for the analysis of selenium, boron, and total dissolved solids. If the analyses of water samples collected from the pilot hole indicate selenium levels are greater than 2 parts per billion, the proposed well will not be completed.
- Four out of the six wells proposed are within the Grassland Water District. The other two wells are proposed to be constructed in the California Department of Fish and Game North Grassland Wildlife Area. One well is proposed to be located in the China Island Unit and the other well is proposed to be located in the Gadwall Unit. Attached is a map that shows the locations and coordinates of the six proposed wells.
- If Reclamation does not buy water from the proposed new wells, Grassland Water District is not expected to operate the wells. If Reclamation decides to purchase this water or if this water is transferred to other CVP contractors, this action will constitute a separate federal action requiring separate environmental documentation.
- Reclamation proposes to use Baroid Granular Bentonite (description attached) mixed with locally sourced water to make drilling mud. Drilling mud will be mixed in an above-ground steel mud pit. During well construction, a large rotary drill rig (or reverse circulation drill rig) would be used to drill the bore hole to target depths. During drilling, the drilling mud will be circulated through the drilling steel (drill pipe, drill collars and drill bit) and up through the annulus between the drill steel and the bore hole walls back to the surface. The drilling mud will carry drill cuttings (small pieces of rock being bored through) back to the surface along with the flow of the mud. Drilling mud returning to the surface will pass from the drill hole to a shale shaker (a set of sloping vibrating screens) set on top of the steel mud pit (via a pipe). The shale shaker will separate the drill cuttings from the drilling mud. Drilling mud then falls through the shale shaker into the steel mud pit beneath it and is reutilized by pumping back down the hole again. The drill cuttings coming off of the sloping vibrating screens of the shale shaker will drop into a pile at the side of the steel mud pit. These cuttings will be loaded into a truck utilizing a backhoe and/or hand labor with shovels. The cuttings will be disposed of by scattering them on the ground surface and spread to form a uniform surface in a nearby area that Reclamation, USFWS and GWD and/or CDFG (depending on which property the well is being drilled) agrees to. The drill cuttings are bits of rock and soil drilled through by the well bore and will contain a small amount of inert bentonite clay drill mud. If local disposal onto the ground surface is not desirable to USFWS, GWD or CDFG, these cuttings will be carried via truck to an approved disposal area. Additional details of this work will be finalized once the contract has been awarded.
- Water from the new wells is expected to be conveyed in the following manner (See attached map):
  1. Well G-1 would provide water through the San Luis Canal
  2. Well G-2 would provide water through the Almond Drive Ditch and then to the San Luis Canal
  3. Well G-3 would provide water through the Santa Fe Canal
  4. Well G-4 would provide water through the Santa Fe Canal

5. Well G-5 would provide water through the Camp 13 Ditch, which connects with Mud Slough and then the Santa Fe Canal
6. Well G-6 would provide water through the J-Lateral and then to the China Island Pumping Plant

- Hoover's spurge (*Chamaesyce hooveri*) typically occurs in large/deep vernal pools and in a "normal year" blooms in July. This species is readily distinguished from other species of *Chamaesyce* by characteristics in growth habit, plant color, and leaf shape. Generally, Hoover's spurge grows in large, deep vernal pools on remnant alluvial fans and depositional stream terraces at the base of the Sierra Nevada foothills. The main remaining area of concentration for Hoover's spurge is in the northeastern Sacramento Valley. The Vina Plains of Tehama and Butte counties contains most of the known extant occurrences. Another concentration is in the Southern Sierra Foothills, including the Visalia-Yettem area of Tulare County and the Hickman-La Grange area of Stanislaus County. Three other occurrences are on the Sacramento National Wildlife Refuge in Glenn County.

This species has little to no potential to occur in the action area. There are no deep vernal pools on the well sites and therefore, no suitable habitat for this species occurs in the proposed action area. In addition, although the species would not have been in bloom during the early summer surveys, leaves would have been identifiable. Finally, a review of existing species lists and databases for the geographic region (USFWS lists, CNDDDB, California Native Plant Society [CNPS] Inventory of Rare and Endangered Vascular Plants of California), revealed that no special-status plants have been recorded on or near the well sites.

- Selenium, Boron and TDS data from the USGS groundwater monitoring program 5 sub-Corcoran wells along the DMC are attached. The attached information also include well coordinates and depths. Finally, we have attached a map showing the well locations.

Please do not hesitate to contact me if you have any questions. It truly has been a pleasure working with you on this project. We really appreciate everything you are doing in working with us to expedite the process.

Kind Regards,

Janice  
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Janice Piñero  
Natural Resources Specialist  
Bureau of Reclamation  
2800 Cottage Way  
Sacramento CA, 95825  
(916) 978-5041  
[jpinero@usbr.gov](mailto:jpinero@usbr.gov)



Please consider your environmental responsibility before printing this e-mail & any documents



# BAROID<sup>®</sup> GRANULAR BENTONITE

30 Mesh Sealing and Plugging Material

**Description** BAROID GRANULAR specially processed, 30-mesh sodium bentonite is used in sealing and grouting boreholes and earthen structures.

