CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ATTACHMENT A ~~TO ORDER R5-2014-XXXX~~
INFORMATION SHEET

TO ORDER R5-2015-XXXX
WASTE DISCHARGE REQUIREMENTS
FOR
~~WASTE DISHARGE REQUIREMENTS GENERAL ORDER~~
~~FOR~~

SAN LUIS & DELTA-MENDOTA WATER AUTHORITY
AND
~~United~~UNITED STATES DEPARTMENT~~O~~ OF THE INTERIOR
BUREAU OF RECLAMATION
~~SURFACE WATER DISCHARGES FROM~~
AND

TO ORDER R5-2015-XXXX
WASTE DISHARGE REQUIREMENTS GENERAL ORDER
FOR

GROWERS IN THE
GRASSLAND ~~BYPASS PROJECT~~DRAINAGE AREA

~~FRESNO AND MERCED COUNTIES~~

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I. Overview

[This attachment to]Two separate orders are drafted to address discharges from the Grassland Drainage Area: one for surface water discharge to tributaries of the San Joaquin River - Waste Discharge Requirements for Surface Water Discharges from the Grassland Bypass Project, Order R5-201[X]5-XXXX (referred to as the "GBP Order[") is intended"), and one for discharges] to [provide information regarding]groundwater - to the [rationale for the]Waste Discharge Requirements General Order[, general information on surface monitoring that has been conducted, and a discussion of this Order's elements that meet required state policy.] for Growers in the Grassland Drainage Area, Order R5-2015-XXXX (referred to as the "GDA Order). The two orders complement each other.

[**II. Introduction**]

This attachment is intended to provide information regarding the rationale for both orders, the relationship between the two orders, general information on surface water and groundwater monitoring that has been conducted, and a discussion of the integration of the two orders to meet required state policy. Table 1 summarizes the rationale for and key differences between the two orders.

Table 1. Key aspects of the GBP Order and GDA Order

	Grassland Bypass Project (GBP) Order	Grassland Drainage Area (GDA) Order
Order	Waste Discharge Requirements with discharge and receiving water limits set in the Basin Plan	General Order, ILRP with receiving water limitations based on beneficial use(s) of groundwater in the Order area
Discharge Location	To surface water (to Mud Slough via San Luis Drain)	To groundwater (area discharge to 97,400 acres in GDA)
Discharger	U.S. Bureau of Reclamation / San Luis & Delta-Mendota Water Authority	Growers in the GDA (commercial irrigated lands)
Water Quality Assessment	Water quality monitored at the point of discharge to surface water, and at receiving water compliance points	Groundwater quality trend monitoring and Management Practices Evaluation Program

The Grassland Bypass Project (GBP) [addresses the transport of subsurface drainage, as well as stormwater runoff,]has been under waste discharge requirements (WDRs) for surface water since 1998. The GBP WDRs cover the discharge to surface water from [a portion of the]the Grassland Drainage Area (GDA). Selenium is the main concern in the surface water discharge due to reproduction impacts on waterfowl. Selenium is a naturally occurring element in the soil and not a material added for crop production. All GBP WDRs were issued, including the current Order, WDR 5-01-234, to the U.S. Bureau of Reclamation (Bureau), owner of the San Luis Drain, and the San Luis & Delta-Mendota Water Authority (Water Authority) that represents member districts within the GDA. The GBP Order replaces Waste Discharge Requirements No. 5-01-234 (2001 Order) and is consistent with the current requirements in the *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River* (Basin Plan).

The Central Valley Regional Water Quality Control Board's (Central Valley Water Board or "board") Irrigated Lands Regulatory Program (ILRP) was initiated in 2003 as a conditional waiver of WDRs program to regulate discharges from irrigated commercial agricultural [lands in the western portion]land to Central Valley surface waters. Since surface water discharges were already regulated under the GBP

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WDRs, the growers in the GDA were not regulated by the ILRP conditional waiver. In 2012, the Central Valley Water Board started issuing waste discharge requirements for discharges to surface water and groundwater for irrigated commercial agricultural land. Discharges to groundwater may include water soluble residue from agricultural operations, such as nitrates or pesticides.

The GDA Order is part of the ILRP and regulates discharge to groundwater by growers in the Grassland Drainage Area and is similar to other ILRP general orders in structure and organization for groundwater monitoring and reporting requirements. Under the GDA Order, growers will be required to obtain coverage for agricultural discharges to groundwater through a third-party entity, or apply for individual coverage.

A. Goals and Objectives of the Irrigated Lands Regulatory Program

The goals and objectives of the GDA Order, which implements the long term ILRP for groundwater in Grassland Drainage Area, are described below. These are the goals described in the PEIR for the ILRP.[1]

"Understanding that irrigated agriculture in the Central Valley provides valuable food and fiber products to communities worldwide, the overall goals of the ILRP are to (1) restore and/or maintain the highest reasonable quality of state waters considering all the demands being placed on the water; (2) minimize waste discharge from irrigated agricultural lands that could degrade the quality of state waters; (3) maintain the economic viability of agriculture in California's Central Valley; and (4) ensure that irrigated agricultural discharges do not impair access by Central Valley communities and residents to safe and reliable drinking water. In accordance with these goals, the objectives of the ILRP are to:

- *Restore and/or maintain appropriate beneficial uses established in Central Valley Water Board water quality control plans by ensuring that all state waters meet applicable water quality objectives.*
- *Encourage implementation of management practices that improve water quality in keeping with the first objective, without jeopardizing the economic viability for all sizes of irrigated agricultural operations in the Central Valley or placing an undue burden on rural communities to provide safe drinking water.*
- *Provide incentives for agricultural operations to minimize waste discharge to state waters from their operations.*
- *Coordinate with other Central Valley Water Board programs, such as the Grasslands Bypass Project WDRs for agricultural lands total maximum daily load development, CV-SALTS, and WDRs for dairies.*
- *Promote coordination with other regulatory and non-regulatory programs associated with agricultural operations (e.g.,* California Department of Pesticide Regulation (DPR), *the State Water Resources Control Board Division of Drinking Water Programs, the California Air Resources Board [ARB], the California Department of Food and Agriculture, Resource Conservation Districts [RCDs], the University of California Extension, the Natural Resources Conservation Service [NRCS], the USDA National Organic Program, CACs, State Water Board Groundwater Ambient Monitoring and Assessment Program, the U.S. Geological Survey, and local groundwater programs [SB 1938, Assembly Bill [AB] 3030, and Integrated Regional Water Management Plans]) to minimize duplicative regulatory oversight while ensuring program effectiveness."*

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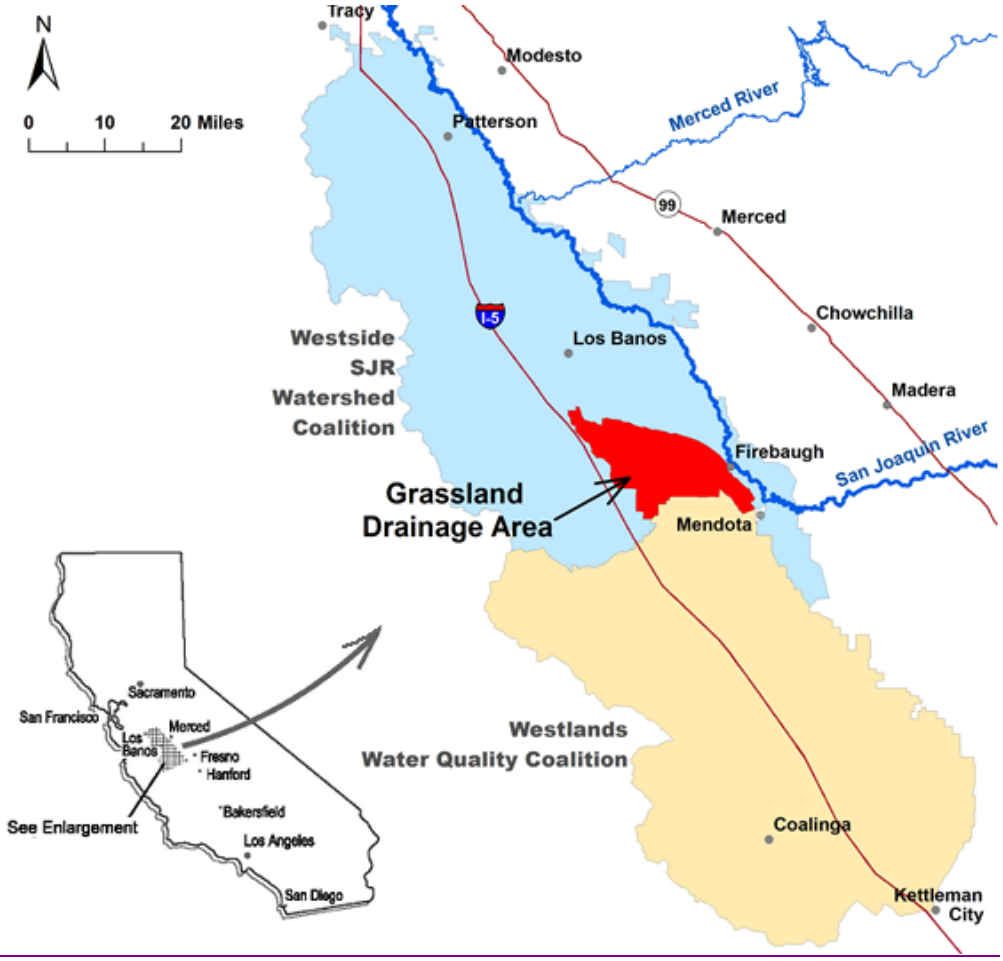
[1] PEIR, page 2-6

II. Generalized Description of the Grassland Watershed and Grassland Drainage Area

The Grassland watershed is a valley floor sub-basin of the San Joaquin River (SJR) Basin, covering an area of approximately 370,000 acres. Major land uses in the Grassland watershed include agriculture and managed wetlands. The Grassland Drainage Area (GDA) encompasses about 97,400 acres within the Grassland watershed, roughly between Los Banos to the north and Mendota to the south (Figures 1 and 2)[2]. Permanent crops (nuts, grapes, and tree crops) make up about 12,000 acres (12%) of total acreage in the GDA. Other crops grown in the GDA may vary from year to year due to economic factors, water availability, contractual requirements, and weather. Top crops based on acreage in 2013 were tomatoes, wheat, cotton, alfalfa (Table 2). The approximate acreage in Table 2 also includes crops grown in the San Joaquin River Water Quality Improvement Project (SJRIP) which occupies about 6,000 acres within the GDA.

Figure ~~.~~ 1: Location of the Grassland Drainage Area



(Figure provided by Summers Engineering, Inc.)

The Grassland watershed overlies the Delta-Mendota groundwater subbasin which consists of the Tulare Formation, terrace deposits, alluvium, and flood-basin deposits. The Grassland Drainage Area primarily overlies the Tulare Formation. The primary aquifer system occurs in unconsolidated alluvial and

[2] The Grassland Drainage Area for the tentative Order differs slightly from the area defined in the 2009 Agreement for Use of the San Luis Drain (Use Agreement) between the Bureau and the Authority (see Figure 1 in the WDR).

continental deposits of the Tulare Formation. The Tulare Formation is composed of beds, lenses, and tongues of clay, sand and gravel that have been alternately deposited in oxidizing and reducing environments. The Corcoran clay of this formation underlies the basin at depths ranging from 100 to 500 feet and acts as a confining bed.

Groundwater in the Delta-Mendota subbasin occurs in three water-bearing zones:

- the lower zone contains confined fresh water in the lower section of the Tulare Formation, beneath the Corcoran Clay layer;
- the upper zone contains confined, semi-confined, and unconfined water in the upper section of the Tulare Formation and younger deposits; and
- a shallow zone which contains unconfined water within approximately 25 feet of the ground surface.

Shallow, saline groundwater occurs within about 10 feet of the ground surface over a large portion of the subbasin. There are also localized areas of high iron, fluoride, nitrate, and boron in the subbasin.

The primary sources of groundwater recharge in the subbasin are from the percolation of applied irrigation water and from canals and water storage facilities. Some recharge occurs due to seepage losses along the San Joaquin River and infiltration of runoff from the Coast Ranges into tributary streams.

Table 2: Primary crops grown and approximate acreage in Grassland Drainage Area*

Land Use	Approximate Acreage
Fallow/Barren**	19,000
Tomatoes	17,000
Wheat	16,000
Cotton	12,000
Alfalfa	10,000
Almonds	6,000
Barley	3,000
Grapes	3,000
Pasture	3,000
Miscellaneous Crops	3,000
Pistachios	2,000
Rice	2,000
Pomegranates	1,000
TOTAL	**97,000**

* Acreage estimates are from Summers Engineering based on the 2013 data in the USDA National Agricultural Statistics Service CropScape located at http://nassgeodata.gmu.edu/CropScape/

** Includes 9,500 acres of non-irrigated land, some of which are dry-land farmed.

Soils on the west side of the SJR Basin are of marine origin and are fine-textured and saline, high in selenium and salts. ~~Major land uses in the watershed include agriculture and managed wetlands.~~ The source of selenium in the GDA are sediments eroded through natural processes from the coastal range foothills that are mobilized through irrigation. Irrigation is necessary for nearly all crops grown commercially in the watershed. ~~Supplied irrigation water applied~~Approximately 10,400 acres in the GDA are not irrigated. Of the remaining 87,000 acres, 33,100 acres (~38%) utilize subsurface drainage systems to remove saline groundwater from the root zone of the irrigated crops and discharging that drainage to the Grassland Bypass channel. About 53,900 acres of irrigated agricultural land are not tile drained.

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Irrigation without adequate drainage causes the shallow or perched water table to rise, leading to waterlogging and evapoconcentration of salts and trace elements in the crop root zone. Adding more irrigation water to dissolve and leach these salts ~~and trace elements~~ into the shallow groundwater is necessary to maintain the salt balance in the ~~crop~~ root zone. ~~Drainage tiles and associated sumps~~Subsurface or tile drainage systems (Figure 3) are ~~used~~utilized to ~~lower the~~ remove percolated irrigation water ~~table.~~and the shallow groundwater from the field. The subsurface drainage from this area typically contains high concentrations of ~~dissolved solids,~~ selenium and salts, and the GDA is the primary source of selenium to Mud Slough and the San Joaquin River. While selenium is the primary concern, the drainage also contains boron, molybdenum, and high levels of salts that can impact receiving waters.

~~The~~ Figure 2: Map of Grassland ~~watershed~~Watershed with Bypass Project

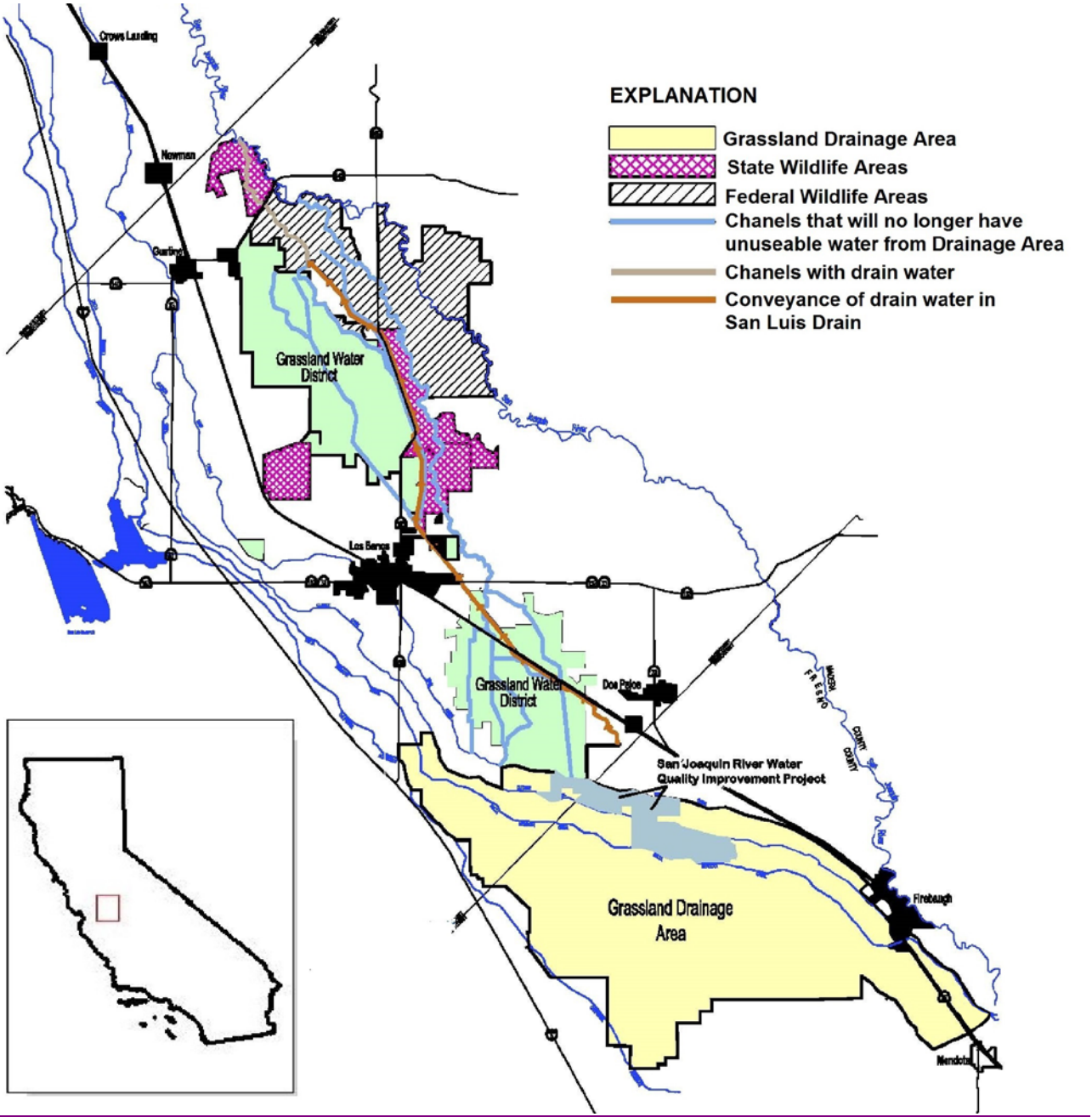

Figure modified from Final EIS/EIR for Grassland Bypass Project, 2010-2019, August 2009

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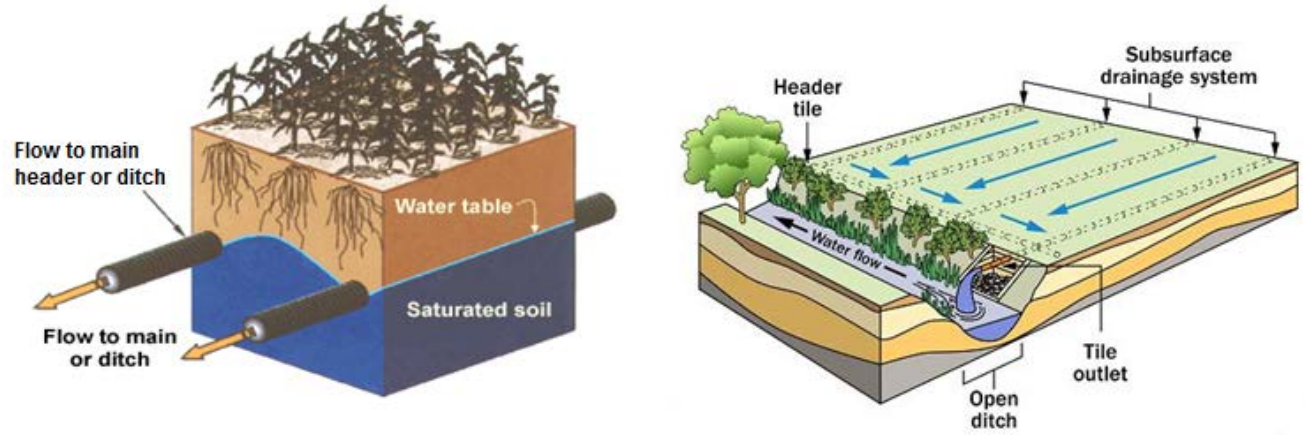
Figure 3: Subsurface (tile) drainage systems



The tile drains are horizontal "pipes", collecting the irrigation water and shallow groundwater to gravity-fed header tile drains that empty into open ditches or sumps that are pumped into a ditch. Tile drains are placed deep enough below the soil surface (about 7 to 8 feet in the GDA) to keep groundwater out of the crop root zone.

A. Water Flow Before and After Grassland Bypass Project (GBP) Implementation

The GBP was initiated as a means to control selenium in the Grassland Drainage Area, and is [a valley floor sub-basin]based upon an agreement between the Bureau and the Water Authority to use a segment of the San Luis Drain to convey agricultural subsurface drainage water from the GDA to Mud Slough (north), a tributary of the San Joaquin River[Basin, covering an].

Historically, subsurface drainage from the GDA first travelled north to the southern section of the Grassland Water District along with the wetland water supply (Figure 4A shows a schematic of water flow in the Grassland area [of]before the GBP). The drainage then moved to the northern section of the Grassland Water District. Depending on how water was routed, the subsurface discharge ended in Salt Slough or Mud Slough (north). Both Salt Slough and Mud Slough enter the San Joaquin River before the confluence of the Merced River.

In the 1980's as part of the Central Valley Water Project, the Bureau allowed the Westlands Water District located south of the GDA, to discharge subsurface drainage water into the San Luis Drain. Instead of being completed to the Delta as originally envisioned, the Drain terminated at Kesterson Reservoir, which was operated as a waterfowl refuge. The drainage water was high in selenium, and selenium bioaccumulated in waterfowl causing deformities and mortality. This raised concerns that selenium levels from subsurface drainage in the GDA could also impact waterfowl in the wetlands. In 1986 Westlands Water District ceased discharge into the San Luis Drain.

With the GBP implementation, subsurface agricultural drainage from approximately [370,000]33,100 acres[. The Grassland Drainage Area (GDA), about 97,400 acres,] in the GDA is [located within the Grassland watershed, roughly between Los Banos to the north and Mendota to the south (Figure 1). The GDA is the primary source of selenium in the watershed area. The GBP routes subsurface drainage and surface runoff from the GDA to a portion of the San Luis Drain, then]routed to the San Luis Drain through the Grassland Bypass Channel. From there, it travels 28 miles to the Drain's terminus and discharges to Mud Slough (north), a point about six miles upstream of the San Joaquin River confluence[.] (Figure 4B shows a schematic of the drainage flows with the GBP). The [Grasslands Bypass Project]GBP effectively allows [agricultural]drainage water from the GDA to "bypass" approximately 93 miles of wetland supply channels, thereby, avoiding the discharge of high levels of selenium to managed wetlands, where waterfowl could be impacted.

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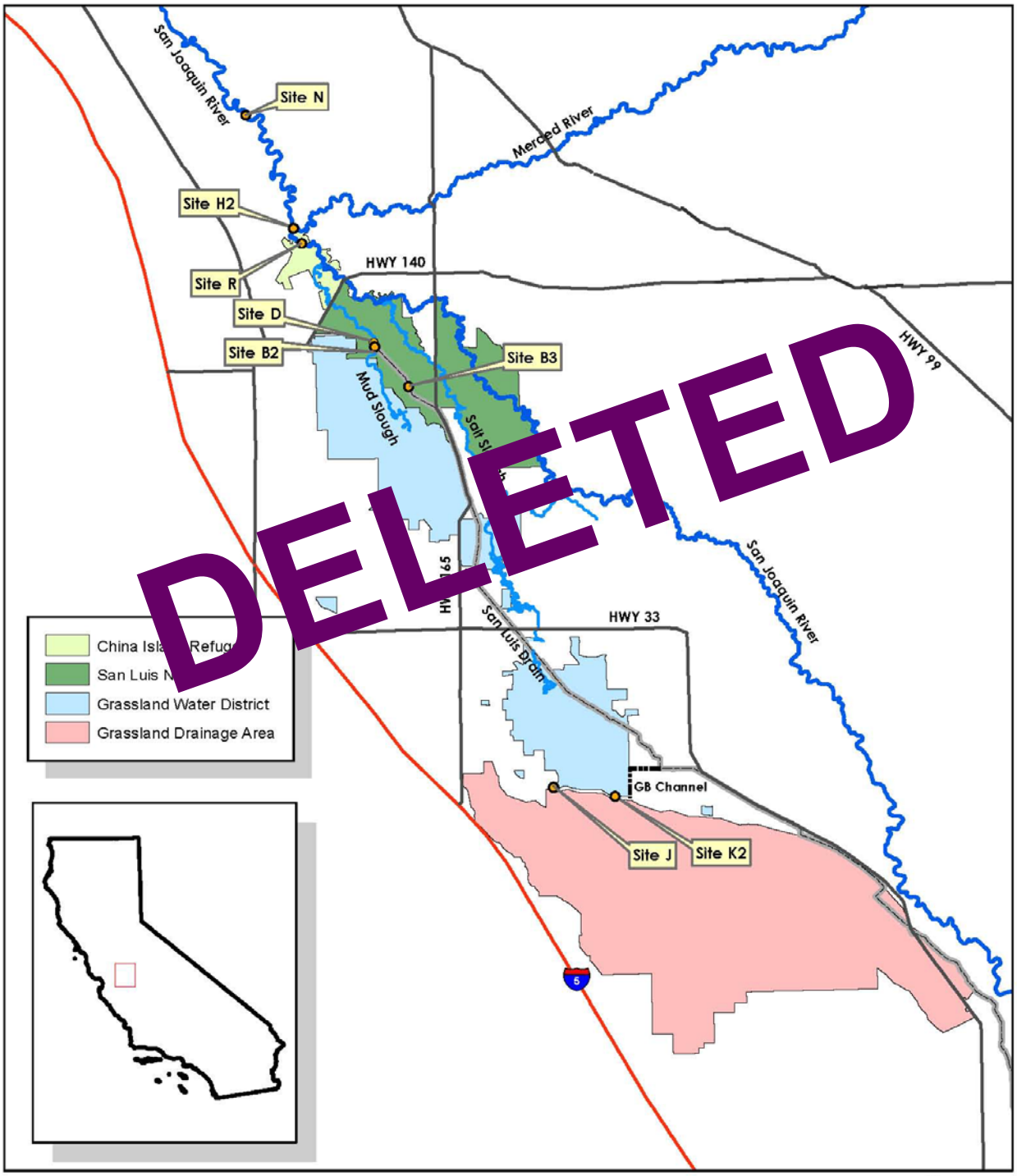
~~Phase I of the GBP went into operation in 1996 and Waste Discharge Requirements (WDRs) were first issued in 1998. Updated WDRs for Phase II of the GBP were adopted in 2001.Since then the board has adopted general waste discharge requirements under the Irrigated Lands Regulatory Program (ILRP), which include provisions related to surface water discharges from irrigated lands. This update of the Order incorporates changes to the Basin Plan, modifications to the GBP (Phase III) and elements of other ILRP WDRs.~~



Grassland Bypass Project

2014 Monitoring and Reporting Plan Sites

0 2.5 5 10 Miles

N W E S

Grassland Bypass Project
NAD 1983 California Zone 10
U.S. Bureau of Reclamation

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Figure 2: Map of Grassland Bypass Project and Grassland Area Farmers
(from Grassland Bypass Project Annual Report 2008-2009)

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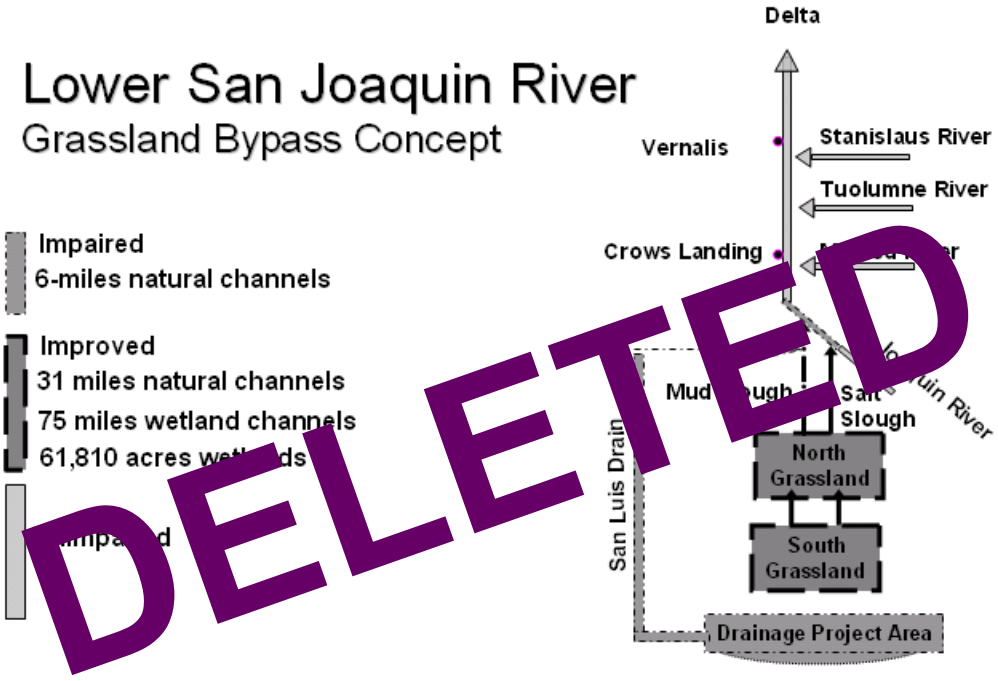
Subsurface agricultural drainage from approximately 38,700 acres in the Grassland Drainage Area is routed to the Drain through the Grassland Bypass Channel. From there, it travels 28 miles to the Drain's terminus and discharges to Mud Slough (north). During most of the year, the discharge primarily consists of subsurface agricultural drainage that is high in salts, selenium, boron, and other constituents. that naturally occur in the soil. The GBP is also designedrequired to handle local stormwater runoff. The San Luis Drain has been blocked above the Grassland Bypass Channel at Check 19Russell Avenue to prevent the introduction of other flows.

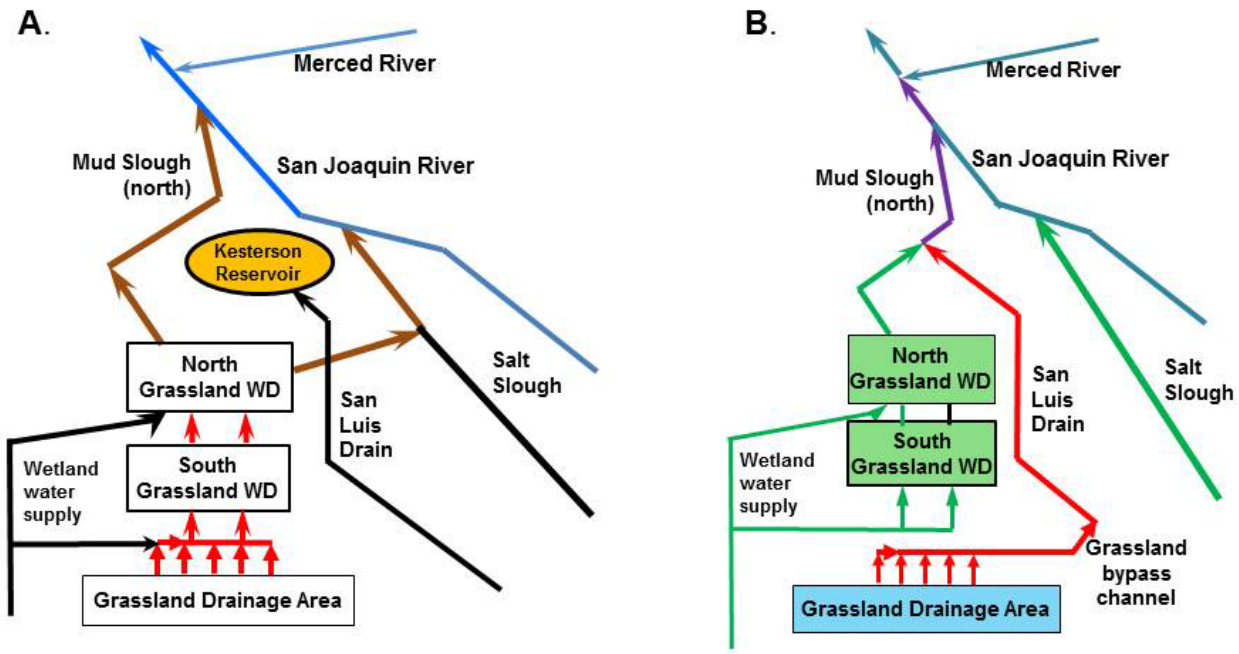
The GBP discharges the subsurface drainage to Mud Slough (north) at a point six miles upstream of the San Joaquin River confluence. Historically, this subsurface agricultural drainage reached the San Joaquin River via Mud Slough (north) or Salt Slough, but was routed through various channels in the Grassland Water District (GWD). These channels were also used to supply water to wetlands within the GWD. The dual use of the channels as both drainage and supply canals limited the ability to provide good quality water to the wetlands. The GBP removes the GDA subsurface agricultural drainage and routes it around the wetland areas using several ditches and a portion of the Drain. Figure 3 shows the conceptual model for the GBP.

When the GBP began, it was known that a 6-mile portion of Mud Slough would be impaired for a time in exchange for permanent improvement of the water supply channels serving wetlands. The GBP temporarily allows drainage to exit the basin, progressively decreasing loads of selenium while management practices to control selenium and adequate in-basin drainage management facilities were developed. The performance goals and time schedules to achieve the selenium water quality objectives for the San Joaquin River were incorporated as part of the Basin Plan. This Order allows for the implementation of further practices and treatment to meet the water quality objectives stated in the Basin Plan.

Figure 34: GBP Conceptual Model



: Water flow before (A) and after (B) Grassland Bypass Project implementation



During major storm events, general surface runoff and stormwater flows may exceed the 150 cfs capacity of the Grassland Bypass Channel. ~~It is not possible during these major events to separate agricultural drainage from surface runoff and stormwater flows.~~ During these major events, all of the commingled surface runoff, storm water flows and any subsurface agricultural drainage may be diverted temporarily to the Grassland Water District channels, ditches and sloughs that carried drainage water and stormwater runoff to the San Joaquin River prior to the GBP implementation. The procedures and monitoring required for such an event are outlined in "*A Storm Event Plan for Operating the Grassland Bypass Project*"[4] and in revised Monitoring and Reporting Program Order WDR 5-01-234[5], and further detailed in section IV.9 of the MRP Order.

~~**IV. History of the Grassland Bypass Project**~~

~~*Phase I*~~

III. ~~The original GBP proposal had a maximum of 5-years for use of~~Organization and Responsibilities

The GBP Order regulates the discharge of agricultural subsurface drainage and stormwater from the Grassland Drainage Area, to tributaries of the San Joaquin River. The waste discharge requirements are issued to the Bureau and the Water Authority. Discharge limits apply to the discharge at the terminus of the San Luis Drain, as well as receiving water limitations in Mud Slough (north) and the San Joaquin River.

The GDA Order is issued to growers that operate commercial irrigated lands, and regulates the discharges to groundwater from the leaching of irrigation water past the tile drains for those areas that use a subsurface drainage system; irrigation water from agricultural lands not tile drained; and stormwater percolating through saturated soil during major storm events. The GDA Order is similar to other ILRP general orders and contains receiving water limitations for groundwater.

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[4] The Storm Event Plan was approved on 25 August 1997 by ~~GAF~~GDA farmers and the Water Authority.
[5] The process for the storm event notifications was incorporated in the revised MRP approved on.7 September 2001.

A. Grassland Bypass Project Order (GBP Order)

The Water Authority, a ~~portion of the Drain to convey subsurface drainage through the GWD and adjacent area. The original~~joint powers agency organized pursuant to the California Government Code Section 6500 *et seq.*[6], represents its member districts that participate in the GBP. Seven contiguous member districts[7] of the Water Authority are located within the GDA. These districts supply or transport irrigation water and/or manage subsurface drainage within the GDA. The Water Authority and these districts have signed the Grassland Basin Drainage Management Activity Agreement (Activity Agreement) that allows the districts to implement the actions and monitoring necessary for compliance for the past and proposed GBP Order. The member districts have formed the Grassland Basin Drainage Steering Committee (Steering Committee) to operate the GBP and the member districts work with their growers to control the release of selenium and other constituents from the GDA.

For the GBP, a number of participating organizations, besides the Bureau, Water Authority and Central Valley Water Board, are involved in committees for GBP data collection, monitoring, and reporting: U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service, U.S. Geological Survey, National Marine Fisheries Service, California Department of Fish and Wildlife.

1. Use Agreement for the San Luis Drain

The GBP was implemented through an "Agreement for Use of the San Luis Drain"[8] between the Bureau and the ~~Authority for the period of~~
Water Authority. The Bureau, the owner of the San Luis Drain, allows the Water Authority, the operator, the use of the San Luis Drain to separate unusable agricultural drainage water discharged from the GDA from wetland water supply conveyance channels, and to facilitate drainage management that maintains the viability of agriculture in the GDA and promotes continuous improvement in water quality in the San Joaquin River. The Use Agreement sets the conditions for use of the San Luis Drain to transport subsurface drainage as listed below:

- the Water Authority is responsible for the operation and maintenance of the San Luis Drain, including preventing drainage flow south of Check 19[9]
- the Water Authority is responsible for ensuring only drainage water from the GDA enters the San Luis Drain and that such drainage water is controlled and monitored to ensure the quality and composition
- maximum rate of flow in the San Luis Drain shall be 150 cfs
- protection of China Island Wildlife Area in coordination with California Department of Fish & Wildlife Service

There have been three use agreements between the Bureau and the Water Authority since 1996:

- 1996 Use Agreement[10] (1 October 1996 to 30 September 2001~~(~~, Water Years[11] 1997 to 2001). A Finding of No Significant Impact was adopted by the Bureau for the original project.

~~In 1996 the Central Valley Regional Water Quality Control Board (Central Valley Water Board) amended the *Water Quality Control Plan, Third Edition, for the Sacramento and San Joaquin River* (Basin Plan) to~~

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[6] A joint powers authority is an entity whereby two or more public authorities (e.g., local governments, or utility or transport districts), may jointly exercise any power common to all of them. The joint power authority has separate operating boards of directors that can be given any of the powers inherent in all of the participating agencies.

[7] The districts are the Charleston Drainage District, Pacheco Water District, Panoche Drainage District, Broadview Water District, Firebaugh Canal Water District, Widren Water District, and the Camp 13 Drainage District. Broadview Water District and Widren Water District remain within the GDA boundaries but no longer participate in or discharge to the GBP.

[8] ~~Agreement No. 6-07-20-21319~~

[9] North of Check 19 is where the Grassland bypass channel enters the San Luis Drain.

[10] Agreement No. 6-07-20-21319.

[11] A water year is defined as a 12 month time period from 1 October of one year to 30 September of the next. The water year is designated by the calendar year in which it ends (the year within which 9 of the 12 months fall).

~~address selenium in the San Joaquin River, Salt Slough, and Mud Slough. The amendment indicated that WDRs would be used to regulate discharges and included time schedules, performance goals and water quality objectives. The control actions were designed to achieve the following in the order of priority:~~

1. ~~Separate subsurface agricultural drainage containing high levels of selenium from sensitive wildlife areas.~~
2. ~~Obtain compliance with selenium water quality objectives in the San Joaquin River downstream of the Merced River confluence.~~
3. ~~Obtain compliance with the selenium objectives in Mud Slough downstream of the San Luis Drain outfall and in the San Joaquin River from its confluence with Mud Slough to the confluence with the Merced River.~~

~~The first goal was achieved through the implementation of the GBP and is reinforced by a prohibition of discharge in the WDRs for the project. The second goal has been achieved through selenium load reduction measures implemented by the Grasslands Area Farmers – Salt Slough and the stretch of the San Joaquin River downstream of the Merced is no longer listed as impaired by selenium. The third goal has not yet been achieved. However, this Order and the Basin Plan requires that the third goal be met by 2019.~~

~~The Central Valley Water Board issued WDR 98-171 on 24 July 1998 for Phase I of the GBP. The WDRs established selenium discharge load values (pounds of selenium monthly and annually) that resulted in a 15 percent reduction from the average historical load to the San Joaquin River by the 5th year. Additional reductions in the selenium load were required to continue improvements to the San Joaquin River water quality and meet selenium requirements in the 1998 Basin Plan.~~

~~WDR 98-171 also required an annual update of the long-term Drainage Management Plan (LTDMP) that would include a summary of achievements of the water quality objectives in the Basin Plan and set in the WDR. Any plans and activities for long-term drainage management by the Grassland Area Farmers to meet the water quality objectives were discussed and goals were established. Any developments impacting the efforts of the Grassland Area Farmers were also discussed.~~

~~*Phase II*~~
~~A new Use Agreement[12] between the Bureau and Authority was completed on 28 September 2001 following the completion of a Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR)[13]. Phase II covers a period from 1 October 2001 to 31 December 2009. During this period, the GBP was regulated by WDR Order 5-01-234 issued on 7 September 2001. The Monitoring and Reporting Program (MRP) attached to the Order required monitoring for general parameters[14], selenium, boron, molybdenum, nitrates and aquatic toxicity testing at specific sites with set schedule and frequency. Stormwater monitoring was required during storm events when the GBP may not be able to accommodate all surface runoff, stormwater flows, and agricultural drainage water. The stormwater monitoring was required to determine the effect of GDA discharge diversion to Grassland and wetlands channels. The Order also included continued reporting of the LTDMP on an annual basis.~~

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~~[12] Agreement No. 01-WC-20-2075~~
~~[13] URS, 2001. *Grassland Bypass Project Environmental Impact Statement and Environmental Impact Report*. Final May 25, 2001. Prepared for U.S. Bureau of Reclamation, Sacramento and Fresno, CA. and San Luis & Delta-Mendota Water Authority, Los Banos, CA.~~
~~[14] General parameters included flow, pH, electrical conductivity and temperature.~~

[Selenium loads limits][15] [were established for discharge to the San Joaquin River and waste discharge requirements were used to control discharges of subsurface agricultural drainage from the Grassland Drainage Area. The compliance timetable gave the Dischargers deadlines to meet the selenium objective in the San Joaquin River and various channels, including Salt Slough and Mud Slough (north).][16] [There was also a prohibition of discharge effective 1 October 2010 for subsurface agricultural drainage discharges unless selenium water quality objectives were being met.]

[The GBP was in compliance with applicable objectives in most channels addressed in the Basin Plan, but was unable to fully manage all agricultural subsurface drainage to meet the water quality objective for Mud Slough (north) and the San Joaquin River above the Merced River confluence by the 1 October 2010 deadline. The GBP operators believed the project area would achieve full control of agricultural subsurface drainage if additional time beyond the set compliance date was granted to allow time to obtain funding and develop technology to reduce selenium loads.][17]

[Phase III]

- [The]2001 Use Agreement[18] (1 October 2001 to 31 December 2009) following the completion of a Final Environmental Impact Statement/Environmental Impact Report (EIS/EIR)[19].

2009 Use Agreement[20] (1 January 2010 through 31 December 2019).The Water Authority and Bureau prepared an Environmental Impact Statement/Environmental Impact Report (EIS/EIR) [for Phase III of the GBP][21] [that] was finalized in August 2009.[22] [A new Use Agreement for the continued use of the San Luis Drain was signed for the period of 1 January 2010 through 31 December 2019.][23] [The Central Valley], when the Water [Board passed amendments to the Basin Plan][24] [to: 1) extend the date for meeting the selenium objective in Mud Slough (north) and the San Joaquin River above the Merced River to 31 December 2019; and 2) revised the compliance time schedule located in chapter IV (implementation chapter) of the Basin Plan for Agricultural Drainage Discharges in the San Joaquin River Basin and its accompanying narrative description in Regional Board Prohibitions, section 6.c.]

[This Order implements the WDRs for Phase III of the GBP. New features in Phase III include in-valley treatment drainage reuse at the San Joaquin River Quality Improvement Project (SJRIP) facility; utilizing and installing drainage recycling system to mix subsurface drain water with irrigation supplies under strict]

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[15] [Load limits for selenium were based on water year classification established using the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification (as defined in Footnote 17 for Table 3 in the State Water Resources Control Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, May 1995) at the 75% exceedance level using data from the Department of Water Resources Bulletin 120 series. The previous year's classification will apply until an estimate is made of the current water year.]

[16] [Salt Slough and the wetland channels had a deadline of 10 January 1997 to meet 2 µg/L selenium, monthly mean; Mud Slough (north) and the San Joaquin River from Sack Dam to the Merced River had a 1 October 2010 deadline to meet 5 µg/L (4-day average); and the San Joaquin River below the Merced River (above normal and wet water years) a deadline of 1 October 2005 at 5 µg/L (4-day average), with critical, dry and below normal water years a deadline of 1 October 2010 at 5 µg/L (4-day average).]

[17] [Stated in ES2 Project Purpose and Need of the EIS/EIR for Phase III. See next section for more information.]

[18] Agreement No. 01-WC-20-2075

[19] URS, 2001. *Grassland Bypass Project Environmental Impact Statement and Environmental Impact Report*. Final May 25, 2001. Prepared for U.S. Bureau of Reclamation, Sacramento and Fresno, CA. and San Luis & Delta-Mendota Water Authority, Los Banos, CA.

[20] Agreement No. 10-WC-20-3975, finalized 17 December 2009.

[21] Entrix, 2009. *Grassland Bypass Project, 2010-2019, Environmental Impact Statement and Environmental Impact Report.* Final August 2009. Concord, CA. Prepared for: U.S. Bureau of Reclamation, South Central California Office and Mid-Pacific Region; and San Luis & Delta-Mendota Water Authority, Los Banos, CA.

[22] [Entrix, 2009. *Grassland Bypass Project, 2010-2019, Environmental Impact Statement and Environmental Impact Report.* Final August 2009. Concord, CA. Prepared for: U.S. Bureau of Reclamation, South Central California Office and Mid-Pacific Region; and San Luis & Delta-Mendota Water Authority, Los Banos, CA.]

[23] [Agreement No. 10-WC-20-3975, finalized 17 December 2009.]

[24] [Resolution No. R5-2010-0046, Amending the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Selenium in the Lower San Joaquin River Basin, 27 May 2010.]

~~limits; continuing current land retirement policies; an active land management program to utilize subsurface drainage on salt-tolerant crops; and a no-tailwater policy to prevent silt from being discharged into the Drain. Discussion of these elements is in section V.~~

- ~~The~~ Authority certified the document and Bureau adopted its Record of Decision[25] to continue the GBP. The third Use Agreement ~~and WDRs specified load reductions for selenium and salinity with values expressed in annual and monthly load objectives. It should be noted that the selenium load values were designed to meet the total maximum daily limit (TMDL) for the San Joaquin River by 2015.[26] The GDA is the major contributor for selenium in the San Joaquin River Basin.[27] The WDR selenium performance goal is 15 µg/L (monthly mean) by 31 December 2015 in Mud Slough (north) and the San Joaquin River from the Mud Slough confluence to the Merced River. The selenium water quality objective for the same locations is 5 µg/L (4-day average) by~~terminates the contract to use the San Luis Drain on 31 December 2019.

The last two Use Agreements ~~between the Bureau and Authority also incorporated a performance incentive system in which GAF is assessed fees if selenium and/or salinity load reduction goals~~include salt load limits as well selenium load limits, as well as financial incentives so that if load limits are not met~~., T~~then "fees" are ~~used~~paid by the GDA growers to a fund dedicated for projects approved by the Oversight Committee[28]. Fees are calculated by the Bureau of Reclamation for the attributable discharge for each year and month.

~~The 2009 Use Agreement provides "Incentive Fee Credits" when annual and monthly discharges are more than 10 percent below the respective load values specified in the tables for selenium and salinity. These incentive credits may be applied against future monthly or annual exceedances through December 2017. These "credits" apply to the Use Agreement between the Bureau and Authority, but are not part of this Order. Such credits could not be applied in a manner that would negate a violation of the limits in this Order.~~

~~The Use Agreements~~The annual selenium load values are designed to meet the total maximum daily load (TMDL) for the San Joaquin River in all water year types by water year 2011.[29] The current Use Agreement provides for project termination if annual selenium loads from the GBP exceed certain values. Figure 4[5] shows the annual selenium loads required by the water year type (critical, below normal, above normal and wet) with the corresponding negotiated values for termination of the project.[30] The graph shows a decrease in the annual selenium loads for each water year type until 201[8]9 when the current Use Agreement expires, and by when selenium loading ~~will~~must comply with the water quality objectives and TMDL requirements.

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[25] Bureau of Reclamation, 18 December 2009, Record of Decision Grassland Bypass Project, 2010-2919.

[26] ~~Selenium load limits have been met for the San Joaquin River below the confluence with the Merced River. The selenium objectives in Mud Slough (north) have not been met.~~

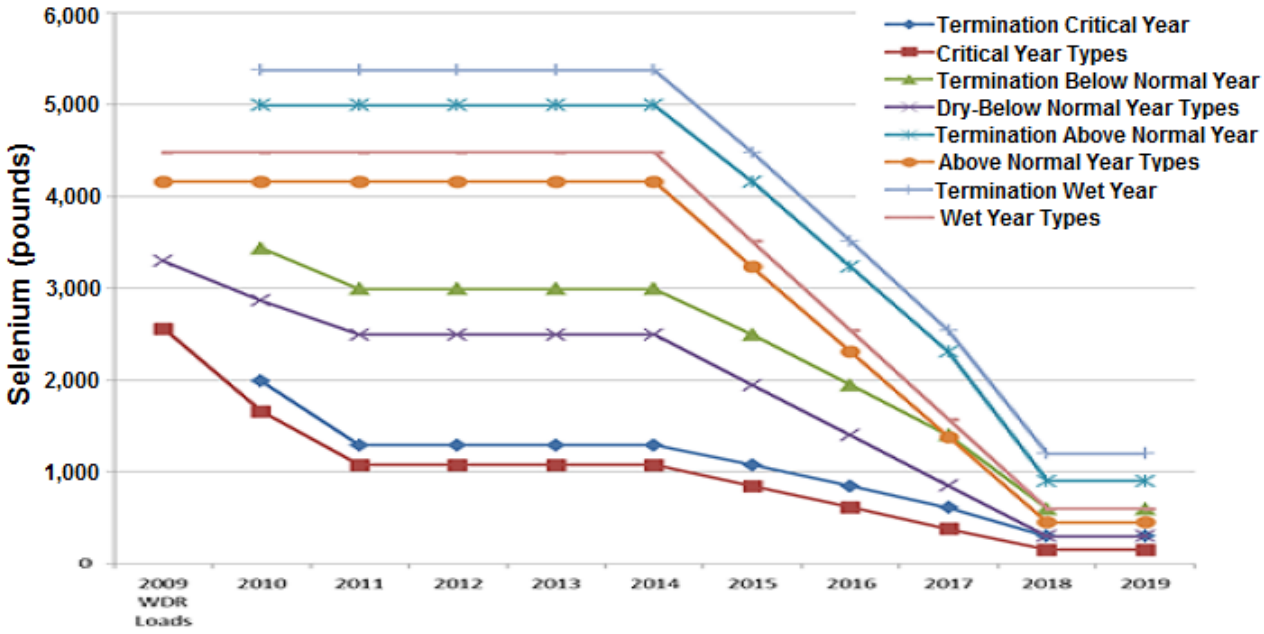
[27] ~~Chilcott, J.E., 1988, *Water Quality of Tile Drainage Discharges in the San Joaquin River Basin*, Regional Water Quality Control Board, Central Valley Region, Staff Report. October, 1988.~~

[28] The Oversight Committee is made up of representatives from the Bureau, USFWS, CDFW, USEPA and the Central Valley Water Board. Among the Oversight Committee's duties, as defined in the Use Agreement, is to review progress and operation of the project including drainage reduction goals, progress in achieving water quality objectives, monitoring data, etc. The Oversight Committee makes recommendations to other parties, as appropriate, regarding all aspects of the project, including modifications to project operation, appropriate mitigative actions, and termination of the Agreement if necessary.

[29] Selenium load limits have been met for the San Joaquin River below the confluence with the Merced River. The selenium water quality objectives in Mud Slough (north) have not been met.

[30] The Oversight Committee may overrule the termination if it finds, after consultation with other parties, the Water Authority has shown the exceedance was caused by unforeseeable and uncontrollable events.

Figure ~~45.~~: Use Agreement Annual Selenium Loads and Termination Loads by Water Year Type



Each Use Agreement also includes extensive biological monitoring and water quality monitoring beyond monitoring requirements in the previous and proposed GBP WDRs. The EIS/EIR requires a program for monitoring and reporting of mitigation measures that are the responsibilities of the lead agencies (the Dischargers) to implement. The Dischargers describe the status of the mitigation measures stated in the Use Agreement and in the Record of Decision (ROD) for the EIS/EIR through published annual reports.

2. Water Board Involvement

In 1988, the Central Valley Water Board adopted an amendment to the *Water Quality Control Plan, Third Edition, for the Sacramento and San Joaquin River* (Basin Plan) establishing a selenium control program. Some improvements in water quality in the San Joaquin River resulted, but selenium levels in the wetland water channels did not improve.

In 1992, the U.S. Environmental Protection Agency promulgated 5 µg/L as the water quality standard for selenium in the San Joaquin River and its tributaries. In November 1995, the Central Valley Water Board received a letter from the Water Authority, U.S. EPA and U.S. Fish and Wildlife Service (commonly referred to as the Consensus Letter) recommending adoption of a Basin Plan amendment that would develop a long-term strategy to achieve compliance with the selenium water quality objectives for the San Joaquin River and its tributaries, and that the Central Valley Water Board issue waste discharge requirements to implement the strategy. The Consensus Letter also contained recommendations for specific numerical monthly and annual discharge limits which would provide for measurable reduction in selenium load.

In 1996 the Central Valley Water Board amended the Basin Plan to address selenium in the San Joaquin River, Salt Slough, Mud Slough, and wetland supply channels in the Grassland watershed. The amendment indicated that WDRs would be used to regulate discharges to surface water and included time schedules, performance goals and water quality objectives. The control actions were designed to achieve the following in the order of priority:

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Separate subsurface agricultural drainage containing high levels of selenium from sensitive wildlife areas.

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~~A. Project Management~~

~~The Authority represents the collection of local drainage and water districts that operate the GBP. The Bureau and the Authority are the responsible parties for the GBP.~~

~~A number of participating organizations, besides the Bureau, Authority and Central Valley Water Board, are involved in the GBP data collection, monitoring, and reporting. These participants include:~~

- ~~U.S. Environmental Protection Agency (USEPA)~~
- ~~U.S. Fish and Wildlife Service (USFWS)~~
- ~~U.S. Geological Survey (USGS)~~
- ~~National Marine Fisheries Service (NMFS)~~
- ~~California Department of Fish and Wildlife (CDFW)~~

~~To assist the Bureau and Authority, several committees and teams of private, State and Federal agencies are directly involved in aspects of the GBP by providing technical, advisory, and policy review and oversight. These include:~~

~~*Oversight Committee*~~

~~The Oversight Committee was created in Phase II and consists of representatives from the Bureau, USFWS, CDFW, USEPA and the Central Valley Water Board. The Oversight Committee role is to evaluate overall operations of the GBP, assess monetary charges to the Authority for selenium loads exceeding those specified in the Use Agreement, and to act on other issues brought to them by the Technical and Policy Review Team (TPRT) and/or the public.~~

~~*Technical and Policy Review Team (TPRT)*~~
~~The Technical Policy Review Team (TPRT) assists the Oversight Committee with technical issues. TPRT members include a representative the Bureau, the Central Valley Water Board, CDFW, NMFS, USFWS, and USEPA. A representative from the USGS serves as an independent technical advisor. Responsibilities of the TPRT include the review and analysis of analytical data and reports, and obtaining appropriate peer or scientific review as necessary.~~

~~*Data Collection and Reporting Team (DCRT)*~~
~~The Data Collection and Reporting Team (DCRT) members are agency representatives and contractors collecting, verifying, and reporting GBP data. The DCRT coordinates monitoring activities and address issues and concerns regarding data collection, data management, and quality assurance/quality control.~~

~~*Quality Control Officer*~~

1. ~~A Bureau representative serves as the quality control officer, working~~[31]
2. Obtain compliance with selenium water quality objectives in the San Joaquin River downstream of the Merced River confluence.[32]
3. Obtain compliance with the selenium objectives in Mud Slough downstream of the San Luis Drain outfall and in the San Joaquin River from its confluence with Mud Slough to the confluence with the Merced River.[33]

The first goal was achieved through the implementation of the GBP and is reinforced by a prohibition of discharge in the GBP WDRs for the project. The second goal has been achieved through selenium load reduction measures implemented by the GDA growers – Salt Slough and the stretch of the San Joaquin River downstream of the Merced are no longer listed as impaired by selenium. The third goal has not yet been achieved, although compliance with the selenium objectives in Mud Slough and in the River are met in some months. The GBP Order and the Basin Plan require that the third goal be met by 31 December 2019.