- Applications/Functions**
- Helps seal leaking ponds and earthen structures
  - Mix with native soils to prepare a clay liner or cell for sewage lagoons, under storage tanks and landfills
  - Plug abandoned holes
  - Mix with native soils for use as backfill
  - Mix with water for slurry trenching

- Advantages**
- Effective in sealing and plugging
  - Simple to apply
  - Cost effective
  - Flexible seal providing low permeability
  - Helps prevent entry of pollutants from the surface

**Typical Properties**

Moisture	7.7
Free swell (ml)	29
pH - 6% suspension	9
Specific gravity	2.5
Bulk density (lb/ft <sup>3</sup> ), compacted	83
Liquid limit number	450-600

Dry Sieve Analysis	Granular 30 Mesh
% + 16	0.00
% + 20	0.02
% + 30	0.85
% + 40	16.19
% + 65	47.36
% + 100	15.75
% + 200	13.60
% - 200	3.20

**Typical Properties  
(continued)**

<b>Wet Sieve Analysis</b>	<b>Granular 30 Mesh</b>
% + 200	2.9
% + 325	4.5

<b>X-Ray Analysis</b>
85% Montmorillonite
5% Quartz
5% Feldspars
2% Cristobalite
2% Illite
1% Calcium and Gypsum

**Recommended  
Treatment**

***Sealing ponds or earthen structures***

Depending on the native soil, disc in or mix 3 to 5 pounds of BAROID GRANULAR sealing material per square foot (15-25 kg/m<sup>2</sup>). Do not neglect the edges of the dam or the sides/walls of the pond. Disc or mix uniformly the required amount of BAROID GRANULAR sealing material so that a 6" (152 mm) blanket of soil and BAROID GRANULAR sealing material is formed. This sealing blanket should then be compacted in place and as a further protection to the sealing blanket 2-4 inches (50-100 mm) of local soil or sand should cover the sealing blanket and be compacted.

If there is water in the pond and the leaking area can be identified and isolated, cover the leaking area from the surface with 4 to 6 pounds of BAROID GRANULAR sealing material per square foot (19-30 kg/m<sup>2</sup>) of surface area.

**Note:** Bentonite is more effective as a sealing agent when confined. Therefore, every effort should be made to cover the BAROID GRANULAR sealing material after it is broadcast with a 2-3 inch (51-76 mm) layer of sand. This will reduce the potential for dispersion into the water and un-yielded bentonite particles interfering with the gill action of fish.

***To suspend cuttings while cable tool drilling***

Place BAROID GRANULAR sealing material in plastic bags. With the tools out of the hole, drop enough bags to get 6 to 10 pounds (2.7-4.5 kg) of BAROID GRANULAR sealing material to the bottom of hole. If hole is dry, add water. While drilling ahead, the churning action of the tools will form a thick slurry that will support the cutting off bottom and make it easier for the bailer to remove them.

**Packaging** BAROID GRANULAR sealing material is packaged in 50-lb (22.7 kg) multiwall paper bags.

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**Availability** BAROID GRANULAR sealing material can be purchased through any Baroid Industrial Drilling Products Retailer. To locate the Baroid IDP retailer nearest you contact the Customer Service Department in Houston or your area IDP Sales Representative.

**Baroid Industrial Drilling Products**

**Product Service Line, Halliburton**

3000 N. Sam Houston Pkwy E.

Houston, TX 77032

**Customer Service** (800) 735-6075 Toll Free (281) 871-4612

**Technical Service** (877) 379-7412 Toll Free (281) 871-4613

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#	RDB	file	created	by	NWIS	
#	STAID	Station	number			
#	LOCAL	Local	identifier			
#	DATES	Date	as	yyyymmdd		
#	TIMES	Sample	start	time		
#	SAMPL	Record	number			
#	P70301	Dissolved	solids,	water,	filtered,	
#	P01020	Boron,	water,	filtered,	microgram:	
#					TDS	
	STAID	LOCAL	DATES	TIMES	SAMPL	P70301
	20S	30S	10D	10S	10S	9S
P259	372553121102501	006S008E09E001M	20100519	1100	1000896	E859
MC10	371726121051501	007S008E28R001M	20100518	1500	1000895	E330
MC15	370102120535901	010S010E32L001M	20100330	1320	1000500	E419
MC18	365322120401201	012S012E16E001M	20100331	1040	1000502	E943
MC21	364650120221901	013S015E19R002M	20100406	1050	1000511	E1540

E= estimate

qwflatout program on placer at 7/29/2010 10:05:59

sum	of	constituent	milligrams	per	liter
per	liter				
Boron					
P01020					
9S					
464					
257					
751					
1740					
1460					

ed value (TDS is a calculated value)

#	STCID	Station	number			
#	LOCAL	Local	identifier			
#	DATES	Date	as	yyyymmdd		
#	TIMES	Sample	start	time		
#	P01145	Selenium,	water,	filtered,	microgram:	per
#						
STCID	LOCAL	DATES	TIMES	R01145	P01145	
20S	30S	10D	10S	6S	9N	
	372553121102501	006S008E09E001M	20100519	1100		8.1
	371726121051501	007S008E28R001M	20100518	1500		0.69
	370102120535901	010S010E32L001M	20100330	1320		0.47
	365322120401201	012S012E16E001M	20100331	1040 <		0.2
	364650120221901	013S015E19R002M	20100406	1050 <		0.4

liter

(p259)

(check 10)

(check 15)

(check 18)

(check 21)

	LOCATION			Datum	Well #1			WELL SUMMA	
	Latitude	Longitude	Depth		TOS	BOS	Well #2	Top	
MC21	36 46' 50.45"	120 22' 19.93"	NAD83	550	530	550	350	330	
MC18	36 53' 22.54	120 40' 12.59"	NAD83	550	530	550	395	375	
MC15	37 01' 02.21"	120 53' 59.74"	NAD83	355	335	355	160	150	
MC10	37 17' 26.5"	121 05' 15.2"	NAD83	380	240	260	135	115	
P259	37 25' 53.8"	121 05' 58.1"	NAD83	430	390	410	255	235	

RY

<b>Bottom</b>		<b>Well #3</b>	
		<b>Top</b>	<b>Bottom</b>
350	78	58	78
395	215	195	215
160	110	90	110
135	--	--	--
255	115	95	115