In 1998, the Central Valley Water Board issued WDR 98-171 for the GBP to the Water Authority[34] and the Bureau (Dischargers). The Monitoring and Reporting Program (MRP) 98-171 required that the Dischargers monitor and report as described in *Compliance Monitoring Program for Use and Operations of the Grassland Bypass Project*[35]. MRP 98-171 also included monitoring for molybdenum at specific locations[36], monitoring during storm events[37], and set discharge limits for selenium monthly and annual loads as stated in the Consensus Letter for the 1998 Order. The 1998 Order also required the annual reporting of the Long-term Drainage Management Plan (LTDMP) that would address activities related to management of subsurface drainage from 1 October 2001 to the time the discharges are in compliance with the Basin Plan.

During the five-year period the 1996 Use Agreement was in effect, the Use Agreement required a 15 percent reduction of selenium from the average historical load to the San Joaquin River by the 5th year, however in the subsequent Use Agreements additional reductions in the selenium load were required to

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[31] Water quality objectives for Salt Slough and wetland water supply channels listed in Appendix 40 are a 2 µg/L monthly mean.
[32] Basin Plan water quality objectives for selenium are 12 µg/L (maximum concentration) and 5 µg/L (4-day average) in the San Joaquin River from the mouth of the Merced River to Vernalis.
[33] Basin Plan water quality objectives for selenium in Mud Slough (north) and the San Joaquin River from Sack Dam to the Merced River have a 5 µg/L 4-day average.
[34] The San Luis & Delta-Mendota Water Authority is a joint powers agency organized pursuant to the California Government Code Section 6500 *et seq*.
[35] Dated September 1996 and required as part of Use Agreement No. 6-07-20-21319.
[36] Molybdenum was added for Sites B, C and D on a monthly basis.
[37] Selenium samples collected and flow to be measured for all discharge sites (J, K, L2 and M2,) as well as Sites F and D.

continue improvements to the San Joaquin River water quality and meet selenium requirements in the 1998 Basin Plan.

WDR 5-01-234 was issued in 2001.[38] MRP 5-01-234 attached to the 2001 GBP Order specified monitoring for general parameters[39], selenium, boron, molybdenum, nitrates and aquatic toxicity testing at specific sites with set schedule and frequency. Stormwater monitoring was required during storm events when the GBP may not be able to accommodate all surface runoff, stormwater flows, and agricultural drainage water. The stormwater monitoring was required to determine the effect of GDA discharge diversion to Grassland and wetlands channels. ~~cooperating agencies to verify, validate, coordinate and update the quality~~ The GBP Order also included continued reporting of the LTDMP on an annual basis.

Selenium loads limits[40] were established for discharge to the San Joaquin River and waste discharge requirements were used to control discharges of subsurface agricultural drainage from the GDA. The compliance timetable gave the Dischargers deadlines to meet the selenium objective in the San Joaquin River and various channels, including Salt Slough and Mud Slough (north).[41] There was also a prohibition of discharge effective 1 October 2010 for subsurface agricultural drainage discharges unless selenium water quality objectives were being met.

~~activities~~In 2004, a Basin Plan amendment for the control of salt and boron in the San Joaquin River was adopted by the board. The amendment includes allocations of salt loads for the Grassland watershed.

In 2010, the Basin Plan was amended to extend the compliance dates for the selenium objective in Mud Slough (north) and the San Joaquin River upstream of the Merced River from 2010 to 2019. With that amendment, the board recognized that, despite the best efforts of the GDA growers and districts in significantly reducing selenium loads, there was just not enough dilution to meet objectives in the receiving waters and additional time was needed to implement solutions.

Since the 2001 GBP Order, the ILRP was initiated in the Central Valley to monitor and evaluate the effect irrigated agriculture has on surface water quality; requirements for groundwater were added to ILRP Orders starting with 2012. Waste discharge requirements to groundwater in the Grassland Drainage Area will be covered by the ILRP in the GDA Order.

B. Grassland Drainage Area Order (GDA Order)

In the GDA Order, the Steering Committee is recognized by the board as a third-party entity to represent the GDA growers under the umbrella of the Water Authority[42]. The Steering Committee, using the Activity

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[38] WDR 5-01-234 was 7 September 2001.
[39] General parameters included flow, pH, electrical conductivity and temperature.
[40] Load limits for selenium were based on water year classification established using the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification (as defined in Footnote 17 for Table 3 in the State Water Resources Control Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, May 1995) at the 75% exceedance level using data from the Department of Water Resources Bulletin 120 series. The previous year's classification will apply until an estimate is made of the current water year.
[41] Salt Slough and the wetland channels had a deadline of 10 January 1997 to meet 2 µg/L selenium, monthly mean; Mud Slough (north) and the San Joaquin River from Sack Dam to the Merced River had a 1 October 2010 deadline to meet 5 µg/L (4-day average); and the San Joaquin River below the Merced River (above normal and wet water years) a deadline of 1 October 2005 at 5 µg/L (4-day average), with critical, dry and below normal water years a deadline of 1 October 2010 at 5 µg/L (4-day average).
[42] In this case, the Grassland Basin Drainage Management Activity Agreement (Activity Agreement) between the water and irrigation districts in the GDA and the San Luis & Delta-Mendota Authority allows the Steering Committee, a separate entity under the joint powers authority, to represent the GDA farmers as participants in the ILRP. The GDA farmers must apply to join the GDA Groundwater Quality Special Project, an activity that will be part of the Activity Agreement, which would allow the Steering Committee to represent the GDA farmers and implement the monitoring and reporting required for the GDA

Agreement which allows outside parties to participate in projects, will implement a GDA Groundwater Quality Special Project that will allow the GDA growers to join as participants. The Steering Committee will assist the farmers of irrigated lands in the GDA in complying with the relevant terms and provisions of the GDA Order, including required monitoring and reporting.

1. GDA Grower Enrollment Process

GDA growers will have approximately five months after the GDA Order adoption to submit a completed application for membership under the GDA Groundwater Quality Special Project to the Steering Committee and will be notified when their membership is approved.

Growers that do not enroll within the allowable timeframe, or are prompted to apply due to Central Valley Water Board enforcement or inspection, will be required to submit (1) a Notice of Intent (NOI) to comply with the terms and conditions of the Order to the Central Valley Water Board, (2) an administrative processing fee for the increased workload associated with the ~~project~~grower outreach (as applicable), and (3) an application for membership under the GDA Groundwater Quality Special Project to the Steering Committee. These additional steps of submitting an NOI and fee directly to the board after the initial enrollment deadline are intended to provide an incentive for growers to enroll promptly. Board staff will provide the Steering Committee with a courtesy copy of the NOA when issued to the grower, so the Steering Committee has confirmation that their grower has received regulatory coverage under the Order.

By 31 July 2016 and every year thereafter the Steering Committee will provide a Membership List to the Central Valley Water Board. The Membership List will specify growers in good standing as well as revoked memberships or pending revocations. The Membership List will also aid in identifying and reaching out to new owners in the case of ownership change. Because pending and revoked memberships could be associated with grower non-compliance with the GDA Order, this type of information is key for the board to prioritize follow-up activities. Board staff will conduct enforcement activities as needed using the list of revoked/pending revocations.

~~V.~~IV. Surface Water Monitoring History of GBP

Initial selenium compliance monitoring for the GBP started in 1995 and was performed by the Central Valley Water Board until 2011, when the Bureau assumed these duties. Monthly, quarterly, and annual reports are posted for all GBP monitoring on the San Francisco Estuary Institute (SFEI) website at http://www.sfei.org/~~Project~~gbp/reports~~.~~ .

~~While selenium is the primary concern, the drainage also contains boron, molybdenum, high levels of salts and other constituents that can impact receiving waters. The Basin Plan contains numerical objectives for boron and molybdenum as well as narrative water quality objectives that apply to this water body. Table 1 shows the numerical objectives for selenium, boron and molybdenum for Mud Slough (north) and the San Joaquin River at various points.~~

~~Table 1: Selenium, Boron and Molybdenum Numerical Objectives~~

~~Constituent~~	~~Monthly Mean~~	~~Maximum~~	~~Location~~
~~Selenium~~	~~20 µg/L~~	~~5 µg/L 4-day average~~	~~Mud Slough (north) and the San Joaquin River from the Mud Slough confluence to the Merced River~~

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Order. This situation parallels the authority of the Westside Coalition Group under the umbrella of the San Joaquin Valley Drainage Authority.

	12 µg/L	5 µg/L 4-day average	San Joaquin River, mouth of the Merced River to Vernalis
Boron	0.8 mg/L (15 March-15 September) 1.0 mg/L (16 September - 14 March) 1.3 mg/L (Critical Year)	2.0 mg/L 2.8 mg/L	San Joaquin River, mouth of the Merced River to Vernalis
Molybdenum	19 µg/L	50 µg/L	Salt Slough, Mud Slough (north) and San Joaquin River from Sack Dam to mouth of Merced River
	10 µg/L	15 µg/L	San Joaquin River, mouth of Merced River to Vernalis

The lower San Joaquin River is 303(d) listed for salts. Effluent limits for salts are not in the waste discharge requirements for the GBP. The Basin Plan provisions for the *Control Program for Salt and Boron Discharges into the Lower San Joaquin River*[43] requires that the Dischargers must by 30 June 2014: 1) participate in a Central Valley Water Board approved real-time management program; or 2) submit a management plan that includes the elements identified in the Monitoring and Reporting Program Appendix MRP-1 and is designed to meet the Base Salt Load Allocations identified in Table IV-4.4, *Summary of Allocations and Credits*,[44] within the applicable compliance schedule for compliance in Table IV-4.3.[45] A real-time monitoring program is being used to measure and report flow and electrical conductivity as part of the Use Agreement monitoring program. It is expected that the selenium reduction in waste discharges will also result in boron and salt reduction.

Previous GBP monitoring sites targeted selenium concentrations from the GBP to determine compliance with selenium load limits set within the Use Agreements and the corresponding WDRs. Monthly load limits for selenium were also calculated based on the category of water year, historical monitoring data, the TMDL allocations, and required water quality objectives. Figure 56 shows the selenium discharged from the Grassland Drainage Area on an annual basis, with the limits set by the water year type. Water Year 2011 was a wet year that met the TMDL requirements for a dry-below normal year type.

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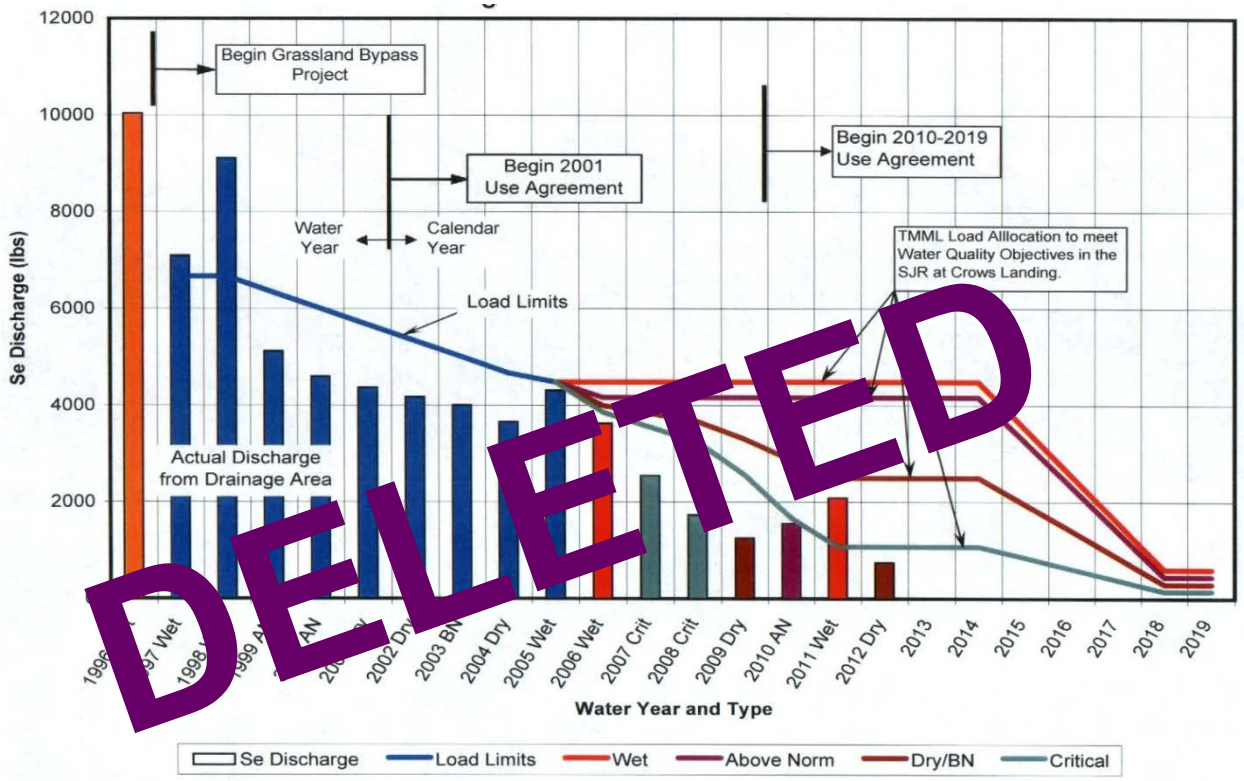
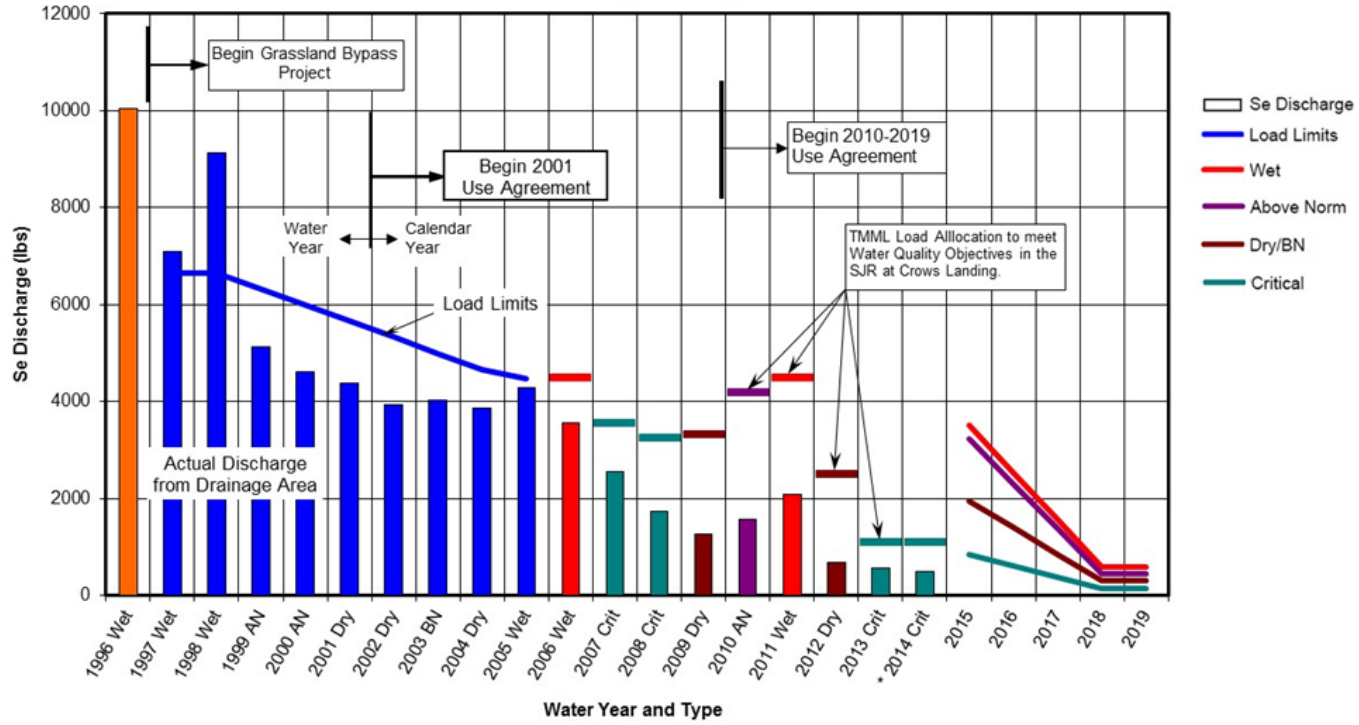
[43] Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, page IV-32.00
[44] *Ibid.*, page IV-32.04
[45] *Ibid.*, page IV-32.03

Figure ~~5~~6: Grassland Drainage Area – Selenium Discharge and Targets

~~From draft WY2010-WY2011 report (WY 2013 data has not been evaluated)~~





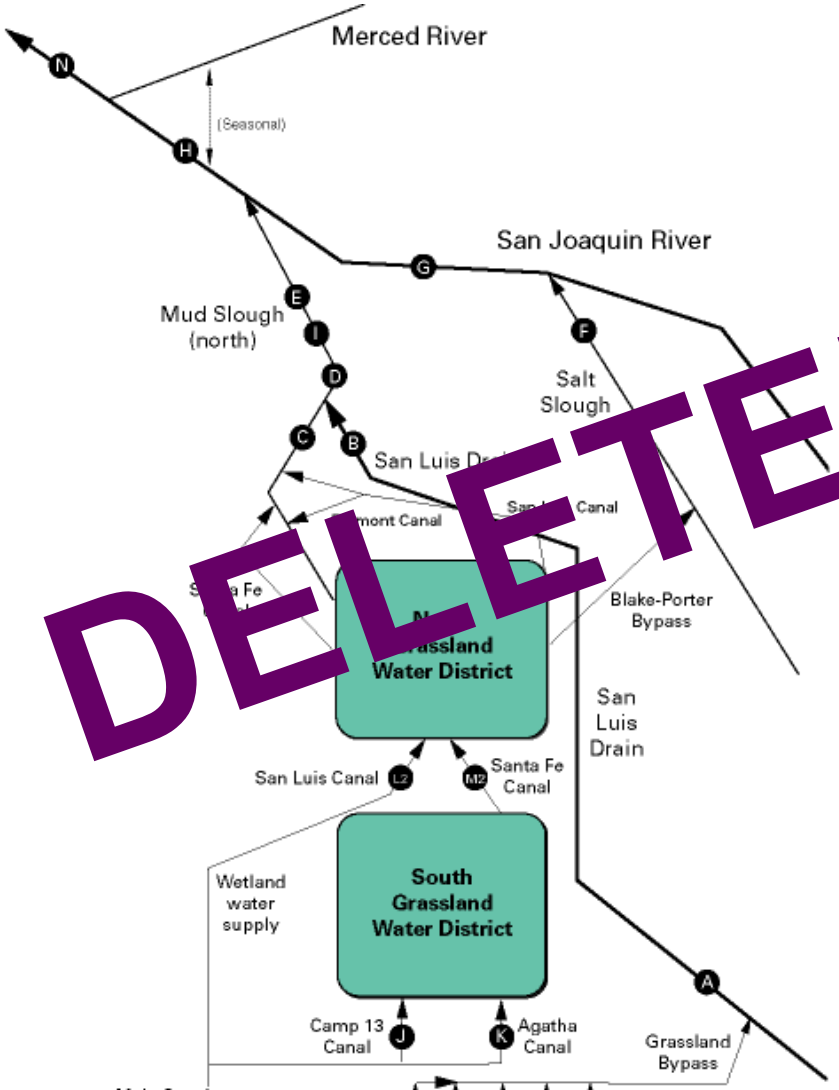
Historically, monitoring has consistently occurred at four areas with at least one monitoring location: 1) the San Luis Drain; 2) Mud Slough (north); 3) the wetlands channels; and 4) the San Joaquin River. The monitoring program has included sampling upstream and downstream sites (shown in Table ~~2~~3) to

determine selenium loading from the GBP and possible other contributors to the total selenium load. Selenium monitoring has historically occurred at Mud Slough (north) upstream of the [San Luis]Drain [discharge](Station C) to determine wetlands contribution; Mud Slough (north) downstream of the [San Luis]Drain (Station D) to determine total discharge from the GBP and wetlands to [the San Joaquin River]Station D; and the GBP contribution to the selenium load by sampling in the [San Luis]Drain before discharge to Mud Slough (Station B). San Joaquin River monitoring has occurred downstream of the Mud Slough discharge (Stations H and N) to determine the GBP's contribution to the river before and after confluence with the Merced River. Figure [6]7 is a schematic showing the location of these sites.

[Table 2: Historic Monitoring Sites in Phases I and II of the Project]

[Feature]	[Station]	[Description]
[San Luis Drain]	[B]	[San Luis Drain, upstream of discharge to Mud Slough (north)]
[Mud Slough (north)]	[C]	[Mud Slough (north) upstream of the San Luis Drain discharge.]
	[D]	[Mud Slough (north) downstream of the San Luis Drain discharge]
[San Joaquin River]	[H]	[San Joaquin River before confluence with Merced River]
	[N]	[San Joaquin River at Crows Landing; downstream of confluence with Merced River, upstream of Vernalis]

[Figure 6: Schematic of Past Monitoring Sites]



Additional monitoring sites under the Use Agreement included areas within the San Luis Drain (Station A), ~~in~~ Salt Slough ~~(Station F), in Mud Slough (north)~~and other wetlands water supply channels (Stations ~~E~~F, J, K, L2, M2), and ~~F), and~~ the San Joaquin River at Fremont Ford (Station G). These sites are still being monitored under the Use Agreement MRP, but on a less frequent schedule or during major storm events. Salt Slough monitoring was reduced since the Basin Plan selenium water quality objective[46] was ~~met in Phase II~~achieved and the channel has been delisted for selenium.

~~Past~~

Figure 7: Schematic of Past GBP Monitoring Sites

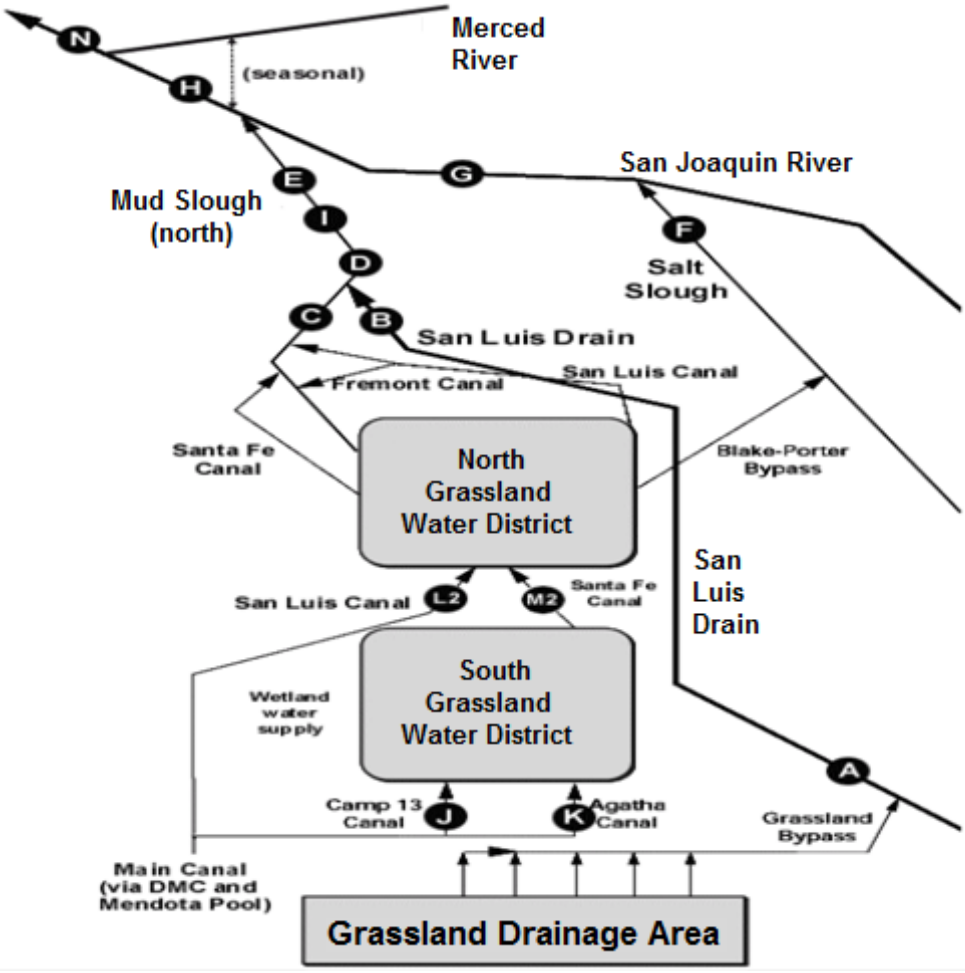


Table 3: Historic Monitoring Sites of the GBP

Feature	CEDEN Code	Station	Location	Latitude	Longitude
San Luis Drain	541MER562	A	Check 17	36.96658 N	-120.67063 W
	541SLDGCR	B3	Gun Club Road	37.23159 N	-120.87599 W
	541MER535	B2	SLD @ Terminus	37.25944 N	-120.90389 W
Mud Slough (north)	541MER536	C	Upstream of SLD Terminus	37.25417 N	-120.9069 W
	541MER542	D	Downstream of SLD	37.26389 N	-120.90611 W
	MSBWSI2	I2	Backwater below SLD	37 27241 N	-120.90975 W

[46] Water quality objective was 2 µg/L selenium (monthly mean) in Salt Slough and wetland water supply channels.

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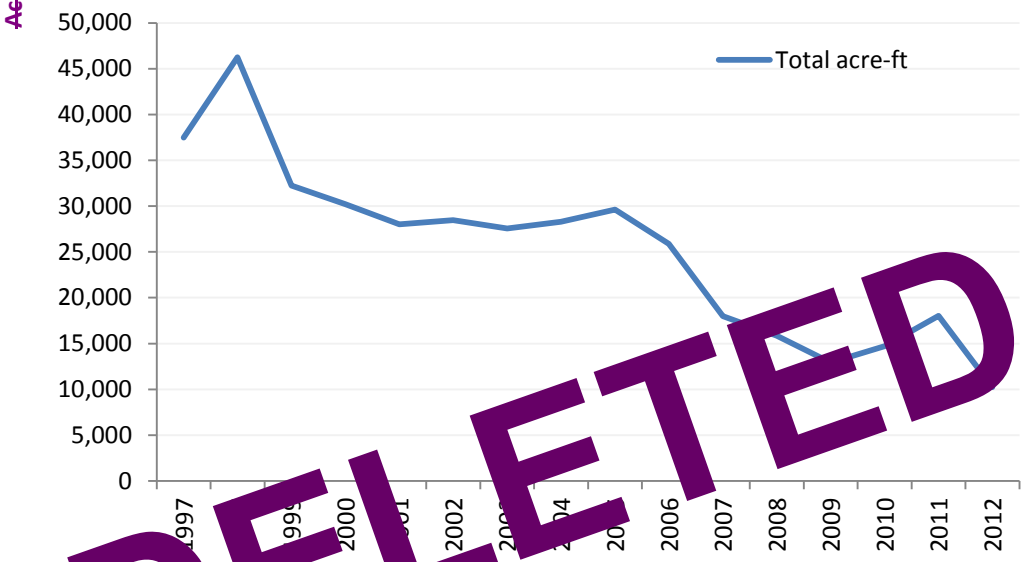
Wetlands channels (*storm only)	541MER531	F	Salt Slough @ Lander Ave	37 24861 N	-120.85111 W
		F2	Salt Slough in San Luis NWR	37 21765 N	-120.83147 W
	541MER505	J*	Camp 13 Drain, headworks	36.94083 N	-120.75611 W
	541MER506	K2*	Agatha Canal, headworks	36.93667 N	-120.70194 W
	541MER563	L2*	San Luis Canal upstream of Splits	37.09167 N	-120.82306 W
	541MER545	M2*	Santa Fe Canal @ Weir Rd	37.09889 N	-120.82667 W
	541MER538	G	Fremont Ford (upstream of Mud Slough confluence)	37.30944 N	-120.92917 W
	541STC512	H2	Above Merced River (Hills Ferry)	37.34250 N	-120.97222 W
	535STC504	N	Crows Landing	37.43149 N	-121.01341 W

A. Surface Water Monitoring Results

Past monitoring results are summarized in this section for the following parameters that are of concern: selenium, boron, molybdenum, salts (as indicated by electrical conductivity measurements~~), and aquatic toxicity. Figure 7 shows that~~). Since GBP implementation, the discharge from the ~~Grassland Drainage Area~~GDA has decreased significantly[47] ~~since GBP implementation.~~, and was 72% lower in 2012 compared to total flow in 1997 (Figure 8). The decrease in flow is likely due to the combined result of water delivery infrastructure improvements, irrigation system modernization, and reuse activities for subsurface drainage.

Figure ~~7~~8: ~~Total Flow~~Discharge from the Grassland Drainage Area, Years 1997 to 201~~2~~3



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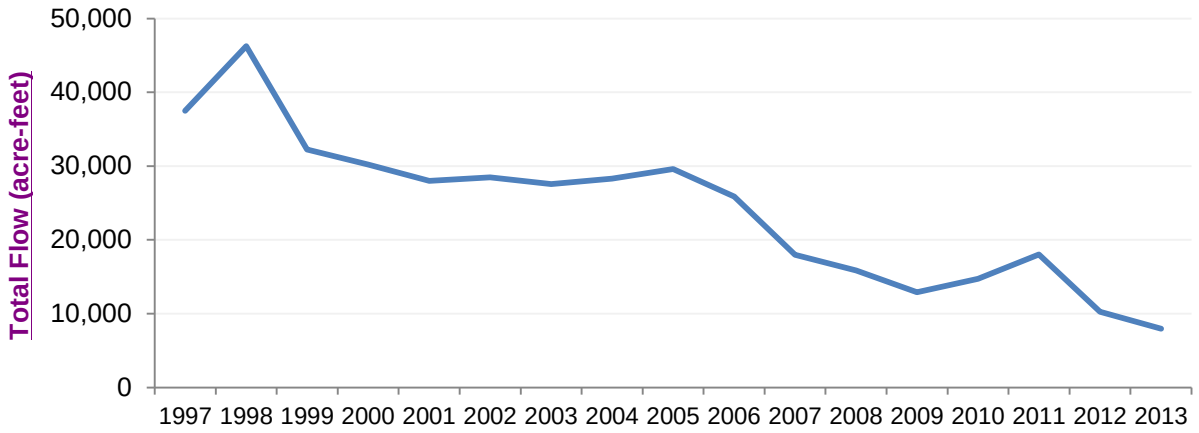
[47] ~~Drainage is down 72% when comparing total flow from CY 2012 with CY1997.~~



1. Selenium

The selenium load has decreased approximately 80%[48] since the start of the program. ~~Figure 8 shows graphically~~In addition to the decrease in discharge volume from the GDA, the monthly average of selenium concentrations at Mud Slough (north) downstream of the Drain ~~discharged from the GDA~~ (Station D) decreased from 2007 to 2013~~. The decrease in~~ (Figure 9). Daily monitoring results for selenium in the San Joaquin River at the Basin Plan compliance point (Crows Landing, Site N) also show the selenium concentration ~~with the decrease in discharge volume from the GDA has decreased the selenium loading and moved the GAF along the "glidepath" identified in the Use Agreement.~~ decrease (Figure 10).

Elevated ~~The selenium load has decreased approximately 80%[49] since the start of the program. Activities implemented to decrease the~~ selenium ~~loading include improved irrigation application, tiered water pricing, tailwater controls, seasonal land fallowing, and reuse and treatment involving recycling, and the use~~concentration in wetlands has been a major issue addressed by the GBP. Selenium concentrations within the wetland channels have decreased significantly with rerouting of the subsurface drainage ~~water on salt tolerant crops and to wet roadways for dust control~~. Salt Slough and wetland water supply channels listed in Appendix 40 of the Basin Plan have a 2 µg/L (monthly mean) selenium objective. Selenium concentrations in Salt Slough have been below the 2 µg/L objective since 1998, and the Slough has been removed from the 303(d) list for selenium (Figure 11). In wetland supply channels to the south Grassland Water District, and to the north Grassland Water District, selenium exceeds the water objective generally during the rainy season when other sources, such as storm runoff from upstream sources, are introduced into the channels (Figure 12). Although all drainage from the GDA is directed to Bypass during the irrigation season, other drains in the area outside of the GDA can cause selenium concentrations over water quality objectives. With dry or critical years, selenium may be introduced to wetland channels from groundwater used to supplement irrigation supply.

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[48] Percentage calculated based on average of selenium annual loads from 2008 to 2012 and the load in 1997. Values for 1997, 2008 to 2011 from Table 3c of Grassland Bypass Project Annual Report 2010-2011. 2012 selenium load value from letter dated 26 December 2013 from Joseph C. McGahan to Pamela C. Creedon, *Waste Discharge Requirement Order No. t-01-234, Update of Long Term Drainage Management Plan.*

[49] ~~Percentage calculated based on average of selenium annual loads from 2008 to 2012 and the load in 1997. Values for 1997, 2008 to 2011 from Table 3c of Grassland Bypass Project Annual Report 2010-2011. 2012 selenium load value from letter dated 26 December 2013 from Joseph C. McGahan to Pamela C. Creedon, *Waste Discharge Requirement Order No. t-01-234, Update of Long Term Drainage Management Plan.*~~

Figure ~~8~~9: Selenium Concentration in Mud Slough below San Luis Drain 2007 to 201~~3~~4

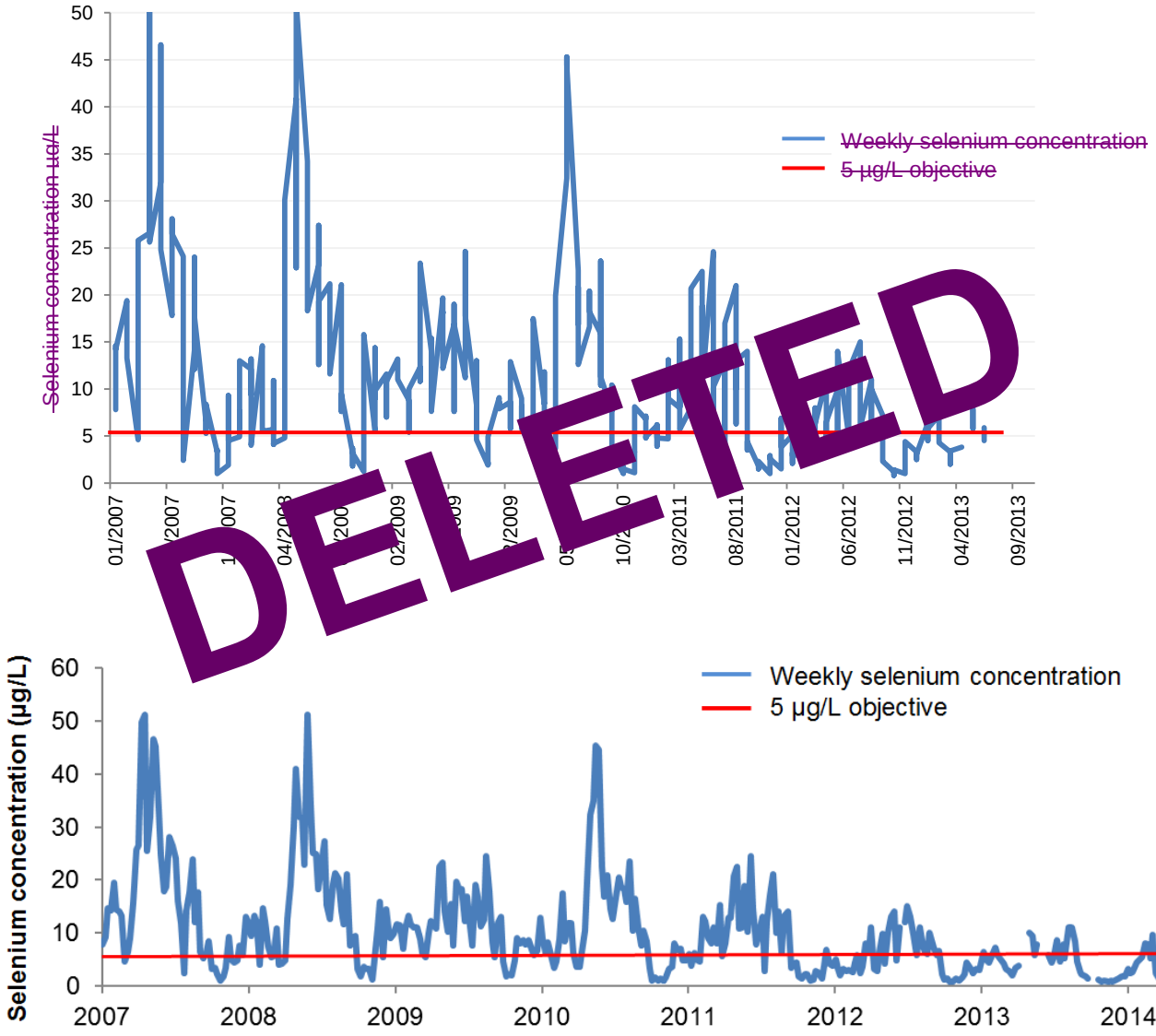

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Figure 10: Selenium Concentration in San Joaquin River at Crows Landing 2003 to 2014

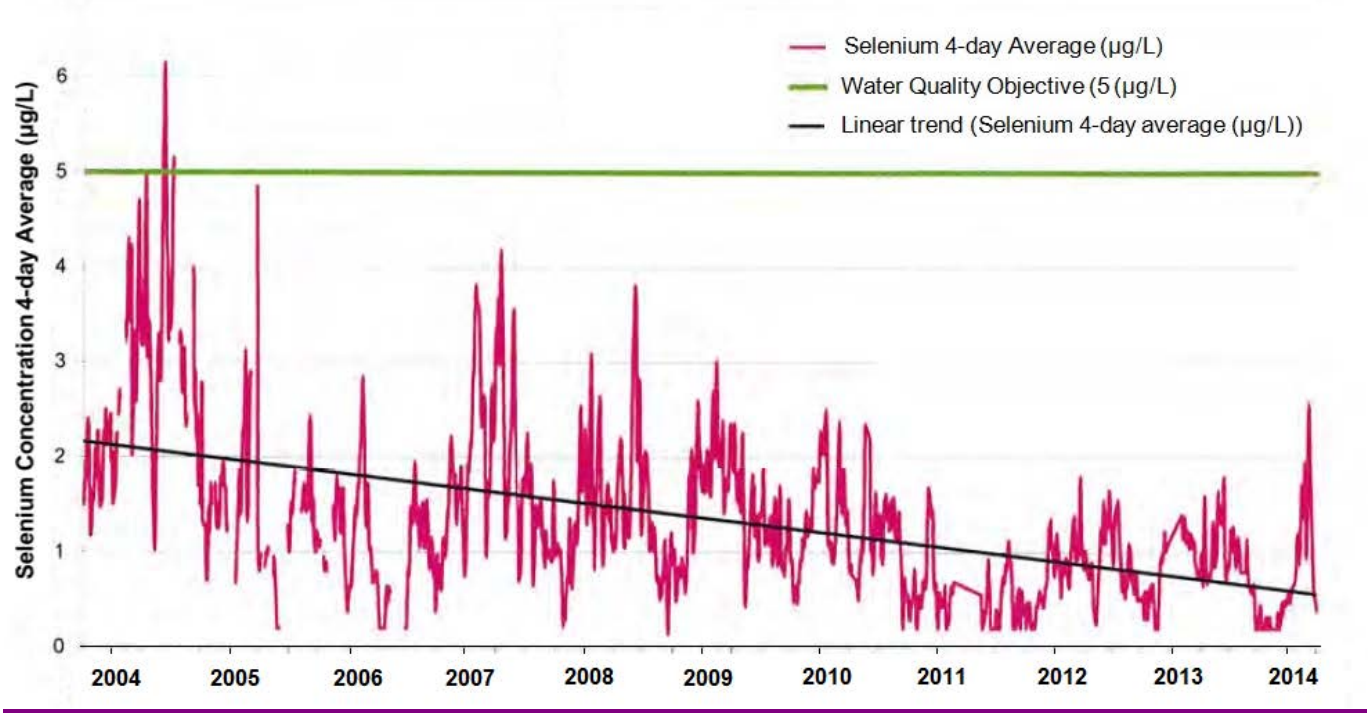

Figure 11: Selenium Concentrations in Salt Slough (Station F)

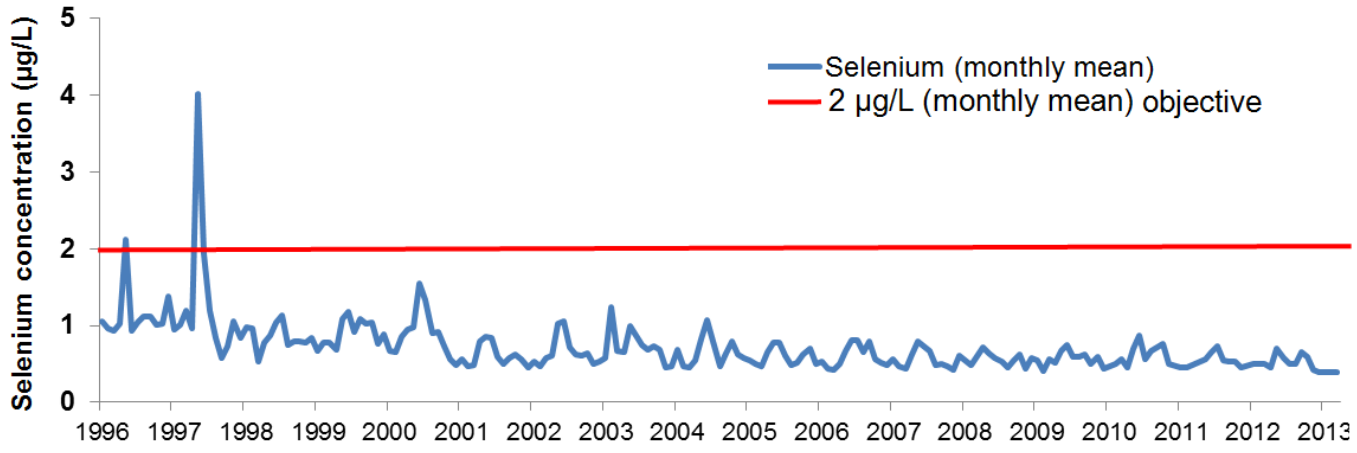

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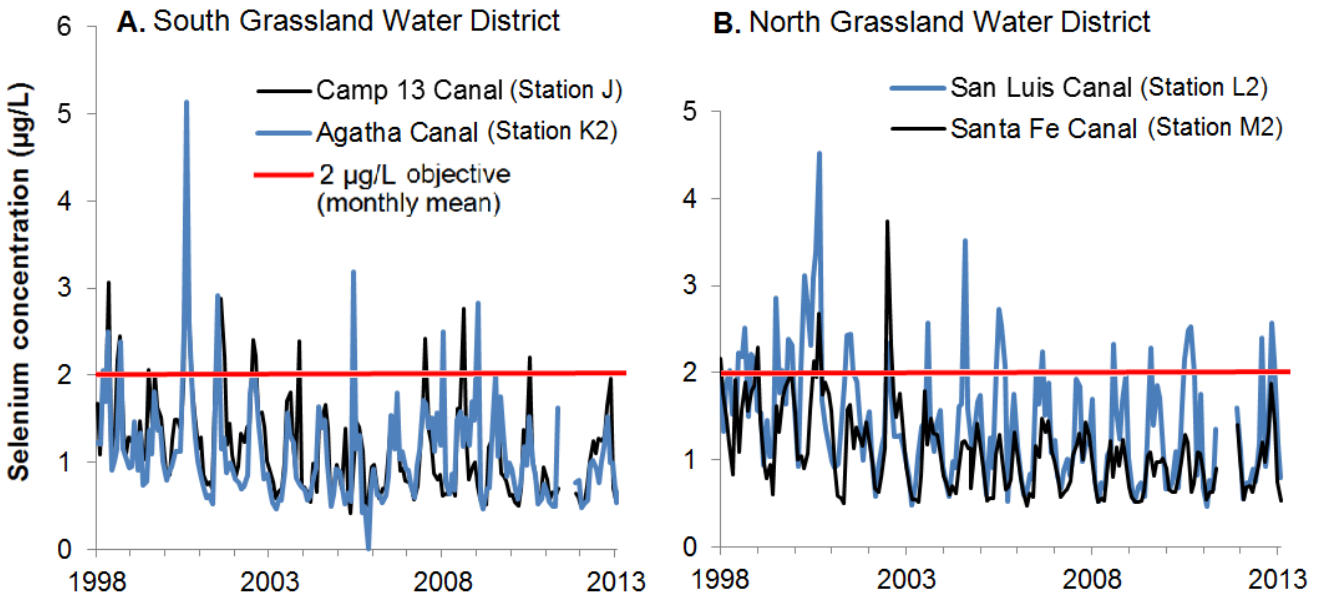
Figure 12: Selenium Concentrations in Wetland Supply Channels

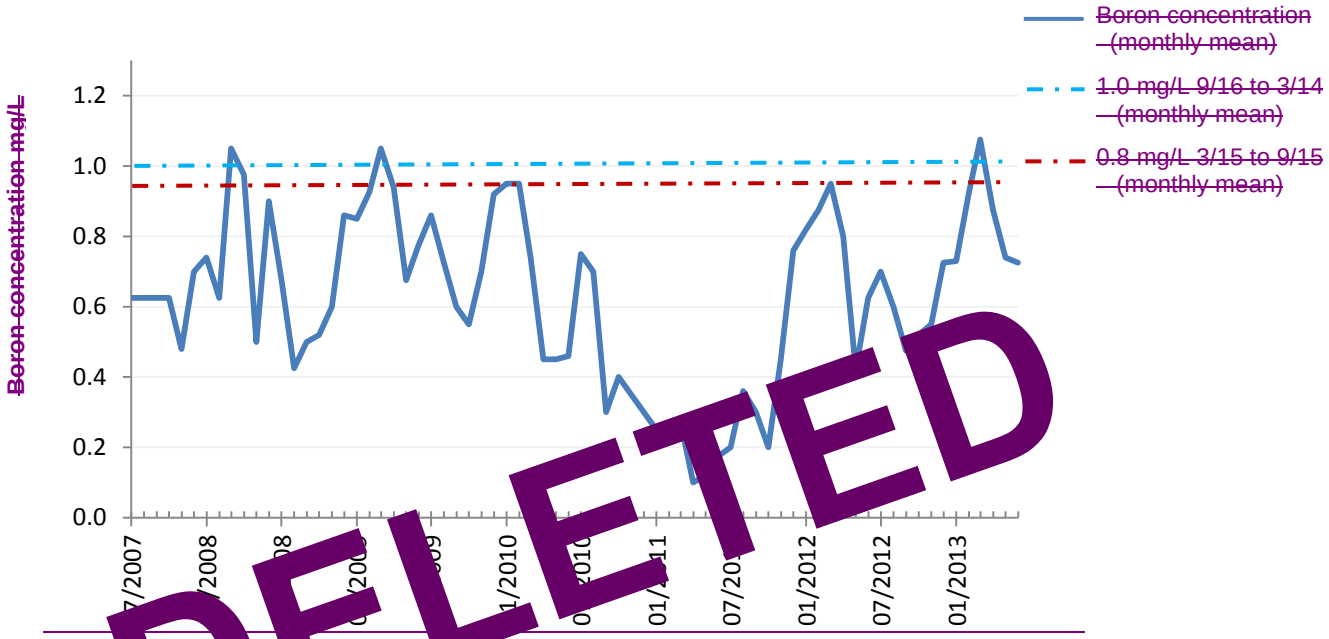


2. Boron and Molybdenum

~~Figure 9 shows graphically the monthly average of~~ The boron concentration~~s~~ in the San Joaquin River after the confluence with the Merced River (Station ~~N) from 2007 to 2013. The boron concentration.~~ N) generally meets the water quality objective (Figure 13), and it is anticipated further implementation of the GBP including the San Joaquin River Improvement Project will further reduce the boron concentrations from the GBP. Molybdenum concentrations observed in Mud Slough (Station D) are generally below the 50 µg/L maximum concentration (Figure 14).

Past monitoring has shown boron and salt loads have decreased as selenium loads have decreased. It is expected that this correlation will continue.

Figure ~~9~~13: Average Monthly Boron Concentration in San Joaquin River (Station N) ~~2007 to 2013~~



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~~Figure 10 shows graphically the molybdenum concentrations observed in Mud Slough (Station D) from 2007 to 2013.[50] Molybdenum has been observed below the 50 µg/L maximum concentration.~~

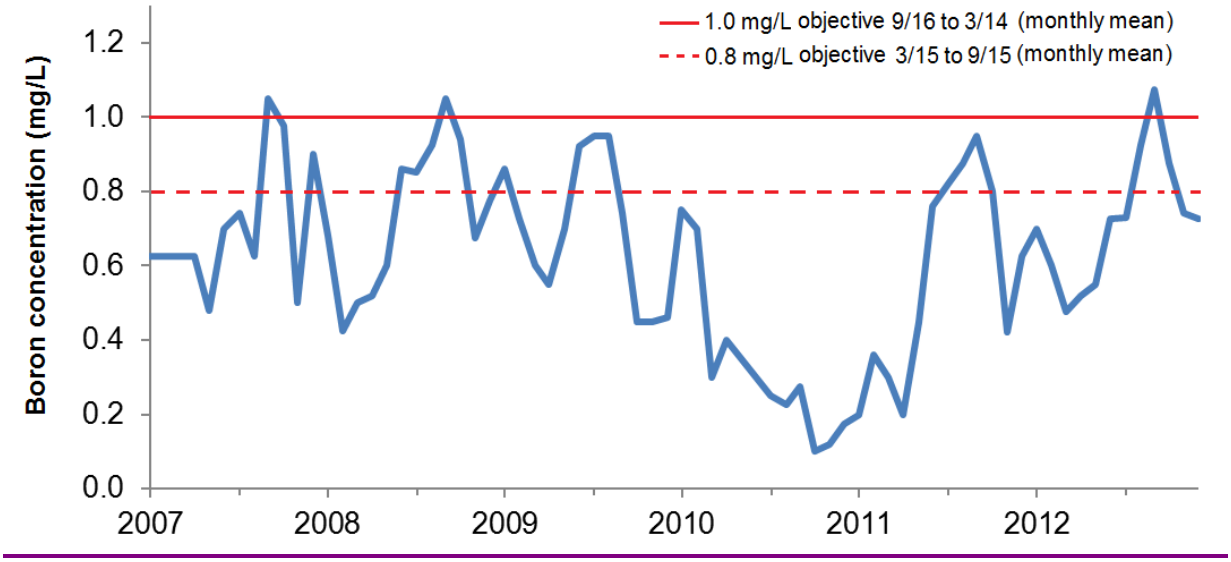
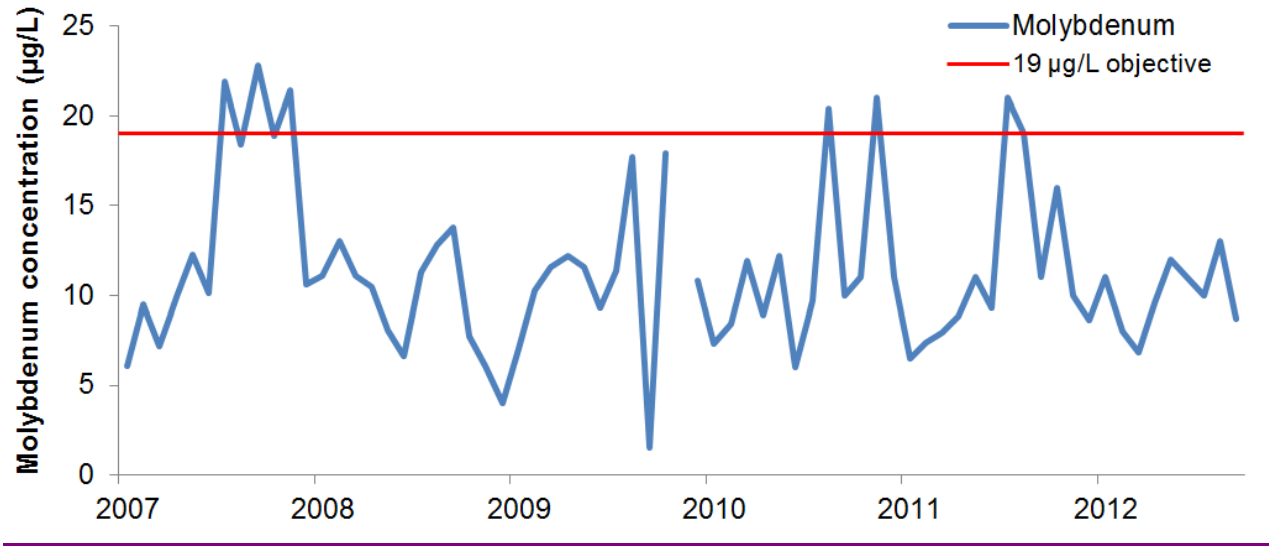


Figure ~~10~~14: Molybdenum Concentration at Mud Slough below San Luis Drain (Station D)



3. Salinity

The lower San Joaquin River is 303(d) listed for salts. Discharge limits for salts are not in the waste discharge requirements for the GBP. The Basin Plan provisions for the *Control Program for Salt and Boron Discharges into the Lower San Joaquin River*[51] requires that by July 2018 in a Critical Year Type and July 2014 in all other Year Types the Dischargers must: 1) participate in a Central Valley Water Board approved real-time management program; or 2) submit a management plan that includes the elements identified in the Monitoring and Reporting Program, Appendix MRP-1 that is designed to meet the Base Salt Load Allocations identified in Table IV-4.4, *Summary of Allocations and Credits*,[52] within the applicable

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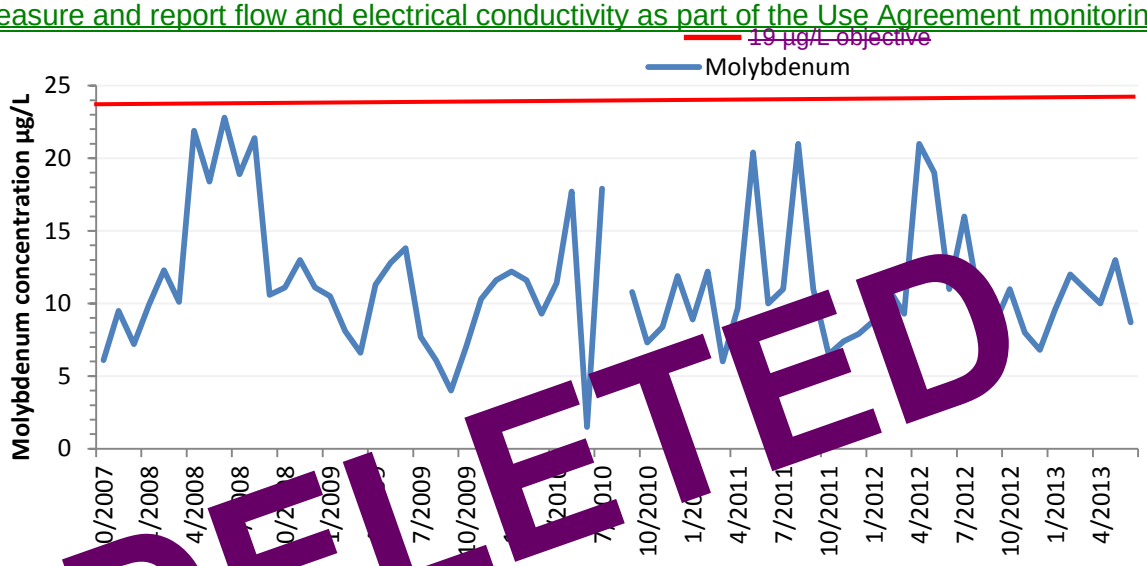
[50] ~~Water Year 2012 data ends in December 2011.~~
[51] Water Quality Control Plan for the Sacramento River and San Joaquin River Basins, page IV-32.00
[52] *Ibid*., page IV-32.04

<u>compliance schedule for compliance in Table IV-4.3.[53] A real-time monitoring program is being used to measure and report flow and electrical conductivity as part of the Use Agreement monitoring program.</u>



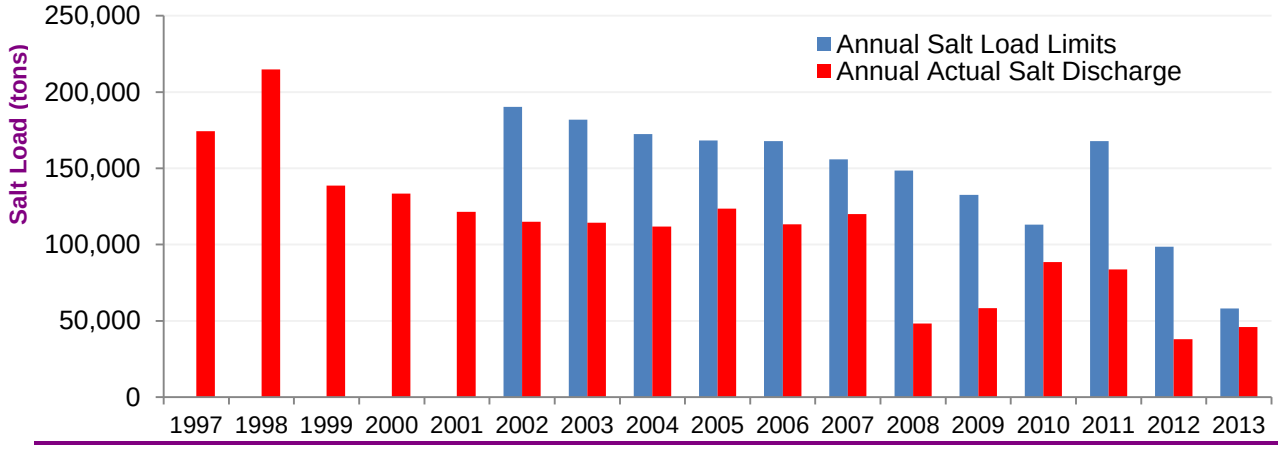
~~3. Salts~~

~~Salt~~<u>The GD participants are part of the board-approved real-time management program[54].</u>

<u>Monthly and annual salt</u> loads are part of the <u>second and third</u> Use Agreements and are calculated using electrical conductivity and flow~~. Salt or salinity load limits are part of the Use Agreements and~~ <u>and are</u> based on water year category. ~~Figure 11 shows~~<u>Annual salt loads have been below</u> the salt load limits based on the methodology in the 2001 Use Agreement ~~with selenium loads as the driving management constraint.~~<u>(Figure 15).</u>

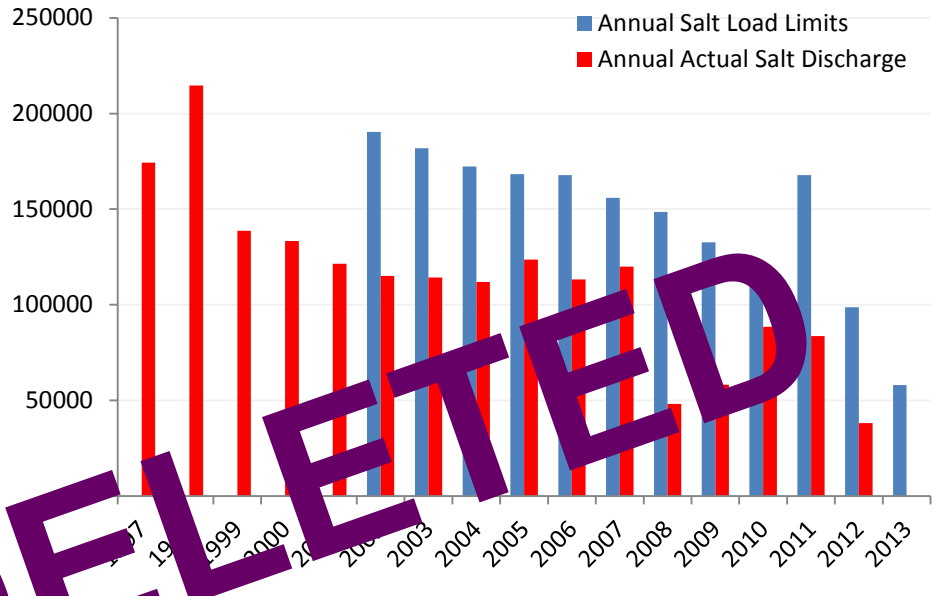
~~In addition, the Basin Plan has a control program for salt and boron discharges from the Lower San Joaquin River. Both the U.S. Bureau of Reclamation and the San Luis & Delta-Mendota Authority are participating in the Central Valley Water Board CV-SALTS program.~~

Figure ~~11~~15: Annual <u>Salt</u> Loads ~~of~~<u>and</u> Salt ~~Discharged~~<u>Load Limits</u> from the Grassland Drainage Area ~~Compared to Salt Load Limits~~



[53] *Ibid*., page IV-32.03

[54] Resolution R5-2014-0151: Real Time Management Program for meeting salinity water quality objectives in the Lower San Joaquin River at Vernalis.



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Tons

N[illegible]rients

4. ~~Implemented~~

Five nutrient parameters were analyzed for the previous MRP Order: nitrate as nitrogen (N), ammonia as N, Total Kjeldahl Nitrogen (TKN), total phosphate, and orthophosphate. Of these five parameters at Station D, nitrate as N was above the water quality objective (10 mg/L) five times for the period from 2004 to 2013. Monitoring since 2008 has had only one exceedance of the 10 mg/L water quality objective for nitrate as N. For Station D from 2000 to 2013, total ammonia as N was <1 mg/L.

~~VI.~~V. Actions and Implemented Management Practices

The ultimate goal of the Grassland Bypass Project is to eliminate all agricultural subsurface drainage to the San Joaquin River, a zero discharge to the ~~r~~River. To accomplish this goal, the ~~Grassland Area Farmers (GAF) and the Dischargers~~GDA growers have ~~worked to implement~~implemented management practices and actions to lower the selenium load discharged to the San Joaquin River, including improved irrigation application, tiered water pricing, tailwater controls, and reuse and treatment involving recycling, and the use of subsurface drainage water on salt tolerant crops and to wet roadways for dust control. This section lists some of the management practices and actions that have been implemented or are planned for implementation:

A. Conservation Efforts

Conservation efforts were initiated by ~~GAF~~GDA growers and by the water district to reduce the volume of subsurface drainage to the GBP. These efforts include the following:

Tons

1. Improved irrigation management
   Growers have implemented management practices that limit pre-irrigation use and over-watering. Installation of drip or micro-irrigation, combined with improved water management, lowers water use and increases irrigation efficiency. Shorter water runs are encouraged. Improved irrigation efficiency results in less water going past the crop root zone and, thereby, raising the water table, which generates the subsurface drainage.

   The member districts of the GDA have ~~or had~~ programs that encourage growers to improve their irrigation practices. Several of the districts have provided low interest loans to growers for improved irrigation equipment.

2. Retrofitting of drainage tile systems

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Growers were encouraged to retrofit the controls on tile-drain systems. Sensors on the sump pumps for drainage tile systems were raised so they were activated only when groundwater approached an approximate minimum depth to groundwater target. Drains that discharged directly to open ditches were modified with a weir control structure to store more drainage water beneath each field prior to discharge to the district drainage system.

[2.]3. Initiation of tiered water pricing
The member districts of the GDA have implemented a tiered water price structure that encourages the conservation of water and efficient use of any delivered irrigation water. Higher prices per acre-foot of water delivered are charged if growers go above a certain amount.

[3.]4. Installation of tailwater controls
Growers in some parts of the GDA are required to separate tailwater from subsurface drainage. Discharge of tailwater is prohibited from the GDA to the Grassland Bypass Channel. A number of GDA growers have installed tailwater return systems or use irrigation methods that do not generate surface runoff.

[4.]5. Reduced drainage seepage
Infrastructure improvements, such as lining canals and installing piping, have reduced drain seepage through the transport system. Reducing drainage seepage to groundwater helps keep groundwater levels lower, and, thereby, reduces the amount of subsurface drainage water produced.

B. Reuse and recycling

The [GAF]GDA growers and water districts have implemented the following efforts to reduce the subsurface drainage from entering waters of the state.

1. Recirculation of subsurface drainage by participating districts
The participating water and irrigation districts in the GDA have constructed facilities to recirculate drain water back into their irrigation distribution system. Recycling drainage water reduces the amount of water that would otherwise need to be imported or pumped and reduces the net amount of subsurface drainage that needs to be discharged out of the area.

2. Prohibition of tailwater discharge into [water district canals]the Grassland Bypass Channel
To encourage conservation and recycling, water districts do not allow the discharge of tailwaters into [their canals]the Grassland Bypass Channel and the San Luis Drain. Tailwater is recirculated within the GDA for reuse.

3. Use of subsurface drain waters on roads
Subsurface drainage has been reused to wet roads for dust control.

C. Dry-land Farming and Fallowing of [I]Land

Approximately [10,400]9,500 acres in the GDA [have been permanently fallowed]are not irrigated, including lands served by the Broadview Water [district and Widren Water]District. These [retired]lands are no longer irrigated[with supplied water], which reduces [the impacts of]deep percolation from these areas.

D. San Joaquin River Water Quality Improvement Project

The San Joaquin River Water Quality Improvement Project (SJRIP) is located within the GDA covering approximately 6,000 acres. The land was bought for the purpose of subsurface drainage disposal. In addition, the SJRIP includes a series of projects to aid the [GAF]GDA growers with lowering the selenium loading from the GBP. Subsurface drainage from the [surrounding area]GDA is channeled to the SJRIP area. Projects in progress or being proposed include the following:

- Reuse of subsurface drainage water: Started in 200[2]1, this project included the construction of distribution facilities and the planting of salt tolerant crops on agricultural land. The planted acreage has increased from the original 1,821 acres to more than 5,200 acres, which have been irrigated with drainage water or blended water (subsurface drainage and “fresh” irrigation water).

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In 2013, approximately 26,000 acre-feet of drain water was reused to irrigate ~~the crops that include producing~~ pistachio trees and salt-tolerant grasses.

- Future phases of the SJRIP ~~project~~area involve the development of additional acreage, installation of more subsurface drainage systems, and implementation of treatment and salt disposal components.
- ~~Another~~The SJRIP project also involves a contaminant monitoring program for bird eggs. This biological monitoring started in 2002 and has examined the levels of selenium in a small sample of bird eggs each year. In line with this project, the ~~GAF, Bureau and Authority~~GDA growers have tried to discourage birds from inhabiting or nesting in the SJRIP. The program involves hazing birds during the nesting season, diligent water management, and modification of drains to discourage avian use.

~~**E. Demonstration Treatment Facility**~~

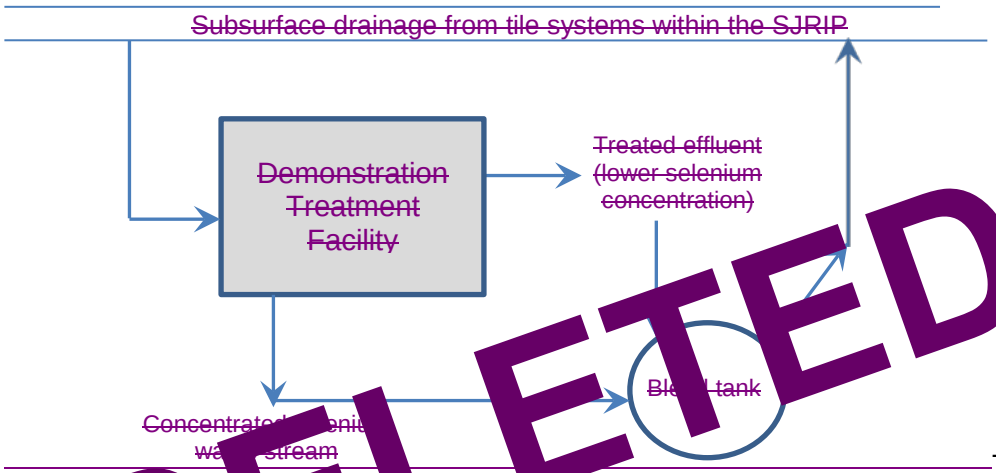
~~Although~~

Subsurface drainage not ~~part of~~reused within the SJRIP~~, but complementary~~ is diverted to the GBP~~, is the Panoche Drainage District~~. The WDRs for the GDA will address releases from the SJRIP to groundwater.

E. Demonstration Treatment Projects

The Bureau's Demonstration Treatment Facility~~. The facility is~~ and other pilot treatment projects are located on a portion of the SJRIP reuse area and will test various treatment projects to reduce selenium and salinity loads from the ~~GAF~~GDA farmers. Projects being considered are:

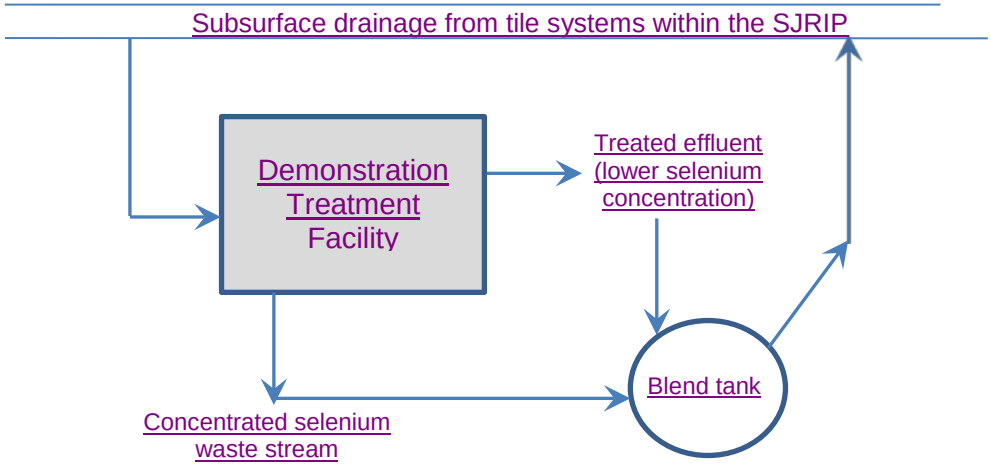
- Water FX Solar Distillation Demonstration Project: use of a parabolic solar collector to heat and distill the subsurface drain water, then condensing the evaporate which should be "clean" water. A concentrated brine solution is produced as the other byproduct. Phase I of the pilot project has been completed. The contractor proposes to expand the project to increase capacity and install thermal storage to allow operation through the night.
- UCLA Smart Membrane Pilot Test: project ~~will test~~is testing an optical membrane monitoring device on a reverse osmosis pilot treatment system. ~~Assembly of the system is in progress.~~
- HDR Deep Well Injection Study: The project reviewed existing information on deep aquifer formations to estimate the potential for deep well injection of subsurface drainage as a management tool.
- USBR RO Demonstration ~~Project~~Treatment Facility: The ~~project will construct~~Bureau has constructed a demonstration-scale reverse osmosis treatment ~~plant and~~facility with a selenium removal component.



The Demonstration

Treatment Facility is operated by the Bureau ~~and~~with cooperation from the Panoche Drainage District to intercept drainage from the existing subsurface agricultural drain systems in the SJRIP area, run the drainage water through various treatment processes to evaluate the efficacy for salt and selenium removal, blend the output from each of the treatment systems, and then recycle the blended mixture back into the SJRIP drainage system (see schematic shown as Figure ~~12~~16). The selenium loading will not change with operation of the Demonstration Treatment Facility since both the treated effluent and the higher selenium byproduct will be blended prior to being discharged back into the SJRIP subsurface drainage system.

Figure ~~12~~16~~::~~ Schematic of Demonstration Treatment Facility



The different treatment options will be evaluated and assessed for efficiency and effectiveness in removing selenium and salts from the subsurface drainage waters. The ultimate goal of the ~~GAF~~GDA growers is a “zero discharge” from the GDA by the end of 2019.

F. Removal of sediment from the San Luis Drain

Selenium is listed as a hazardous waste at high concentrations under the USEPA 40 CFR 261.24.[55] Sediments in the ~~San Luis~~ Drain ~~(SLD) may~~ contain selenium. These sediments, if transported along the Drain, would transport the selenium that may then migrate back into the water column. If selenium migration from the sediment to water column occurs, this selenium would be included in the total annual load discharged by the ~~GAF~~GDA growers. If sediment acts as a sink (or repository) for the selenium, then the selenium concentration may reach the value where it may be considered “hazardous” waste.

The 20~~1~~09 Use Agreement limits the maximum rate of flow in the Drain to be 150 cfs in order to avoid re-suspending sediment that may contain selenium. If monitoring results indicate the Drain behaves like a sink, the total selenium load in the sediment can be calculated and the information used to determine if the concentrations are close to hazardous waste values. Sediments would be removed before composite concentrations reach those values.

~~Monitoring in Phase III~~

The Bureau and the Water Authority have been monitoring the accumulation and selenium content of sediment in the San Luis Drain (Drain). Recent data[56] indicate that 214,000 tons of sediment have accumulated in the Drain during the GBP, and the selenium concentration in sediment in 2012 ranged

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~~[55] USEPA defines materials with a selenium concentration of 1 ppm (or mg/kg), if no longer useful and “discarded”, to be “hazardous waste” and must be disposed in accordance with regulations.~~

[56] San Francisco Estuary Institute, Grassland Bypass Project Annual Report 2012 – 2013. Draft Chapters 9 and 10 posted on http://www.sfei.org/gbp/reports

from 3 to 28 mg/kg dry weight (converted to wet weight concentration, the 28 mg/kg is approximately 10 mg/kg at moisture content 63%)[57], well below the hazardous waste criterion of 100 mg/kg wet weight[58].

VI. Required Surface Water Monitoring (GBP Order)

~~The Basin Plan amendments allow discharges from the GBP area to continue to exceed selenium objectives at Mud Slough (north) and the San Joaquin River between the Mud Slough discharge and the confluence with the Merced River. Load limits for selenium set forth in this Order and the required monitoring will determine if progress is being made to reach compliance with water quality objectives.~~

~~Table 3 shows the compliance time schedule for meeting the selenium water quality objective and performance goal as specified in the Basin Plan.~~

~~Table 3: Selenium Compliance Time Schedule~~

~~(~~The ~~performance goal is in italics; the water quality objective is in bold.)~~

~~Water Body~~	~~31 December 2015~~	~~31 December 2019~~
~~Mud Slough (north) and the San Joaquin River from the Mud Slough Confluence to the Merced River~~	~~*15 µg/L monthly mean*~~	~~**5 µg/L 4-day average**~~

~~Total maximum monthly loads (TMMLs) for selenium have been established based on the water quality objective which will apply no later than 31 December 2019 (Table 4.)~~

~~Table 4: Selenium~~ ~~Monthly Load Allocations for the Grassland Drainage Area~~[59]
~~(pounds of selenium)~~

~~Month~~	~~Effluent Limits which apply no later than 31 December 2019~~			
	~~Critical~~	~~Dry/Below Normal~~	~~Above Normal~~	~~Wet~~
~~October~~	~~55~~	~~233~~	~~260~~	~~328~~
~~November~~	~~55~~	~~233~~	~~260~~	~~328~~
~~December~~	~~152~~	~~319~~	~~398~~	~~211~~
~~January~~	~~151~~	~~319~~	~~398~~	~~211~~
~~February~~	~~93~~	~~185~~	~~472~~	~~488~~
~~March~~	~~92~~	~~184~~	~~472~~	~~488~~
~~April~~	~~101~~	~~193~~	~~490~~	~~506~~
~~May~~	~~105~~	~~197~~	~~497~~	~~512~~
~~June~~	~~69~~	~~130~~	~~212~~	~~354~~
~~July~~	~~70~~	~~131~~	~~214~~	~~356~~
~~August~~	~~75~~	~~137~~	~~225~~	~~366~~
~~September~~	~~57~~	~~235~~	~~264~~	~~332~~

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[57] San Francisco Estuary Institute, 2012 Grassland Bypass Project Annual Report (Final Draft). http://www.sfei.org/sites/default/files/2012%20GBP%20Annual%20Report%20Final.pdf, accessed on 2 April 2015

[58] Total Threshold Limit Concentration defined for selenium in California Code of Regulations. Title 22. Division 4.5. Chapter 11. Article 3. §66261.24 (a)(2)(A), Table (II).

[59] ~~The effluent limits in Table 4 are based on the calculated load allocation need to meet the water quality objectives the San Joaquin River at Crows Landing. The monthly load allocation is based on the water year classification applied to the following calendar year. For example, the October through December 2014 load limits are based on the water year classification for October 2013 through September 2014.~~

~~Total~~	~~1075~~	~~2496~~	~~4162~~	~~4480~~

~~Past monitoring has shown boron and salt loads have decreased as selenium loads have decreased. It is expected that this correlation will continue.~~

~~G. Monitoring in Phase III~~

~~The~~ monitoring program (sites and parameters analyzed) in ~~this~~the GBP MRP Order are ~~used~~designed to evaluate compliance with the requirements of the GBP WDR, which include objectives and limitations in the Basin Plan. ~~Additional monitoring at other locations and for other constituents are specified in the Use Agreement, but not required~~ Monitoring will be performed by ~~this~~ the Bureau and the Water Authority as specified in WDR Order R5-2015-XXXX. Tables 1 and 2 of the MRP Order~~.~~

~~GBP's Phase III~~ show details on the location of monitoring stations and monitoring sites, parameters and frequency for sampling required by the WDR.

A. Surface Water Monitoring ~~relevant to this Order are shown in Table 5.~~ [60]

Monitoring sites under the GBP Order are shown in Figure 1 of the Order. A summary of the required monitoring to assess compliance with the discharge limitations and the receiving water limitations is shown in Table 4. A rationale and summary of differences from the monitoring programs under previous WDRs follow in the section below. In general, the monitoring design for the Bypass Project has evolved as water quality issues have been identified and resolved over time.

Flow is measured at the San Luis Drain terminus, in Mud Slough, and in the San Joaquin River as a basic parameter in the measurement of contaminant loads in the Grassland Basin. Additionally, flow in the San Luis Drain must be managed to prevent sediment erosion. Stations B3 and D will be monitored for compliance with discharge and receiving water limits, respectively. Stations N and R will be monitored for compliance with the Basin Plan receiving water limits in the San Joaquin River before and after the confluence with the Merced River. The constituents and sample frequency are selected to determine compliance with numeric objectives in the Basin Plan for Mud Slough (north), and at various points in the San Joaquin River.

Diversion points into the wetland channels are monitored daily for flow and water quality during storm events, when any GDA subsurface drainage is routed from the Grassland Bypass channel to the southern Grassland Water District wetland channels. Drains outside of the GDA that may supply wetland channels are within areas covered by other ILRP Orders that surround the GDA.

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[60] DCRT. Grassland Bypass Project 2013 Revised Monitoring Program dated 26 March 2013.

Table 4: Monitoring sites, parameters and monitoring frequency for the GBP Order

Monitoring Site	Daily	Weekly						Monthly			TBD	Semi-annually	Annually
	Flow	pH	EC	temp	TOC	Se	B	Mo	Nitrate	Ammonia	Pesticides	Toxicity *(D. magna, P. promelas, H. azteca)*	Sediment
Station N San Joaquin below Merced River		x	x	x		x	x	x					
Station H2 San Joaquin above Merced River	x												
Station R China Island (San Joaquin after Mud Slough)		x	x	x		x	x	x			x		
Station D Mud Slough (north) after San Luis Drain (***receiving waters***)	x	x	x	x	x	x	x	x	x	x	x	x	
Station B2 San Luis terminus	x												
Station B3 San Luis Drain (***discharge***)		x	x	x		x	x	x	x	x	x		x
J, K2, L2, M2 Wetland chanels (***storm monitoring - daily***)	x	x	x	x		x	x						

Monitoring sites from the previous MRP Order were changed due to safety concerns, operational changes, and monitoring costs. ~~Monitoring at Salt Slough was dropped since the selenium water quality objective was met. These changes include: 1) continuous monitoring of flow, electrical conductivity and temperature at certain stations due to installation of transmitting pressure transducers; 2) replacement of Station H2 with Station R as a monitoring site in the San Joaquin River; 3) replacement of Station B2 with Station B3 in the San Luis Drain; and 4) removing monitoring from the wetland channels except during storm events. A map of these sites is shown in Figure 13.~~Differences between the previous MRP Order and the GBP Order include:

~~**Table 5: Phase III Monitoring Stations**~~

~~Feature~~	~~Station~~	~~Location~~	~~Latitude~~	~~Longitude~~
~~**San Luis Drain**~~	~~B2**~~	~~Terminus at Mud Slough~~	~~37.26100 N~~	~~-120.90520 W~~
	~~B3~~	~~Gun Club Road~~	~~37.23159 N~~	~~-120.87599 W~~
~~**Mud Slough (north)**~~	~~D~~	~~Downstream of SLD discharge~~	~~37.26374 N~~	~~-120.90627 W~~
~~**Wetlands channels**~~	~~J*~~	~~Camp 13 Drain, headworks~~	~~36.94117 N~~	~~-120.75685 W~~
	~~K*~~	~~Agatha Canal, headworks~~	~~36.93399 N~~	~~-120.70258 W~~
~~**San Joaquin River**~~	~~R~~	~~China Island Unit~~	~~37.33622 N~~	~~-120.96763 W~~
	~~H2**~~	~~Hills Ferry above Merced River~~	~~27.34737 N~~	~~-120.97500 W~~
	~~N~~	~~Crows Landing~~	~~37.43149 N~~	~~-121.01341 W~~

~~* Samples will be collected when water is passing site during a storm event.~~
~~** Flow monitoring at station only; no monitoring required by MRP.~~

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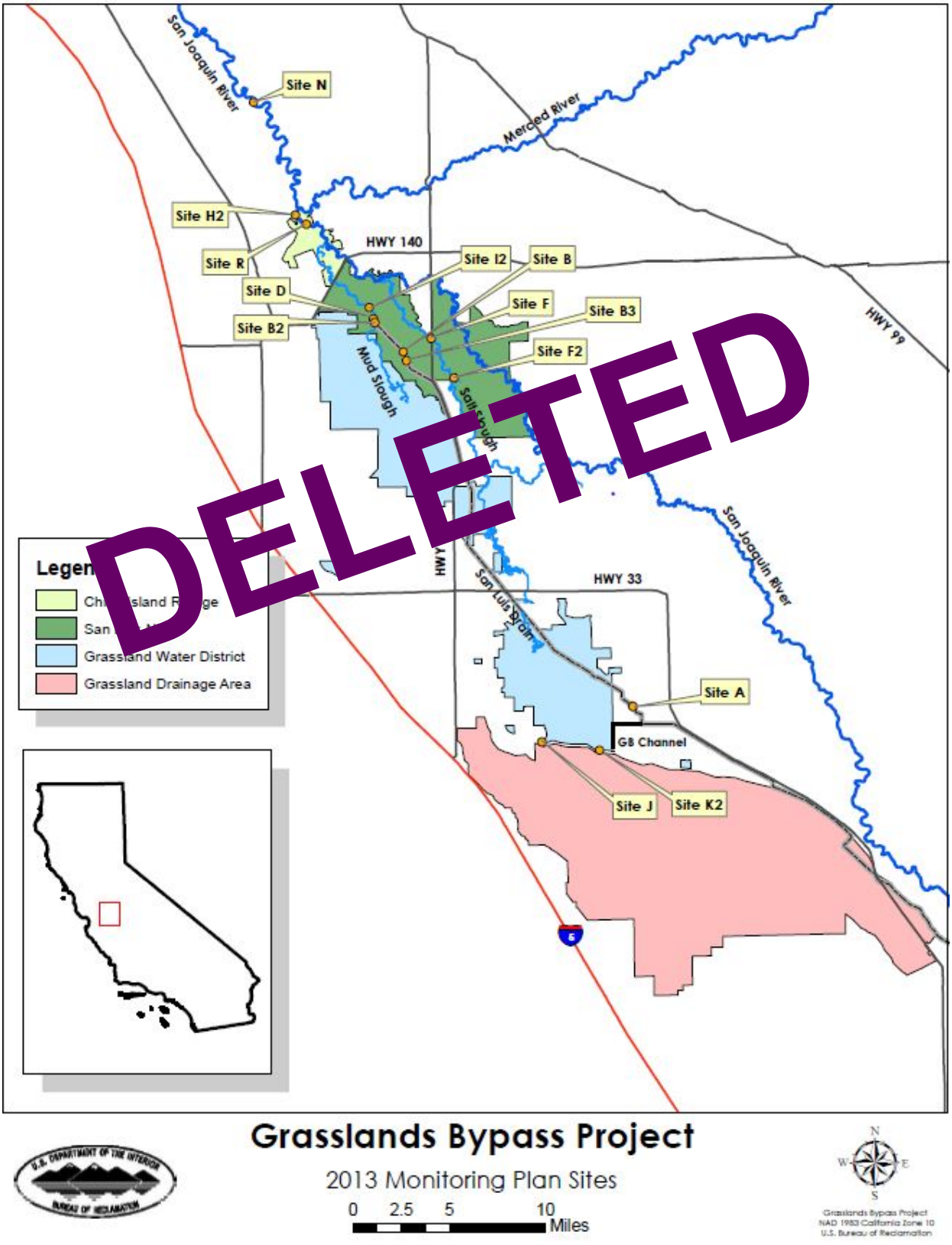
~~Figure 13: Monitoring Stations for Phase III~~



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- ~~Figure is from *Grassland Bypass Project 2013 Revised Monitoring Program, 26 March 2013*~~Station C was eliminated as a monitoring site. Station C is located in the Mud Slough before the San Luis Drain outfall and no subsurface drainage is discharged to the site unless a major storm event occurs. In that case, monitoring is initiated at stations J, K2, L2 and M2 where subsurface drainage enters the wetland supply channels.
- Station G was eliminated as a monitoring site. Station G is located in the San Joaquin River upstream of the Mud Slough confluence and was previously used to monitor compliance for the Salt Slough discharge. This site should have minimal selenium loading since subsurface drainage is no longer discharged to Salt Slough.
- Station B3 replaces Station B2 in the San Luis Drain.

Station R at the China Island Unit in the San Joaquin River before the Merced confluence is added as a monitoring site. This site will monitor compliance with water quality objectives

~~H. Surface Water Monitoring~~ Requirements in Phase III[61]

~~Table 2 of the MRP Order summarizes the monitoring stations, parameters and frequency for sampling required by the WDR during Phase III. At Stations B2 and H2 only flow will be monitored.~~

~~Monitoring will be performed by the entities with responsibilities and authority in the Grassland Drainage Area as specified in WDR Order R5-2014-XXXX. The Dischargers are required to submit an Annual Monitoring Report by 31 March of each year that will cover the monitoring period from the previous calendar year (1 January through 31 December). The following parameters will be monitored.~~

~~1. Flow~~

~~Flow is a basic parameter in the measurement of contaminant loads in the Grassland Basin. Flow in the San Luis Drain must be managed to prevent sediment erosion. For all sites, flow measurements are daily averaged based on continuous measurements, or the flow observed passing over weir boards or across a staff gauge.~~

~~2. Selenium~~

~~The monitoring program for Phase III requires weekly monitoring of selenium (total) at Stations B3, D, R, and N. Additional sampling will occur in the wetlands channels and Mud Slough (north) if flow is passing through during a storm event.~~

~~3. Boron and Molybdenum~~

- ~~Boron is to be measured on a weekly basis at Stations D, R, and N to determine compliance with the numeric objectives in the Basin Plan~~ for the San Joaquin River~~. Sampling at Stations D and R will be used to determine if~~ before the Merced River, replacing H2 (Hills Ferry). This site is closer to the discharge from Mud Slough (north) ~~after the confluence with the San Luis Drain or other sources in~~into the San Joaquin River ~~may be contributing to any boron exceedances further downstream~~than Hills Ferry.
- ~~Molybdenum is sampled monthly at Stations B3, D, R, and N to determine compliance with numeric objectives in the Basin Plan for~~ Stormwater monitoring will be required at Stations J, K2, L2 and M2. These four sites will monitor the selenium concentration entering wetland channels since they are the diversion points for subsurface drainage into those channels. The previous MRP Order required monitoring at Stations D [Mud Slough (north) after the San Luis Drain terminus] and F (Salt Slough).

Differences in monitored parameters between the previous MRP Order and the GBP Order include:

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[61] ~~DCRT. Grassland Bypass Project 2013 Revised Monitoring Program dated 26 March 2013.~~

Elimination of Total Kjeldahl Nitrogen (TKN), total phosphate, and ortho phosphate from monitoring parameters. Monitoring at Station D (Mud Slough ~~(north), San Joaquin River downstream of the confluence with the Merced River, and the San Joaquin River~~ after the ~~Merced River~~ San Luis Drain confluence~~. Monitoring at Station B3 will determine the contribution from the GDA to Mud Slough (north).~~

~~4. Salts~~

~~Electrical conductivity, taken on a daily average, can be used as an indicator of salts. Continuous real-time monitoring for electrical conductivity and flow are taken at Stations D, H2 and N. Flow measurements are measured by pressure transducers at these sites. Weekly sampling at Stations B3 and R will be required by the MRP and will include electrical conductivity as part of the field measurements.~~

~~Nutrients)~~

~~Nutrients~~ ~~monitoring include nitrates as Nitrogen (N) and total ammonia as N. Previous monitoring data from 2000 to 2013 at Station D indicate total phosphorus as P is less than 0.5 mg/L. Nitrate as N during that same period~~ showed ~~21 events (weekly sampling) with~~ concentrations ~~above the 10~~ to be <3.5 mg/L for TKN and <2 mg/L ~~level, but only 1 event since 2008. Monitoring occurs monthly at Stations B3 and D.~~

~~5. Pesticides~~

~~Pesticides will be monitored biannually with the pesticides analyzed based on evaluation by the Discharger and the Regional Board of pesticide use data for the GDA. Sampling timing will be dependent on use periods and will occur at Stations B3, D and R. The entire Central Valley currently has Total Maximum Daily Loads (TMDLs) for diazinon, chlorpyrifos, and organochlorine pesticides, and Regional Board staff is developing a general pesticide TMDL for the Central Valley.~~

~~6. Aquatic Toxicity~~

- ~~Aquatic toxicity monitoring is used to evaluate compliance with the Basin Plan narrative toxicity~~ for both total phosphorus and ortho phosphate. These levels are not a water quality ~~objective. The toxicity monitoring is monthly for all species. Samples are to be collected from Station D. Toxicity testing will involve three species: *Magna dubia*, *Pimpehales promelas*, and *Selenastrum capricornutum*. Acute toxicity testing (4-day test) will be used for *M. dubia and P. promelas*, with results~~problem. As a comparison, Westside SJR Watershed Coalition (located north of the GDA) reported ~~on survival compared to a lab control.[62] Chronic toxicity testing (~~TKN and total phosphorus concentrations ranging from 0.088 to 150 mg/L, and 0.048 to 4.7~~-day) shall be performed with *S.capricornutum* with the results reported based on growth compared to the lab control.[63]~~ mg/L, respectively.

~~7. Sediment Toxicity~~

- ~~Sediment toxicity~~Nutrients (nitrate as N and ammonia as N) will be monitored monthly at Stations B3 (San Luis Drain before terminus) and D. The previous MRP required monitoring at Station N (San Joaquin River at Crows Landing).
- In the San Luis Drain, a 24-hour composite for boron is ~~used~~no longer required. A weekly grab sample will be required instead to ~~evaluate~~determine compliance with the ~~Basin Plan narrative toxicity~~ water quality objective ~~and narrative settleable material objective. The~~ in Table 5.

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~~62 USEPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. USEPA-821-R-02-012. Test methods 20021.0 and 2000.0 for D. magna and P. promelas, respectively.~~

~~63 USEPA, 2002. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organism, Fourth Edition. USEPA-821-R-02-013. Test method1003.0.~~

- Total organic carbon (weekly) and sediment toxicity ~~test is a 10-day test with *Hyalella* azteca with reporting based on survival compared to a lab control.[64] Sediment~~ testing ~~for total organic carbon and grain size will be concurrent with the *H. azteca* toxicity testing since these factors have been found to influence~~(biannual) will be required at Station D.
- Pesticides will be monitored at Stations B3, D and R on a schedule and frequency to be determined after evaluating pesticide use in the GDA.

Annual sediment ~~toxicity results.~~

~~8. Sediment Monitoring~~

- ~~Sediment~~ testing is now required ~~annually for~~at Station B3, with the analyses to be determined.

~~Additional testing~~Additional monitoring at other locations and for other constituents are specified as part of the Use Agreement in the GBP Monitoring Plan, but are not required by this MRP Order. Additional testing by the Dischargers, not required by the MRP, will occur at various locations in the San Luis Drain for sediment depth and cross-sectional area, selenium, total organic carbon and percent moisture. These values will be used to determine the sediment volume in the drain, and changes in quantity and movement of sediment in the Drain. The chemical analyses will be used as a comparison with Department of Health Services and USFWS selenium criteria for hazardous waste and ecological risk, respectively.

~~I.~~B. Stormwater Monitoring

Storm and flood event monitoring will be required when flows are expected to exceed the capacity of the San Luis Drain as a result of major rainfall events~~.~~, and discharges must be made from the GDA to Grasslands wetlands. Actions to be taken are specified in the MRP and Storm Event Plan.[65]

VII. Groundwater Quality Monitoring (GDA Order)

The concept of higher and lower vulnerability areas was integrated into the GDA Order to allow the board to tailor requirements to applicable waste discharge conditions. Resources can be focused on areas that need enhanced water quality protection, because the Steering Committee has the option to identify low vulnerability areas where reduced program requirements would apply.

Vulnerability may be based on, but is not limited to, the physical conditions of the area (soil type, depth to groundwater, beneficial uses, etc.), water quality monitoring data, and the practices used in irrigated agriculture (pesticide permit and use conditions, label requirements, application method, etc.). Additional information such as models, studies, and information collected may also be considered in designating vulnerability areas.

Groundwater Quality Vulnerability

High vulnerability areas for groundwater are those areas that meet the requirements for preparing a Groundwater Quality Management Plan or areas identified in the Groundwater Assessment Report, where available information indicates irrigated lands could cause or contribute to an exceedance of water quality objectives or degradation of groundwater quality that may threaten applicable beneficial uses. The Groundwater Assessment Report may rely on water quality data to identify high vulnerability areas and on assessments of hydrogeological conditions and other factors (e.g., areas of high fertilizer use) to

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[64] ~~USEPA, 2000. Methods for Measuring the Toxicity and Bioaccumulation of Sediment-associated Contaminants with Freshwater Invertebrates, Second Edition. Test method 100.1.~~

[65] Grassland Area Farmers and San Luis & Delta-Mendota Water Authority. "A Storm Event Plan for Operating the Grassland Bypass Project". August 25, 1997.

identify high vulnerability areas. The Steering Committee is also expected to review readily available studies and assessments of groundwater quality to identify those areas that may be impacted by irrigated agricultural operations.

In general, low vulnerability areas for groundwater are areas that do not exhibit characteristics of high vulnerability groundwater areas (as defined in the MRP). Vulnerability designations will be proposed by the Steering Committee, based on the high and low vulnerability definitions provided in Attachment E of the GDA Order. Vulnerability designations will be refined and updated periodically per the Groundwater Assessment Report and Monitoring Report processes (described in Attachment B, Monitoring and Reporting Program [MRP] Order R5-2015-XXXX). The Executive Officer will make the final determination regarding the irrigated lands waste discharge vulnerability areas.

A. Groundwater Monitoring Advisory Workgroup

The Groundwater Monitoring Advisory Workgroup (GMAW) consists of groundwater experts representing state agencies, the USEPA, the United States Geological Survey, academia, and private consultants. The following questions were identified by the GMAW and Central Valley Water Board staff as critical questions to be answered by groundwater monitoring conducted to comply with the ILRP[66].

1. What are irrigated agriculture's impacts to the beneficial uses of groundwater and where has groundwater been degraded or polluted by irrigated agricultural operations (horizontal and vertical extent)?
2. Which irrigated agricultural management practices are protective of groundwater quality and to what extent is that determination affected by site conditions (e.g., depth to groundwater, soil type, and recharge)?
3. To what extent can irrigated agriculture's impact on groundwater quality be differentiated from other potential sources of impact (e.g., nutrients from septic tanks or dairies)?
4. What are the trends in groundwater quality beneath irrigated agricultural areas (getting better or worse) and how can we differentiate between ongoing impact, residual impact (vadose zone) or legacy contamination?
5. What properties (soil type, depth to groundwater, infiltration/recharge rate, denitrification/ nitrification, fertilizer and pesticide application rates, preferential pathways through the vadose zone [including well seals, abandoned or standby wells], contaminant partitioning and mobility [solubility constants]) are the most important factors resulting in degradation of groundwater quality due to irrigated agricultural operations?
6. What are the transport mechanisms by which irrigated agricultural operations impact deeper groundwater systems? At what rate is this impact occurring and are there measures that can be taken to limit or prevent further degradation of deeper groundwater while we're identifying management practices that are protective of groundwater?
7. How can we confirm that management practices implemented to improve groundwater quality are effective?

The workgroup members reached consensus that the most important constituents of concern related to agriculture's impacts to the beneficial uses of groundwater are nitrate (NO_3-N) and salinity. In addition to addressing the widespread nitrate problems, the presence of nitrates in groundwater at elevated levels would serve as an indicator of other potential problems associated with irrigated agricultural practices. Central Valley Water Board staff utilized the recommended salinity and nitrate parameters and added general water quality parameters contained within a majority of the groundwater monitoring programs administered by the board (commonly measured in the field) and some general minerals that may be

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[66] Groundwater Monitoring Data Needs for the ILRP (25 August 2011). Available at: http://www.waterboards.ca.gov/centralvalley/water_issues/irrigated_lands/new_waste_discharge_requirements/stakeholder_advisory_workgroup/2011sept30_advsry_wkgrp_mtg/gmaw_25aug_data_needs.pdf

mobilized by agricultural operations (general minerals to be analyzed once every five years in Trend wells). The general water quality parameters will help in the interpretation of results and ensure that representative samples are collected. The board considered the above questions in developing the GDA Order's groundwater quality monitoring and management practices assessment, and evaluation requirements.

B. Groundwater Quality Monitoring and Management Practice Assessment, and Evaluation Requirements

The groundwater quality monitoring, assessment, and evaluation requirements have been developed in consideration of the critical questions developed by the Groundwater Monitoring Advisory Workgroup (listed above). The Steering Committee must collect sufficient data to describe irrigated agricultural impacts on groundwater quality and to determine whether existing or newly implemented management practices comply with the groundwater receiving water limitations of the GDA Order. The strategy for evaluating groundwater quality and protection consists of: 1) a Groundwater Quality Assessment Report (GAR), 2) a Management Practices Evaluation Program, and 3) a Groundwater Quality Trend Monitoring Program.

The general purpose of the Groundwater Quality Assessment Report (GAR) is to analyze existing monitoring data and provide the foundation for designing the Management Practices Evaluation Program and the Groundwater Quality Trend Monitoring Program, as well as identifying high vulnerability groundwater areas where a groundwater quality management plan must be developed and implemented.

A Management Practices Evaluation Program (MPEP) is to be developed where known groundwater quality impacts exist for which irrigated agricultural operations are a potential contributor or where conditions make groundwater more vulnerable to impacts from irrigated agricultural activities (high vulnerability areas). The purpose of the MPEP is to identify whether existing site-specific and/or commodity-specific agricultural management practices are protective of groundwater quality in the high vulnerability areas and to assess the effectiveness of any newly implemented management practices instituted to improve groundwater quality. Given the wide range of management practices/commodities within the Grassland Drainage Area boundaries, it is anticipated that the Steering Committee will rank or prioritize its high vulnerability areas and commodities, and present a phased approach to implementing the MPEP. The MPEP must be designed to answer GMAW questions 2, 5, 6, and 7. Where applicable, management practices identified as protective of groundwater quality through the MPEP (or equivalent practices) must be implemented by GDA growers, whether the grower is in a high or low vulnerability area (see section IV.B.21 of the GDA Order).

Since the focus of the MPEP is answering the questions related to management practices, the method or tools to be used are not prescribed by the board. The Steering Committee is required to develop a workplan that describes the tools or methods to be used to associate management practice activities on the land surface with the effect of those activities on underlying groundwater quality. The board anticipates that the MPEP workplan will likely propose using a variety of tools, such as vadose zone monitoring, modeling, and groundwater monitoring. The Steering Committee has the option of developing the workplan as part of a group effort that may include other agricultural water quality coalitions and commodity groups. Such a joint effort may avoid duplication of effort and allow collective resources to be more effectively focused on the highest priority studies, while ensuring the goals of the MPEP are met. Existing monitoring wells can be utilized where available for the MPEP.

The trend monitoring program is designed to determine current water quality conditions of groundwater in the Grassland Drainage Area, and to develop long-term groundwater quality information that can be used to evaluate the regional effects (i.e., not site-specific effects) of irrigated agriculture and its practices. Trend monitoring has been developed to answer GMAW questions 1 and 4. At a minimum, trend monitoring must include annual monitoring for electrical conductivity, pH, dissolved oxygen, temperature, nitrate as nitrogen (N), selenium, and once every five year monitoring for total dissolved solids,

carbonate, bicarbonate, chloride, sulfate, boron, calcium, sodium, magnesium, and potassium. Existing shallow wells, such as domestic supply wells, will be used for the trend groundwater monitoring program. The use of existing wells is less costly than installing wells specifically designed for groundwater monitoring, while still yielding data which can be compared with historical and future data to evaluate long-term groundwater trends.

As the management practices identified as protective of groundwater quality through the MPEP are implemented, the trend monitoring, together with other data included in updates to the GAR, should show improvements in water quality. The trend monitoring and GAR updates will, therefore, provide a regional view as to whether the collective efforts of growers are resulting in water quality improvements. If groundwater quality trends indicate degradation in low vulnerability areas, then a Groundwater Quality Management Plan must be developed and implemented. Negative trends of groundwater quality in high vulnerability areas over time would be an indicator that the existing Groundwater Quality Management Plan is not effective or is not being effectively implemented.

The Steering Committee may also look to and explore using existing monitoring networks such as those being conducted in accordance with local groundwater management plans (e.g., AB 3030, SB 1938, and Integrated Regional Water Management Plans).

GMAW question 3, which seeks to differentiate sources of existing impact, cannot be easily answered by traditional groundwater monitoring. The MPEP and trend monitoring will help to answer this question, but other methods such as isotope tracing and groundwater age determination may also be necessary to fully differentiate sources. The MRP does not require these advanced source methods because they are not necessary to determine compliance with the GDA Order. The MPEP will be used to help determine whether waste discharge at represented sites is of high enough quality to meet the groundwater limitations of the GDA Order.

Through the MPEP, the potential impacts of irrigated agriculture waste discharges to groundwater will be assessed for different types of practices and site conditions, representative of discharge conditions throughout the Grassland Drainage Area. In this way, the board will evaluate whether waste discharges from irrigated agricultural operations are protective of groundwater quality throughout the Grassland Drainage Area. Where the MPEP finds that additional "protective" practices must be implemented in order to ensure that grower waste discharges are in compliance with the GDA Order's water objectives for groundwater, the GDA Order requires growers to implement such practices, or equivalent practices. This representative MPEP process will ensure that the effects of waste discharges are evaluated and where necessary, additional protective practices are implemented.

C. Data Summary, Pesticides

Monitoring conducted by the USGS in 2010[67] showed detections of 14 pesticides and pesticide degradates in groundwater within the Delta-Mendota subbasin. The Delta-Mendota subbasin includes a broader area than the GDA. Pesticides and pesticide degradates were detected in 16 of the 18 wells[68] in the Delta-Mendota subbasin study area. The most frequently detected pesticides in the studies for the Delta-Mendota subbasin include simazine, atrazine, deethylatrazine (degradate of triazine herbicides), hexazinone, EPTC, metachlor, and dichloroaniline (degradate of diuron). All pesticide detections were below health-based thresholds and applicable water quality objectives. Analyses were not run for all pesticides used in the study areas, nor in all wells within the Delta-Mendota subbasin.

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[67] Mathany, T.M., Landon, M.K., Shelton, J.L., and Belitz, K., 2013. Ground-water quality data in the Western San Joaquin Valley study unit, 2010 – Results from the California GAMA Program: U.S. Geological Survey Data Series 706, 102 p. Available at http://pubs.usgs.gov/ds/706/

[68] Thirteen of the eighteen wells monitored had depth to top perforation of less than 200 feet below level surface.

The California Department of Pesticide Regulation (DPR), as part of its regulatory requirements under the Pesticide Contamination Prevention Act enacted in 1985, is required to maintain a statewide database of wells sampled for pesticide active ingredients and, in consultation with the California Department of Public Health (DPH) and the State Water Resources Control Board (State Water Board), provide an annual report of the data contained in the database and the actions taken to prevent pesticides contamination to the Legislature and other state agencies. These data will be evaluated by the Steering Committee as part of its Groundwater Quality Assessment Report.

DPR's current groundwater quality monitoring program should be sufficient to identify any emerging pesticides of concern and to track water quality trends of identified pesticides of concern. However, the presence of pesticides in groundwater indicates a discharge of waste subject to Water Board regulation. Therefore, should the board or DPR identify groundwater quality information needs related to pesticides in groundwater, the board may require the Steering Committee to conduct studies or implement a monitoring plan to address those information needs. Where additional information collected indicates a groundwater quality problem, a coordinated effort with DPR to address the identified problem will be initiated and the board may require the Steering Committee to develop a groundwater quality management plan (GQMP).

D. Data Summary Nitrates –GAMA

The USGS 2010 report also analyzed nitrates for the Delta-Mendota subbasin wells. Maximum nitrate levels in the Delta-Mendota subbasin above the applicable water quality objective[69] were found in production and monitoring wells that sampled groundwater at 200 feet or less below ground level.[70] In the Grassland Drainage Area, there was limited groundwater monitoring, but a maximum nitrate concentration of 12.7 mg/L was found at a monitoring well taken at one event. Additional information collected at shallower depths (where applicable) may be needed to adequately assess current groundwater quality conditions in the area.

E. Hydrogeologically Vulnerable and Groundwater Protection Areas

In 2000, the State Water Resources Control Board (State Water Board) created a map showing locations where published hydrogeologic information indicated conditions that may be more vulnerable to groundwater contamination. They termed these areas "Hydrogeologically Vulnerable Areas." The map identifies areas where geologic conditions allow recharge to underlying water supply aquifers at rates or volumes substantially higher than in lower permeability or confined areas of the same groundwater basin. The map does not include hydrogeologically vulnerable areas where local groundwater supplies occur mainly in the fractured igneous and metamorphic rocks which underlie the widespread mountain and foothill regions of the Sierra Nevada, or in permeable lava flows which may provide primary recharge for extensive but sparsely populated groundwater basins.

DPR has developed a map of Groundwater Protection Areas (GWPAs) that identifies areas vulnerable to groundwater contamination from the agricultural use of certain pesticides. The areas are based upon either pesticide detections in groundwater or upon the presence of certain soil types (leaching and/or runoff area) and a depth to groundwater shallower than 70 feet.

No areas in the GDA have been identified as being in the DPR Groundwater Protection Areas or the State Water Board Hydrogeologically Vulnerable Areas. Monitoring data from the San Luis Drain, which transports tile drainage from the GDA, shows nitrate levels averaging less than 9 mg/L (with a maximum

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[69] Maximum contaminant level (MCL) of 10 mg/L nitrate as nitrogen (N).
[70] Depth to top of perforation was less than 200 feet below surface level. Nitrate as N concentrations ranged from 0.03 mg/L to 23.8 mg/L, with the mean concentration of 8.5 mg/L nitrates as N for those wells (total of 14).

of 19 mg/L) from 2008 to 2013 during the irrigation season from May through July. During this period, the tile drainage should be representative of groundwater.[71]

F. Groundwater Quality Management Plans (GQMPs)

Under the GDA Order, groundwater quality management plans will be required where there are exceedances of water quality objectives, where there is a trend of degradation[72] that threatens a beneficial use, as well as for "high vulnerability groundwater areas" (to be designated by the Steering Committee in the Groundwater Quality Assessment Report based on definitions provided in Attachment E).

Instead of development of separate GQMPs, the GDA Order allows for the submittal of a comprehensive GQMP 60 days after approval of the Groundwater Quality Assessment Report. GQMPs will only be required if irrigated lands may cause or contribute to the groundwater quality problem. GQMPs are the key mechanism under the GDA Order to help ensure that waste discharges from irrigated lands are meeting Groundwater Receiving Water Limitation III.A. The limitations apply immediately unless the grower is implementing management practices consistent with an approved GQMP for a specified waste in accordance with the time schedule authorized pursuant to section XII of the GDA Order. The GQMP will include a schedule and milestones for the implementation of management practices (see Appendix MRP-1). The schedule must identify the time needed to identify new management practices necessary to meet the receiving water limitations, as well as a timetable for implementation of identified management practices. The MPEP will be the process used to identify the effectiveness of management practices, where there is uncertainty regarding practice effectiveness under different site conditions. However, the GQMP will also be expected to include a schedule for implementing practices that are known to be effective in partially or fully protecting groundwater quality. For example, the ratio of total nitrogen available to crop consumption of nitrogen that is protective of water quality may not be known for different site conditions and crops. However, accounting for the amount of nitrate in irrigation supply water is known to be an effective practice at reducing the amount of excess nitrogen applied.

The GQMPs are work plans describing how the Steering Committee will assist their growers in addressing the identified water quality problem; the types of actions growers will take to address the identified water quality problem; how the Steering Committee will conduct evaluations of effectiveness of implemented practices; and how consistency with Time Schedule for Compliance will be documented (Section XII of the GDA Order). Executive Officer approval indicates concurrence the GQMP is consistent with the GDA Order and that the proper implementation of the identified practices (or equivalently effective practices) should result in addressing the water quality problem that triggered the preparation of the GQMP. Approval also indicates concurrence that any proposed schedules or interim milestones are consistent with the requirements in section XII of the GDA Order. If the Executive Officer is assured that the growers in the area are taking appropriate action to come into compliance with the receiving water limitations (as described in the GQMP), the growers will be considered in compliance with those limitations. Approval of GQMPs does not establish additional waste discharge requirements or compliance time schedule obligations not already required by these waste discharge requirements. Instead, the Executive Officer is approving a method for determining compliance with the receiving water limitations in the affected area. See *Russian River Watershed Committee v. City of Santa Rosa* (9th Cir. 1998) 142 F.3d 1136; *CASA v. City of Vacaville* (2012) 208 Cal.App.4th 1438.

The main elements of GQMPs are to A) investigate potential irrigated agricultural sources of waste discharge to groundwater, B) review physical setting information for the plan area such as geologic factors and existing water quality data, C) considering elements A and B, develop a strategy with

[71] Tile drains remove perched groundwater containing high salinity, from the root zone of the crop. As the crop is irrigated, the perched groundwater rises until it is removed through the tile drain system.

[72] A trend in degradation could be identified through the required trend monitoring or through the periodic updates of the Groundwater Quality Assessment Report.

schedules and milestones to implement practices to ensure discharge from irrigated lands are meeting Groundwater Receiving Water Limitation III.A, D) develop a monitoring strategy to provide feedback on GQMP progress, E) develop methods to evaluate data collected under the GQMP, and F) provide reports to the Central Valley Water Board on progress.

Elements A – F are necessary to establish a process by which the Steering Committee and Central Valley Water Board are able to investigate waste sources and the important physical factors in the plan area that may impact management decisions (elements A and B), implement a process to ensure effective practices are adopted by growers (element C), ensure that adequate feedback monitoring is conducted to allow for evaluation of GQMP effectiveness (elements D and E), and facilitate efficient board review of data collected on the progress of the GQMP (element F).

The GDA Order requires the Steering Committee to develop GQMPs that include the above elements. GQMPs will be reviewed and approved by the Executive Officer. Also, because GQMPs may cover broad areas potentially impacting multiple groundwater users in the plan area, these plans will be circulated for public review. Prior to plan approval, the Executive Officer will consider public comments on proposed GQMPs.

In accordance with Water Code section 13267, the burden of the GQMP, including costs, is reasonable, since 1) the monitoring and planning costs are significantly lower when undertaken regionally by the Steering Committee than requiring individual farmers to undertake similar monitoring and planning efforts, and 2) the Central Valley Water Board must be informed of the efforts being undertaken by growers to address identified groundwater quality problems. A regional GQMP is, therefore, a reasonable first step to address identified groundwater quality problems.

However, if the regional GQMP does not result in the necessary improvements to water quality, the burden, including costs, of requiring individual growers in the impacted area to conduct monitoring, describe their plans for addressing the identified problems, and evaluate their practices is a reasonable subsequent step. The benefits and necessity of such individual reporting, when regional efforts fail, include, but are not limited to: 1) the need of the board to evaluate the compliance of regulated growers with applicable orders; 2) the need of the board to understand the effectiveness of practices being implemented by GDA growers; and 3) the benefits of improved groundwater quality to all users.

VIII. Templates for Farm Evaluation, Nitrogen Management Plan, and Nitrogen Management Plan Summary Report (GDA Order)

The Central Valley Water Board intends to provide templates (Farm Evaluation; Nitrogen Management Plan, Nitrogen Management Plan Summary Report) to GDA growers that must be used to comply with the applicable reporting requirements of the GDA Order. The Central Valley Water Board allowed agricultural water quality coalitions and commodity groups to jointly propose templates to be used to satisfy the requirements of previous ILRP orders. The purposes of the templates are to collect information consistently across irrigated agricultural areas and commodities, and to minimize the costs for growers to provide that information. Consistent information collection will facilitate analysis within a geographic area and across the Central Valley. Those purposes may not be met if the Central Valley Water Board includes provisions that allows for submittal of proposed templates under each third-party order issued as part of the long-term irrigated lands regulatory program. However, the Central Valley Water Board recognizes that templates may require modifications for different geographic areas. Therefore, although the Steering Committee will not have an opportunity to develop new templates under the GDA Order, the Steering Committee will have an opportunity to provide comments on the templates' applicability to groundwater for its geographic area.

A. Grower Reports

The GDA Order requires that GDA growers prepare farm plans and reports as described below. The GDA Order establishes prioritization for farmer completion and updating of the farm plans and reports based on whether the operation is within a high or low vulnerability area. The Central Valley Water Board intends to provide templates for GDA farmer reports to the Steering Committee, who will have an opportunity to comment on the template applicability to its geographic area.

1. Farm Evaluations

The GDA Order requires that GDA growers complete a farm evaluation describing management practices implemented to protect groundwater quality. The evaluation also includes information such as location of the farm, location of in service wells and abandoned wells and whether wellhead protection practices have been implemented.

The GDA Order requires all members to complete the Farm Evaluation and submit it to the Steering Committee by 1 March 2017. The schedule for completing subsequent Farm Evaluations is based on whether the operation is within a high or low vulnerability area. Farm evaluations must be maintained at the farming operations headquarters or primary place of business and submitted to the Steering Committee for summary reporting to the Central Valley Water Board.

The farm evaluation is intended to provide the Steering Committee and the Central Valley Water Board with information regarding individual grower implementation of the GDA Order's requirements. Without this information, the board would rely solely on representative groundwater monitoring to determine compliance with water quality objectives. The board would not be able to determine through representative monitoring only whether all GDA growers are implementing protective practices, such as wellhead protection measures for groundwater. For groundwater protection practices, it may take years in many areas (even decades in some areas) before broad trends in groundwater may be measured and associated with implementation of the GDA Order. Farm evaluations will provide evidence that growers are implementing management practices to protect groundwater quality while Groundwater Quality Trend Monitoring data and Management Practices Evaluation Program (MPEP) information are collected.

The reporting of practices identified in the farm evaluation will allow the Steering Committee and board to effectively implement the MPEP. Evaluating management practices at representative sites (in lieu of farm-specific monitoring) only works if the results of the monitored sites can be extrapolated to non-monitored sites. One of the key ways to extrapolate those results will be to have an understanding of which farming operations have practices similar to the site that is monitored. The reporting of practices will also allow the board to determine whether the GQMP is being implemented by growers according to the approved schedule.

The focus of the reporting is on parcels in high vulnerability areas. The Central Valley Water Board needs to have an understanding of whether GDA growers are improving practices in those areas where groundwater quality are most impacted (or potentially impacted). Reporting frequency is annual for all sizes of farming operations in high vulnerability areas. The reporting frequency is every five years for all farming operations in low vulnerability areas. The Executive Officer is given the discretion to reduce the reporting frequency for growers in high vulnerability areas, if there are minimal year to year changes in the practices reported and the implemented practices are protective of water quality. This discretion is provided, since the reporting burden would be difficult to justify given the costs if there were minimal year to year changes in the information provided.

~~VII.~~ While ~~Technical Reports~~

~~The surface water quality monitoring under the~~the focus of the reporting is on high vulnerability areas, the MPEP requirement affects management practices implemented in both high and low

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vulnerability areas. Management practices identified as protective of groundwater quality through the MPEP (or equivalent practices) must be implemented by growers, where applicable, whether the grower is in a high or low vulnerability area (see section IV.B.20 of the GDA Order).

2. Nitrogen Management Plans

Nitrate derived from both agricultural and non-agricultural sources has resulted in degradation and/or pollution of groundwater beneath agricultural areas in California's Central Valley.[73] To address these concerns, the GDA Order requires that growers implement practices that minimize excess nitrogen application relative to crop consumption. Proper nutrient management will work to reduce excess plant nutrients, such as nitrogen, from reaching state waters. Nitrogen management must take site-specific conditions into consideration in identifying steps that will be taken and practices that will be implemented to minimize nitrate movement through surface runoff and leaching past the root zone.

GDA growers will be required to complete a nitrogen management plan according to the schedule in the GDA Order. A grower in a low vulnerability area is required to prepare nitrogen management plans, but does not need to certify the plans or provide summary reports to the Steering Committee. Should the groundwater vulnerability designation change from "low" to "high" vulnerability, those growers in the previously designated low vulnerability area would then need to have their nitrogen management plan certified and submit summary reports in accordance with a schedule issued by the Executive Officer.

For GDA growers located within a high vulnerability groundwater area, for which nitrate is identified as a constituent of concern, the plan must be certified in one of the following ways:

- Self-certified by the grower who attends a California Department of Food and Agriculture or other Executive Officer approved training program for nitrogen plan certification. The grower must retain written documentation of their attendance in the training program; or
- Self-certified by the grower that the plan adheres to a site-specific recommendation from the Natural Resources Conservation Service or the University of California Cooperative Extension. The grower must retain written documentation of the recommendation provided; or
- Certified by a nitrogen management plan specialist as defined in Attachment E of the GDA Order. Such specialists include Professional Soil Scientists, Professional Agronomists, Crop Advisors[74] certified by the American Society of Agronomy, or Technical Service Providers certified in nutrient management in California by the Natural Resources Conservation Service.
- Certified in an alternative manner approved by the Executive Officer. Such approval will be provided based on the Executive Officer's determination that the alternative method for preparing the nitrogen management plan meets the objectives and requirements of the GDA Order.

The GDA Order requires nitrogen management reporting (nitrogen management plan summary reports) for growers in high vulnerability groundwater areas. The first nitrogen management plan summary report must be submitted one year after the first nitrogen management plans are due. The nitrogen management plan summary report provides information on what was actually done the previous crop year, while the plan indicates what is planned for the upcoming crop year. Therefore, the first summary report is due the year following the implementation of the first nitrogen

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[73] ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft. March. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA. Appendix A, page 46.

[74] Should the California Department of Food and Agriculture and the California Certified Crop Adviser's establish a specific nitrogen management certification, any Certified Crop Adviser who certifies a nitrogen management plan must have a nitrogen management certification.

management plan. This reporting will provide the Steering Committee and the Central Valley Water Board with information regarding individual grower implementation of the GDA Order's requirements. Without this information, the board would rely primarily on groundwater monitoring to determine compliance with water quality objectives. Groundwater monitoring alone would not provide a real-time indication as to whether individual growers are managing nutrients to protect groundwater. Improved nitrogen management may take place relatively quickly, although it may take many years before broad trends in nitrate reduction in groundwater may be measured. Nitrogen management reporting will provide evidence that growers are managing nutrients to protect groundwater quality while trend data and Management Practices Evaluation Program information are collected.

Spatial Resolution of Nitrogen Management Plan and Farm Evaluation Information
The GDA Order requires reporting to the Central Valley Water Board of nitrogen management information and management practices identified through the farm evaluation. These data are required to be associated with the township (36 square mile area) where the farm is located. The spatial resolution by township provides a common unit that should facilitate analysis of data and comparisons between different areas.

Information collected from nitrogen management summary reports will be provided annually. The nitrogen management data collected by the Steering Committee from individual farmers will be aggregated by the township where the enrolled parcel is located and will not be associated with the farmer or their enrolled parcel. For example, the Steering Committee may have information submitted for 180 different parcels in a given township. At a minimum, the board would receive a statistical summary of those 180 data records describing the range, percentiles (10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}), and any outliers for similar soil conditions and similar crops in that township. A box and whisker plot or equivalent tabular or graphical presentation of the data approved by the Executive Officer may be used. Based on this analysis, the Central Valley Water Board intends to work with the Steering Committee to ensure that those farmers who are not meeting the nitrogen management performance standards identified in the GDA Order improve their practices. As part of its annual review of the monitoring report submitted by the Steering Committee, the board will evaluate the effectiveness of Steering Committee outreach efforts and trends associated with nitrogen management. The board intends to request information from the Steering Committee for those growers who, based on the board's evaluation of available information, do not appear to be meeting nitrogen management performance standards. The reporting of nitrogen management data may be adjusted based on the outcomes of the efforts of the State Water Resources Control Board's Expert Panel and the California Department of Food and Agriculture's Nitrogen Tracking and Reporting System Task Force (see Finding 46 and the State Water Board's Report to the Legislature[75]).

In order to determine whether growers in a given township are improving their practices, the Steering Committee will need to assess the data collected from Farm Evaluations and evaluate trends. The Steering Committee's assessment and evaluation, along with the data used to make the evaluation, will be provided in the Steering Committee's annual monitoring report. By receiving the individual data records identified to at least the township level, the board will be able to determine whether individual growers are in compliance and the board will be able to identify specific data records for additional follow-up (e.g., requesting that the Steering Committee provide the grower's name and parcel associated with the data record). The board will be able to independently verify the assessments and evaluations conducted by the Steering Committee. The board, as well as other stakeholders, can also conduct its own analysis and interpretation of the data, which may not be possible if only summary information for implemented management practices were provided. If the data suggest that growers are not improving their practices, the Executive Officer can require the

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[75] State Water Board Resources Control Board. 2013. Report to the Legislature, Recommendations Addressing Nitrate in Groundwater <http://www.swrcb.ca.gov/water_issues/programs/nitrate_project/docs/nitrate_rpt.pdf>

Steering Committee to submit the management practice or nitrogen management plan summary information in a manner that specifically identifies individual growers and their parcels.

IX. Technical Reports

A. GBP Order

The surface water quality monitoring under the GBP Order is regional in nature, since the GBP addresses drainage discharges at a regional level and responsibility for those discharges is assumed by entities with responsibility and authority in the Grassland Drainage Area. A benefit of regional monitoring is the ability to determine whether water bodies accepting discharges from the ~~Grassland Drainage Area~~GDA are meeting discharge and receiving water limitations. Regional monitoring allows the Central Valley Water Board to determine, at the regional level, whether implemented operations and actions are protective of water quality. There are limitations to regional monitoring when trying to determine possible sources of water quality problems.

Therefore, through the Surface Water Quality Management Plans, the Dischargers must evaluate the effectiveness of its operations in meeting discharge and receiving water limitations. Through the evaluations and studies conducted by the Dischargers, and the board's compliance and enforcement activities, the board will be able to determine whether is the Dischargers are complying with the GBP Order.

~~This~~The GBP Order requires the Dischargers to provide technical reports. These reports may include special studies at the direction of the Executive Officer. The Executive Officer may require special studies where the required monitoring is ineffective in determining potential sources of water quality problems. Special studies help ensure that the potential information gaps may be filled through targeted technical reports.

~~**VIII. Reports and Plans**~~

B. GDA Order

The trend groundwater quality monitoring under the GDA Order is representative in nature instead of individual field discharge monitoring. The benefits of representative monitoring include the ability to determine whether water bodies accepting discharges from numerous irrigated lands are meeting receiving water limitations (e.g., through selection of representative sampling locations and representative MPEP studies). Representative monitoring also allows the Central Valley Water Board ~~staff will post all~~ to determine whether practices are protective of water quality.

Therefore, through the Management Practices Evaluation Program and Groundwater Quality Management Plans, the Steering Committee must evaluate the effectiveness of management practices in protecting water quality. Since GDA growers must report the practices they are implementing to protect water quality, the information from the management practice evaluation can be applied to individual growers to determine whether their implemented practices are protective of groundwater quality.

An effective method of determining compliance with water quality objectives is water quality monitoring at the individual level. Individual monitoring may also be used to help determine sources of water quality problems. Individual monitoring of waste discharges is required under many other Water Board programs. An example of such program is the Central Valley Water Board's Dairy Program.[76] The costs of individual monitoring would be much higher than representative groundwater quality monitoring

[76] The dairy program requires individual monitoring of surface water discharges and allows for a "representative" groundwater monitoring in lieu of individual groundwater monitoring.

required under the GDA Order. Representative monitoring site selection may be based on a group or category of represented waste discharges that will provide information required to assess compliance for represented farmers, reducing the number of samples needed to evaluate compliance with the requirements of the GDA Order. The Steering Committee is tasked with ensuring that selected monitoring sites are representative of waste discharges to groundwater from all irrigated agricultural operations within the GDA Order's boundaries.

The GDA Order requires the Steering Committee to provide technical reports. These reports may include special studies at the direction of the Executive Officer. The Executive Officer may require special studies where representative monitoring is ineffective in determining potential sources of water quality problems or to identify whether management practices are effective. Special studies help ensure that the potential information gaps described above under the GDA Order's representative monitoring requirements may be filled through targeted technical reports, instead of more costly individual monitoring programs.

X. Reports and Plans

The GBP and GDA Orders are structured such that the Executive Officer is to make determinations regarding the adequacy of reports and information provided by the Dischargers (GBP Order) or the Steering Committee or GDA growers (GDA Order) and allows the Executive Officer to approve such reports. All plans and reports ~~required for~~that require approval by the Executive Officer will be posted on the board's website upon approval. In addition, the GDA Order identifies specific reports and Executive Officer's decisions that must be posted for public comment and review. It is the right of any interested person to request the Central Valley Water Board to review any of the aforementioned Executive Officer decisions.

XI. Approach to Implementation and Compliance and Enforcement (GDA Order)

The board has been implementing the Irrigated Lands Regulatory Program since 2003. The implementation of the program has included compliance and enforcement activities to ensure growers have the proper regulatory coverage and are in compliance with the applicable board orders. The following section describes the state-wide policy followed by the board, as well as how the board intends to implement and enforce the GDA Order.

The State Water Board's Water Quality Enforcement Policy (Enforcement Policy) defines an enforcement process that addresses water quality in an efficient, effective, and consistent manner[77]. A variety of enforcement tools are available in response to noncompliance. The Enforcement Policy endorses the progressive enforcement approach which includes an escalating series of actions from informal to formal enforcement. Informal enforcement actions are any enforcement taken by staff that is not defined in statute or regulation, such as oral, written, or electronic communication concerning violations. The purpose of informal enforcement is to quickly bring an actual, threatened, or potential violation to the discharger's attention and to give the discharger an opportunity to return to compliance as soon as possible. Formal enforcement includes statutorily based actions that may be taken in place of, or in addition to, informal enforcement. Formal enforcement is recommended as a first response to more significant violations, such as the highest priority violations, chronic violations, and/or threatened violations. There are multiple options for formal enforcement, including Administrative Civil Liabilities (ACLs) imposed by a Regional Water Board or the State Water Board. A 30-day public comment period is required prior to the settlement or imposition of any ACL and prior to settlement of any judicial civil liabilities.

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[77] State Water Resources Control Board. 2010. Water Quality Enforcement Policy. <http://www.swrcb.ca.gov/water_issues/programs/enforcement/docs/enf_policy_final111709.pdf>

A. Compliance/Enforcement Related to Grower Participation

Upon the adoption of other ILRP Orders, staff sent letters to thousands of landowners whose property may require regulatory coverage. Parcels that potentially need regulatory coverage are identified from readily available information sources, such as county tax assessor records; aerial photography; and the California Department of Conservation's Farmland Mapping and Monitoring Program. The staff also conducts inspections in the field to verify that parcels have an irrigated agricultural operation. The Assistant Executive Officer sends Water Code Section 13260 Directives when inspections verify that parcels require coverage under the ILRP, when growers who used to be growers are no longer listed on the annual membership lists, or when growers who received Executive Officer approval to join a third-party have not done so. The 13260 Directives require growers to enroll or re-instate their membership with a third-party, obtain coverage for their discharges under other applicable general waste requirements, or submit a Report of Waste Discharge to the Central Valley Water Board. As the highest level of informal enforcement, Notices of Violation (NOV's) are sent to growers who fail to respond to Orders and Directives, and direct the recipients obtain the proper regulatory coverage for their waste discharges. The board intends to issue Administrative Civil Liability Complaints to those growers who do not respond to the NOV. In addition, the board may enroll those growers under the general WDRs for dischargers not participating in a third-party group (R5-2013-0100), after such growers are provided an opportunity for a hearing.

B. Compliance/Enforcement Related to Quality Violations

The board intends to respond promptly to complaints and conduct field inspections on a routine basis to identify potential water quality violations. Complaints will generally result from local residents contacting the board based on their observations of sediment, taste or odor problems in groundwater. The board will generally contact and coordinate with the Steering Committee, the local county health department, and the local county agricultural commissioner depending on the nature of the problem.

In addition, the board staff will conduct field inspections of individual grower's operations to determine whether practices protective of groundwater are in place. Such practices include backflow prevention devices; well head protection; and those practices found protective through the Management Practices Evaluation Program. The informal and formal enforcement process described above will be used should any violations of the GDA Order be identified through field inspections.

C. Compliance/Enforcement Related to Information Collected

As a part of field inspections, and with the consent of the grower, owner or authorized representative as required by applicable laws, staff may also review information and farm plans prepared by growers. The Executive Officer will request information, as necessary, from growers and the Steering Committee to audit the quality and accuracy of information being submitted. The Executive Officer will regularly report to the board on the results of any audits of the information reported by the Steering Committee, the outcome of any field verification inspections of information submitted by the growers, and make recommendations regarding changes to the reporting requirements and the information submittal process, if needed. The findings of the GDA Order provide a further description of the enforcement priorities and process for addressing violations.

~~IX.~~XII. Water Quality Objectives

~~Surface water limitations in section II of the Order specify that waste discharge may not cause or contribute to an exceedance of discharge or receiving water limitations, or cause a trend in degradation that may threaten applicable beneficial uses, or cause a condition of pollution or nuisance.~~

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A. ~~Water quality objectives that apply to surface water are described in the *Water Quality Control Plan for the Sacramento and San Joaquin River Basins* (~~Surface Water (GBP Order)

The Basin Plan~~). Applicable~~ specifies water quality objectives for selenium, boron, and molybdenum at various locations (Table 5). While the Basin Plan includes a control program for salt and boron discharges to the lower San Joaquin, the Central Valley Water Board CV-SALTS program is working with stakeholders, including the Bureau and Water Authority, to implement the program. The 2009 Use Agreement contains monthly salinity load values dependent on the month and water year category. These values are based on salt load allocation in Table IV-4.4 of the Basin Plan, but have not been incorporated into the GBP Order to allow the Dischargers the flexibility to implement the CV-SALTS program. The Bureau has implemented a real-time management program[78] as described in Table IV 4.4.

Table 5: Selenium, Boron and Molybdenum Numerical Objectives

Constituent	Objectives	Maximum	Location
Selenium	5 µg/L 4-day average	20 µg/L	Mud Slough (north) and the San Joaquin River from the Mud Slough confluence to the Merced River
	5 µg/L 4-day average	12 µg/L	San Joaquin River, mouth of the Merced River to Vernalis
Boron	0.8 mg/L (15 March-15 September) 1.0 mg/L (16 September - 14 March) 1.3 mg/L (Critical Year)	2.0 mg/L 2.6 mg/L	San Joaquin River, mouth of the Merced River to Vernalis
Molybdenum	19 µg/L monthly average	50 µg/L	Salt Slough, Mud Slough (north) and San Joaquin River from Sack Dam to mouth of Merced River
	10 µg/L monthly average	15 µg/L	San Joaquin River, mouth of Merced River to Vernalis

The Basin Plan amendments allow discharges from the GBP area to continue to exceed selenium objectives at Mud Slough (north) and the San Joaquin River between the Mud Slough discharge and the confluence with the Merced River. Load limits for selenium set forth in the GBP Order and the required monitoring will determine if progress is being made to reach compliance with water quality objectives.

The compliance time schedule has been established for selenium in Mud Slough (north) and the San Joaquin River from the Mud Slough confluence to the Merced River. A performance goal specified in the Basin Plan for achieving 15 µg/L monthly mean is by 31 December 2015. The water quality objective (5 µg/L as 4-day average) must be met by 31 December 2019. Total maximum monthly loads (TMMLs) for selenium have been established based on the water quality objective (Table 6).

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[78] In 2014, the Central Valley Water Board adopted a Resolution R5-2014-0151 approving a Real Time Management Program for meeting salinity water quality objectives in the Lower San Joaquin River at Vernalis.

Table 6: Selenium Monthly Load Allocations for the Grassland Drainage Area[79]

Month	Discharge Limits (lbs of selenium) which apply no later than 31 December 2019			
	Critical	Dry/Below Normal	Above Normal	Wet
October	55	233	260	328
November	55	233	260	328
December	152	319	398	211
January	151	319	398	211
February	93	185	472	488
March	92	184	472	488
April	101	193	490	506
May	105	197	497	512
June	69	130	212	354
July	70	131	214	356
August	75	137	225	366
September	57	235	264	332
Total	1075	2496	4162	4480

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B. Groundwater (GDA Order)

Water quality objectives that apply to groundwater include, but are not limited to, (1) ~~the~~ numeric objectives, including the bacteria objective~~,~~ and the chemical constituents objective (includes ~~listed chemicals and state drinking water standards, i.e., maximum contaminant levels (~~state MCLs~~)~~ promulgated in Title 22 ~~California Code of Regulations (~~CCR~~)~~ Division 4, Chapter 15 section~~s~~ 64431~~,~~ and 64444 and ~~6449 that~~ are applicable through the Basin Plan to ~~waters designated as~~ municipal and domestic supply), ~~dissolved oxygen objectives, pH objectives, the salinity objectives, and the turbidity objectives; and (2) the~~ and (2) narrative objectives~~,~~ including ~~the biostimulatory substances objective,~~ the chemical constituents ~~objective,~~, taste and ~~the~~odor, and toxicity ~~objective. The Basin Plan also contains numeric water quality objectives that apply to specifically identified water bodies, such as the areas in the Grassland Bypass Project. The Basin Plan includes performance goals and discharge and receiving water limitations for the Grassland area. Federal water quality criteria that apply to surface water are contained in federal regulations referred to as the California Toxics Rule and the National Toxics Rule. See 40 CFR sections 131.36 and 131.38.~~objectives.

The requirements that waste discharge not unreasonably affect beneficial uses or cause a condition of pollution or nuisance are prescribed pursuant to sections 13263 and 13241 of the California Water Code. Section 13263 of the California Water Code requires Regional Water Boards, when establishing waste discharge requirements, to consider the need to prevent nuisance and the provisions in section 13241 of the California Water Code. Section 13241 requires Regional Water Boards to consider several factors when establishing water quality objectives including prevention of nuisance and reasonable protection of beneficial uses.

~~A.~~C. Implementation of Water Quality Objectives

The Basin Plan includes numeric and narrative water quality objectives. The narrative toxicity objective states: *"All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life."* The Basin Plan states that material and relevant information, including numeric criteria, and recommendations from other agencies and scientific

[79] The discharge limits in Table 6 are based on the calculated load allocation needed to meet the water quality objectives for San Joaquin River at Crows Landing. The monthly load allocation is based on the water year classification applied to the following calendar year. For example, load limits for October through December 2014 are based on the water year classification for October 2013 through September 2014.

literature will be utilized in evaluating compliance with the narrative toxicity objective. The narrative chemical constituent objective states that waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. At a minimum, *"…water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs)"* in Title 22 of the California Code of Regulations (CCR). The Basin Plan further states that, to protect all beneficial uses, the Regional Water Board may apply limits more stringent than MCLs. The narrative tastes and odors objective states: *"Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to domestic or municipal water supplies or to fish flesh or other edible products of aquatic origin, or that cause nuisance, or otherwise adversely affect beneficial uses."*

The Sacramento-San Joaquin Basin Plan at page IV-16.00, contains an implementation policy, "~~Policy for~~ Application of Water Quality Objectives," that specifies that the Central Valley Water Board "*will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives*." With respect to narrative objectives, the Regional Water Board must establish limitations using one or more of three specified sources, including: (1) USEPA's published water quality criteria, (2) a proposed state criterion (i.e., water quality objective) or an explicit state policy interpreting its narrative water quality criteria (i.e., the Regional Water Board's "Policy for Application of Water Quality Objectives"), or (3) an indicator parameter. For purposes of ~~this~~the GBP Order, all three sources will be used as part of the process described below.

Implementation of numeric and narrative water quality objectives under the GBP Order involves an iterative process. The GBP Order's MRP establishes management plan trigger limits that are equivalent to the applicable Basin Plan numeric water quality objectives. For constituents that are not assigned Basin Plan numeric water quality objectives, Central Valley Water Board staff will develop trigger limits in consultation with the Department of Pesticide Regulation (for pesticides) and other agencies as appropriate. Central Valley Water Board staff will provide interested parties, including the Dischargers, with an opportunity to review and comment on the trigger limits. The Executive Officer will then provide the trigger limits to the Dischargers. Those trigger limits will be considered the numeric interpretation of the applicable narrative objectives. In locations where trigger limits are exceeded, water quality management plans must be developed that will form the basis for reporting which steps have been taken to achieve compliance with numeric and narrative water quality objectives.

~~X.~~XIII. Non-Point Source (NPS) Program

~~This~~The GBP Order regulates waste discharges from irrigated agricultural lands to state waters at a specific location with limits set within the Basin Plan. As such, even though the source of the discharge is an NPS, the discharge to state waters is covered by a WDR with discharge and receiving water limits and a time schedule for compliance specified in the Basin Plan.

The GDA Order regulates waste discharges from irrigated agricultural lands to state waters as an NPS program. Accordingly, the waste discharge requirements must implement the provisions of the State Water Board's *Policy for Implementation and Enforcement of the Nonpoint Source Pollution Control Program* (NPS Policy). Under the NPS Policy, the Regional Water Board must find that the program will promote attainment of water quality objectives. The ~~nonpoint~~non-point-source program also must meet the requirements of five key structural elements. These elements include (1) the purpose of the program must be stated and the program must address NPS pollution in a manner that achieves and maintains water quality objectives and beneficial uses, including any applicable antidegradation requirements; (2) describe the practices to be implemented and processes to be used to select and verify proper implementation of practices; (3) where it is necessary to allow time to achieve water quality requirements, include a specific time schedule, and corresponding quantifiable milestones designed to measure progress toward reaching specified requirements; (4) feedback mechanisms to determine whether the program is achieving its purpose; and (5) the consequences of failure to achieve the stated purpose.

[This Order addresses]The GBP and GDA Orders address each of the five key elements, as described below.

(1) [this]the GBP Order is to address the water quality impacts of surface water discharges from the area served by the GBP. The principal goal of the GBP is summarized as providing for the achievement of the water objectives set by the board and the Basin Plan related to subsurface drainage discharges from the Grassland Drainage Area while maintaining viable agricultural production in the area. The requirements of [this]the GBP Order include requirements to meet discharge and receiving water limitations, applicable water quality objectives as stated in the Basin Plan and the requirements of State Water Board Resolution 68-16 (antidegradation requirements). Further discussion of [this]the GBP Order's implementation of antidegradation requirements is given below under the section titled "State Water Board Resolution 68-16."

The purpose of the long-term irrigated lands regulatory program, of which the GDA Order is an implementing mechanism, is stated above under the section titled "Goals and Objectives of the Irrigated Lands Regulatory Program."[80] The program goals and objectives include meeting water quality objectives. The requirements of the GDA Order include requirements to meet applicable water quality objectives and the requirements of State Water Board Resolution 68-16 (antidegradation requirements). Further discussion of the GDA Order's implementation of antidegradation requirements is given below under the section titled "State Water Board Resolution 68-16."

(2) The board is prevented by Water Code section 13360 from prescribing specific management practices [or measures]to be implemented. However, it may set forth performance standards and require dischargers to report on what [measures]practices they have or will implement to meet those standards. [This]

The GBP Order requires that the Dischargers report in the Drainage Management Plan updates on the actions that have or will be implemented to achieve compliance with discharge and receiving water limitations. The update will include the description of various control or management practices utilized to control the discharge of selenium and other constituents of concern and the milestones achieved set in the Basin Plan or previous annual reports under the Drainage Management Plan. The Drainage Management Plan may be submitted as part of the Annual Monitoring Report.

For the GDA Order, examples of the types of practices that irrigated agricultural operations may implement to meet program goals and objectives have been described in the Economics Report[81] and evaluated in the Program Environmental Impact Report (PEIR)[82] for the long-term ILRP. The GDA Order requires each individual operation to develop a farm evaluation that will describe their management practices in place to protect groundwater quality. The GDA Order also requires the development of groundwater quality management plans (GQMPs) in areas where there are exceedances of water quality objectives. The requirements for GQMPs include that the third-party identifies management practices and develop a process for evaluating the effectiveness of such practices. The requirements of the GDA Order are consistent with Key Element 2.

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[80] The goals and objectives were developed as part of the ILRP Program Environmental Impact Report, ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft. March. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA.

[81] The goals and objectives were developed as part of the ILRP Program Environmental Impact Report, ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft. March. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA.

[82] ICF International. 2011. *Irrigated Lands Regulatory Program - Program Environmental Impact Report*. Final and Draft. March. (ICF 05508.05.) Sacramento, CA. Prepared for Central Valley Regional Water Quality Control Board, Sacramento, CA.

(3) [This]The GBP Order requires the development and implementation of a management plan to meet water quality objectives stated in the Basin Plan. A time schedule for compliance with the Basin Plan objectives is part of this Order. In addition, [this]the GBP Order requires the development of SQMPs when water quality objectives are not met. For constituents that do not have a specific time schedule in the Basin Plan, SQMPs must include time schedules for implementing the plans and meeting the receiving water limitations (section II of the Order) as soon as practicable, but within a maximum of 10 years. The time schedules for the SQMPs must be consistent with the requirements for time schedules set forth in [this]the GBP Order. The time schedules must include quantifiable milestones that will be reviewed by the Executive Officer and the public prior to approval. The time schedule requirements in [this]the GBP Order are consistent with Key Element 3.

The GDA Order requires the development of GQMPs in areas where water quality objectives are not met. GQMPs must include time schedules for implementing the plans and meeting the groundwater receiving water limitations (section III of the Order) as soon as practicable, but within a maximum of 10 years for groundwater. The time schedules must be consistent with the requirements for time schedules set forth in the GDA Order. The time schedules must include quantifiable milestones that will be reviewed by the Executive Officer and the public prior to approval. The time schedule requirements in the GDA Order are consistent with Key Element 3.

(4) [To provide]Both Orders require feedback on whether program goals are being achieved[, this Order requires]. The GBP and GDA Orders require surface water [and groundwater]quality monitoring[. This], respectively. The feedback will allow iterative implementation of practices to ensure that program goals are achieved. This feedback mechanisms required by [this Order]the GBP and GDA Orders are consistent with Key Element 4.

(5) [This Order establishes]The Orders establish the following consequences where requirements are not met:

(a) The Dischargers (GBP Order) or the Steering Committee or GDA growers (GDA Order) will be required, in an iterative process, to conduct additional monitoring and/or implement actions/measures when discharge or receiving water limitations or water quality objectives are not being met[;].

(b) Appropriate Central Valley Water Board enforcement action where the iterative process is unsuccessful, program requirements are not met, or time schedules are not met[;].

[This Order describes]Both Orders describe consequences for failure to meet requirements and is consistent with Key Element 5.

[XI.]XIV. California Environmental Quality Act (CEQA)

A. [This]GBP Order

The GBP Order is covered by the Environmental Impact Statement and Environmental Impact Report for the Grassland Bypass Project (EIS/EIR).[83] The lead agency for the EIS [was]is the U.S. Bureau of Reclamation. The lead agency pursuant to CEQA (Public Resources Code section 21100 et [-]seq.) [was]is the San Luis & Delta-Mendota Water Authority. A Notice of Determination (NOD) was filed on 12 October 2009.[84] A Record of Decision (ROD-07-141) was issued in December 2009. No legal challenges were made to either decision[s].

[83] Entrix, 2009. *Grassland Bypass Project, 2010-2019, Environmental Impact Statement and Environmental Impact Report.* Final August 2009. Concord, CA. Prepared for: U.S. Bureau of Reclamation, South Central California Office and Mid-Pacific Region; and San Luis & Delta-Mendota Water Authority, Los Banos, CA

[84] NOD filed for the Grassland Bypass Project, 2010-2019, State Clearinghouse Number 2007121110.

~~This~~The GBP Order relies on the environmental impact analysis contained in the EIS/EIR to satisfy the requirements of CEQA. The EIS/EIR identifies the following mitigation measures that apply to surface water discharges regulated by ~~this~~the GBP Order:

- Update and implement a water quality monitoring program.
  Results of the monitoring program for the GBP will be reviewed semi-annually, or more frequently as required, by the Oversight Committee. If unacceptable problems or impacts are identified, appropriate mitigative actions will be identified by the Oversight Committee to address the problems.

  Appropriate mitigative actions may include, but not necessarily be limited to, interruption of specific identified contaminant pathways through hazing or habitat manipulation; increased management, enhancement, and recovery activities directed at impacted species in channels cleaned up as a result of the GBP, and/or establishment and attainment of more stringent contaminant load reductions. The costs of mitigation, as well as any required cleanup, will be borne by the draining parties. Monitoring to ensure the mitigative actions are effective will be required or continued to evaluate effectiveness.

- Implement the Storm Event Plan developed in 2007 when trigger event occurs.
  When major storm events occur, the Grassland Bypass Channel may not be able to handle the combined commingled discharge of surface runoff, storm water flows and agricultural drainage Flow may be diverted to Grassland Water District channels. Increased water velocities in the Drain have the potential to scour and damage the structural integrity of the Drain, as well as releasing the accumulated sediment in the channel. The Storm Event Plan details a process for notifying regulatory and system users, the trigger velocity when gates to the Grassland Water District supply channel may be opened and then closed, and a requirement for daily monitoring to determine quantity and quality of the bypassed flows.

~~The board Order requires implementation of these mitigation measures.~~

The board Order requires implementation and reporting of these mitigation measures. These measures are in addition to mitigation measures found in the Use Agreement, the EIS/EIR, and the Biological Opinion from the U.S. Fish and Wildlife Service.[85] These additional mitigation measures in the other documents include a provision of water to enhance wildlife management areas and development of mitigation funds from monthly fees applicable to each pound of selenium discharged commencing in 2015, as well as mitigation achieved through environmental commitments regarding operations, spill prevention, downstream users notification, regional archaeology, protection of China Island, Mud Slough, sediment and ongoing load reduction assurance measures. The status of mitigation measures will be reported in the Annual Report as required by the MRP.

The Dischargers have complied with the habitat mitigation requirements in the affected reaches of Mud Slough (north) and the San Joaquin River by paying for the delivery of water to California Department of Fish and Wildlife for the creation of 95 acres of wetland (China Island), and by funding the habitat enhancement and water deliveries to U.S. Fish and Wildlife Service for 32 acres of created wetlands (Schwab Unit).

B. GDA Order

For the purposes of adoption of the GDA Order, the Central Valley Water Board is the lead agency pursuant to CEQA (Public Resources Code sections 21100 et seq.). The Central Valley Water Board has prepared a Final Program Environmental Impact Report (PEIR)[86] that analyzes the potential

[85] Memorandum, "Endangered Species Consultation on the Proposed Continuation of the Grassland Bypass Project, 2010-2019", dated 18 December 2009.
[86] Ibid.

environmental impacts of six program alternatives for a long term ILRP. As described more fully in Attachment D, the GDA Order relies upon the PEIR for CEQA compliance. The requirements of the GDA Order include regulatory elements that are also contained in the six alternatives analyzed in the PEIR. Therefore, the actions by growers to protect water quality in response to the requirements of the GDA Order are expected to be similar to those described for Alternatives 2-6 of the PEIR (Alternative 1 does not include groundwater protection).

The PEIR describes that potential environmental impacts of all six alternatives are associated with implementation of water quality management practices, construction of monitoring wells, and impacts to agriculture resources (e.g., loss of production of prime farmland) due to increased regulatory costs. Under the GDA Order, GDA growers will be required to implement water quality management practices to address water quality concerns. The PEIR describes and evaluates potential impacts of practices likely to be implemented to meet water quality and other management goals on irrigated lands. These water quality management practices include:

- Nutrient management
- Improved water management
- Tailwater recovery system
- Pressurized irrigation
- Sediment trap, hedgerow, or buffer
- Cover cropping or conservation tillage
- Wellhead protection

These practices are examples of the types of practices that would be broadly applied by irrigated agricultural operations throughout the Central Valley and are considered representative of the types of practices that would have potential environmental impacts. It is important to note that the evaluated practices are not required; operators will have the flexibility to select practices to meet water quality goals. The GDA Order represents one order in a series of orders that has been developed, based on the alternatives evaluated in the PEIR for all irrigated agriculture within the Central Valley.

The GDA growers and water districts have implemented several management practices and activities to minimize subsurface drainage discharges into surface waters of the state. These practices and activities include the installation of tailwater recovery systems, isolation of tailwater from subsurface drainage, and lining canals and installing piping to reduce seepage. With GDA Order regulating discharges to groundwater only, it is possible to further narrow the types of practices that may be implemented in response to the requirements in the GDA Order. Of the types of management practices evaluated in the PEIR, only the following would be applicable to the GDA growers with respect to discharges to groundwater:

- Improved water management
- Tailwater recovery system
- Pressurized irrigation
- Nutrient management
- Wellhead protection

As described in the PEIR for Alternatives 2-6, the combination of an operator's choice of management practice and where that practice is implemented (i.e., located within a sensitive resource area) may result in significant environmental impacts for the following resource areas:

- Cultural resources: Potential loss of resources from construction and operation of management practices and monitoring wells.
- Noise and vibration: Exposure of sensitive land uses to noise from construction and operation of management practices (e.g., pump noise) and monitoring wells.

- Air quality: Generation of construction and operational emissions from management practices and monitoring wells (e.g., equipment and pump emissions generated during construction and continued operation of practices).
- Climate change: Cumulative, from a potential increase in greenhouse gas emissions.
- Vegetation and wildlife: Loss of habitat, wildlife, and wetland communities from construction and operation of practices and monitoring wells (e.g., loss of habitat if a practice is sited in a previously undisturbed area). Cumulative loss of habitat.
- Fisheries: Loss of habitat from construction of management practices and monitoring wells.
- Agriculture resources: Loss of farmland from increased regulatory cost. Cumulative loss of agriculture resources.

The above is a generalized summary of affected resource areas. The reader is directed to the Attachment D, Findings of Fact and Statement of Overriding Considerations, of the GDA Order for specific impacts and discussion. Attachment D provides a listing of the above impacts, the written findings regarding those impacts consistent with § 15091 of the CEQA Guidelines, and the explanation for each finding.

Mitigation Measures

The impacts described above, except for agriculture resources, cumulative climate change, and cumulative vegetation and wildlife can be reduced to a less than significant level through the employment of alternate practices or by choosing a location that avoids sensitive areas (e.g., installing a monitoring well that is already disturbed rather than in an area with undisturbed habitat). Where no alternate practice or less sensitive location for a practice exists, the GDA Order requires that the Steering Committee and GDA growers choosing to employ these practices avoid impacts to sensitive resources by implementing the mitigation measures described in Attachment C. A CEQA Mitigation Monitoring and Reporting Program is included in Attachment B of the GDA Order, Monitoring and Reporting Program R5-2015-XXXX.

~~XII.~~XV. Statement of Policy With Respect to Maintaining High Quality Waters in California (State Water Board Resolution 68-16)

This section of the Information Sheet first provides background on State Water Board Resolution 68-16 *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (Resolution 68-16). Following the background discussion, the Information Sheet describes how the various provisions in the WDR and MRP collectively implement Resolution 68-16. In summary, the requirements of Resolution 68-16 are met through a combination of upfront project-level planning and implementation~~;~~ at the regional (GBP Order) or farm level (GDA Order), representative monitoring and assessments to determine whether trends~~;~~ in degradation are occurring, and regional planning and ~~revisions to project~~on-farm implementation when ~~trends in~~ degradation trends are identified~~. This project has been in operation since 1996 and it has been regulated by WDRs since 1998. Monitoring has demonstrated that there have been significant reductions in the discharge of selenium and salt~~.

~~Regional~~

For the GBP Order, regional trend monitoring of surface water together with periodic assessments of available surface water information is required to determine compliance with water quality objectives and determine whether any trends in water quality improvement or degradation are occurring. If trends in such degradation are identified that could result in impacts to beneficial uses, a surface quality management plan must be prepared by the Dischargers. The plan must include the identification of steps that will be implemented to address the trend in degradation and an evaluation of the effectiveness of those practices in addressing the degradation. Failure to implement improved practices will result in further direct regulation by the board, including, but not limited to, taking enforcement action.

~~A separate Board order~~For the GDA Order, the GDA growers will ~~be developed~~need to conduct an on-farm evaluation to determine whether their practices are protective of water quality and whether they are meeting the established farm management performance standards. Through the process of becoming aware of effective management practices, evaluating their practices, and implementing improved practices, growers are expected to meet the farm management performance standards and, thereby, achieve best practicable treatment or control (BPTC), where applicable. GDA growers must prepare and implement a farm-specific nitrogen management plan. Implementation of the nitrogen management plan should result in achieving BPTC for ~~regulation of discharges~~nitrates discharged to groundwater ~~from the area served~~.

Representative monitoring of groundwater together with periodic assessments of available groundwater information is required to determine compliance with water quality objectives and determine whether any trends in water quality (improvement or degradation) are occurring. If trends in such degradation are identified that could result in impacts to beneficial uses, a groundwater quality management plan must be prepared by the ~~GBP.~~ Steering Committee. The plan must include the identification of practices that will be implemented to address the trend in degradation and an evaluation of the effectiveness of those practices in addressing the degradation. The Steering Committee must report on the implementation of practices by its growers. Failure of individual farmers to implement practices to meet farm management performance standards or address identified water quality problems will result in further direct regulation by the board, including, but not limited to, requiring individual farm water quality management plans, regulating the individual grower directly through WDRs for individual farmers, or taking other enforcement action.

As discussed further below, the combination of these requirements fulfills the requirements of Resolution 68-16 for any degradation of high quality waters authorized by ~~this~~the GDA Order.

A. Background

Basin Plan water quality objectives are developed to ensure that beneficial uses are protected. The quality of some state surface waters is higher than established Basin Plan water quality objectives. For example, nutrient levels in good, or "high quality" waters may be very low, or not detectable, while existing water quality standards for nutrients may be much higher. In such waters, some degradation of water quality may occur without compromising protection of beneficial uses. State Water Board Resolution 68-16 *Statement of Policy with Respect to Maintaining High Quality of Waters in California* (Resolution 68-16) was adopted in October of 1968 to address high quality waters in the state. Title 40 of the Code of Federal Regulations, Section 131.12 -- Antidegradation Policy (40 CFR 131.12) was developed in 1975 to ensure water quality necessary to protect existing uses in waters of the United States. Resolution 68-16 applies to discharges to all high quality waters of the state (Water Code section 13050[e]); 40 CFR 131.12 applies only to surface waters.

The requirement to implement the Antidegradation Policy is contained in Resolution 68-16 (provision 2 presented below) and in the Basin Plan. The Basin Plan states that the Central Valley Water Board actions must conform to State Water Board plans and policies and among these policies is Resolution 68-16, which requires that:

1. *"Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies."*
2. *"Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and*

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(b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."

For discharges to surface waters only, the Federal Antidegradation Policy (Section 131.12, Title 40, CFR) requires:

1. *"Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.*
2. *Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control.*
3. *When high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.*
4. *In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act."*

The State Water Board has interpreted Resolution 68-16 to incorporate the Federal Antidegradation Policy in situations where the policy is applicable~~.~~ (SWRCB Order WQ 86-17). The application of the Federal Antidegradation Policy to nonpoint source discharges (including discharges from irrigated agriculture) is limited.[87]

Administrative Procedures Update (APU) 90-004, Antidegradation Policy Implementation for NPDES Permitting, provides guidance for the Regional Water Boards in implementing Resolution 68-16 and 40 CFR 131.12, as these provisions apply to NPDES permitting. APU 90-004 is not applicable in the context of this Order because nonpoint discharges from agriculture are exempt from NPDES permitting.

A number of key terms are relevant to application of Resolution 68-16 to the GBP and ~~40 CFR 131.12 to this Order~~GDA Orders. These terms are described below.

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[87] 40 CFR 131.12(a)(2) requires that the "State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and *all cost-effective and reasonable best management practices for nonpoint source control*." The EPA Handbook, Chapter 4, clarifies this as follows: "Section 131.12(a)(2) does not mandate that States establish controls on nonpoint sources. The Act leaves it to the States to determine what, if any, controls on nonpoint sources are needed to provide attainment of State water quality standards (See CWA Section 319). States may adopt enforceable requirements, or voluntary programs to address nonpoint source pollution. Section 40 CFR 131.12(a)(2) does not require that States adopt or implement best management practices for nonpoint sources prior to allowing point source degradation of a high quality water. However, States that have adopted nonpoint source controls must assure that such controls are properly implemented before authorization is granted to allow point source degradation of water quality." Accordingly, in the context of nonpoint discharges, the BPTC standard established by state law controls.

High Quality Waters: Resolution 68-16 applies whenever "existing quality of water is better than quality established in policies as of the date such policies become effective,"[88] and 40 CFR 131.12 refers to "quality of waters [that] exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation." Such waters are "high quality waters" under the state and federal antidegradation policies. In other words, high quality waters are waters with a background quality of better quality than that necessary to protect beneficial uses.[89] The Water Code directs the State Water Board and the Regional Water Boards to establish water quality objectives for the reasonable protection of beneficial uses. Therefore, where water bodies contain levels of water quality constituents or characteristics that are better than the established water quality objectives, such waters are considered high quality waters.

Both state and federal guidance indicate~~s~~ that the definition of high quality waters is established by constituent or parameter [State Water Board Order WQ 91-10~~;~~, USEPA Water Quality Handbook, Chapter 4 Antidegradation (40 CFR 131.12) ("EPA Handbook")]. Waters can be of high quality for some constituents or beneficial uses but not for others. With respect to degraded groundwater, a portion of the aquifer may be degraded with waste while another portion of the same aquifer may not be degraded with waste. The portion not degraded is high quality water within the meaning of Resolution 68-16 (see State Water Board Order WQ 91-10).

In order to determine whether a water body is ~~a~~ high quality water with regard to a given constituent, the background quality of the water body unaffected by the discharge must be compared to the water quality objectives. If the quality of a water body has declined since the adoption of the relevant policies and that subsequent lowering was not a result of regulatory action consistent with the state antidegradation policy, a baseline representing the historically higher water quality may be an appropriate representation of background.[90] However, if the decline in water quality was permitted consistent with state and federal antidegradation policies, the most recent water quality resulting from permitted action constitutes the relevant baseline for determination of whether the water body is high quality (see, e.g., SWRCB Order WQ 2009-0007, page 12). Additionally, if water quality conditions have improved historically, the current higher water quality would again be the point of comparison for determining the status of the water body as ~~a~~ high quality water.

Best Practicable Treatment or Control: Resolution 68-16 requires that, where degradation of high quality waters is permitted, best practicable treatment or control (BPTC) limits the amount of degradation that may occur. Neither the Water Code nor Resolution 68-16 defines the term "best practicable treatment or control."

Despite the lack of a BPTC definition, certain State Water Board water quality orders and other documents provide direction on the interpretation of BPTC. The State Water Board has stated: "one factor to be considered in determining BPTC would be the water quality achieved by other similarly situated dischargers, and the methods used to achieve that water quality" (see Order WQ 2000-07, pages 10-11). In a "Questions and Answers" document for Resolution 68-16 (the Questions and Answers Document), BPTC is interpreted to additionally include a comparison of the proposed method to existing proven technology~~;~~, evaluation of performance data (through treatability studies~~);~~), comparison of alternative methods of treatment or control, and consideration of methods currently

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88 Such policies would include policies such as State Water Board Resolution 88-63, Sources of Drinking Water Policy, establishing beneficial uses, and water quality control plans.

89 USEPA Water Quality Handbook, Chapter 4 Antidegradation (40 CFR 131.12) , defines "high quality waters" as "those whose quality exceeds that necessary to protect the section 101(a)(2) goals of the Act [Clean Water Act], regardless of use designation."

90 The state antidegradation policy was adopted in 1968~~;~~ therefore water quality as far back as 1968 may be relevant to an antidegradation analysis. For purposes of application of the federal antidegradation policy only, the relevant year would be 1975.

used by the discharger~~s~~ or similarly situated dischargers.[91] The costs of the treatment or control should also be considered. Many of the above considerations are made under the "best efforts" approach described later in this section. In fact, the State Water Board has not distinguished between the level of treatment and control required under BPTC and what can be achieved through "best efforts."

The Regional Water Board may not "specify the design, location, type of construction~~,~~ or particular manner in which compliance may be had with [a] requirement, order, or decree" (Water Code 13360). However, the Regional Water Board still must require the discharger~~s~~ to demonstrate that the proposed manner of compliance constitutes BPTC (SWRCB Order WQ 2000-~~7~~07). The requirement of BPTC is discussed in greater detail below.

Maximum Benefit to People of the State: ~~-~~ Resolution 68-16 requires that where degradation of water quality is permitted, such degradation must be consistent with the "maximum benefit to people of the state." Only after "intergovernmental coordination and public participation" and a determination that "allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located" does 40 CFR 131.12 allow for degradation.

As described in the Question and Answers Document, factors considered in determining whether degradation of water quality is consistent with maximum benefit to people of the State include economic and social costs, tangible and intangible, of the proposed discharge, as well as the environmental aspects of the proposed discharge, including benefits to be achieved by enhanced pollution controls. With reference to economic costs, both costs to the dischargers and the affected public are considered. Closely related to the BPTC requirement, consideration must be given to alternative treatment and control methods and whether lower water quality can be abated or avoided through reasonable means, and the implementation of feasible alternative treatment or control methods should be considered.

USEPA guidance clarifies that the federal antidegradation provision "is not a 'no growth' rule and was never designed or intended to be such. It is a policy that allows public decisions to be made on important environmental actions. Where the state intends to provide for development, it may decide under this section, after satisfying the requirements for intergovernmental coordination and public participation, that some lowering of water quality in "high quality waters" is necessary to accommodate important economic or social development" (EPA Handbook for Developing Watershed Plans to Restore and Protect Our Waters, Chapter 4). Similarly, under Resolution 68-16, degradation is permitted where maximum benefit to the people of the state is demonstrated.

Water Quality Objectives and Beneficial Uses: As described above, Resolution 68-16 and Section 40 CFR 131.12 are both site-specific evaluations that are not easily employed to address large areas or broad implementation for classes of discharges. However, as a floor, any degradation permitted under the antidegradation policies must not cause an exceedance of water quality objectives or a pollution or nuisance. Furthermore, the NPS Policy establishes a floor for all water bodies in that implementation programs must address NPS pollution in a manner that achieves and maintains water quality objectives and beneficial uses. ~~This Order allows a set time period in which the Dischargers exceed water quality objectives while establishing the controls and treatment required to meet those objectives.~~

Waters that are Not High Quality: The "Best Efforts" Approach

: Where a water body is ~~at or exceeding water quality objectives already, it is~~ not ~~a~~ high quality ~~water~~ and ~~is not subject to the requirements of~~ the antidegradation ~~policy. Data collected by~~policies are

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[91] See *Questions and Answers, State Water Resources Control Board, Resolution 68-16* (February 16, 1995).

accordingly not triggered, the Central Valley Water Board[, dischargers, federal and] should, under State [agencies, and others demonstrate]Water Board precedent, set limitations more stringent than the objectives set forth in the Basin Plan. The State Water Board has directed that [water bodies receiving discharge from the GBP are already impaired], "where the constituent in a groundwater basin is already at or exceeding the water quality objective, the Regional Water Board should set limitations more stringent than the Basin Plan objectives if it can be shown that those limitations can be met using 'best efforts.'" SWRCB Order WQ 81-5; *see also* SWRCB Orders Nos. WQ 79-14, WQ 82- 5, WQ 2000-07. Finally, the NPS Policy establishes standards for [some constituents associated with irrigated agricultural activities.]management practices.

The "best efforts" approach involves the Regional Water Board establishing limitations expected to be achieved using reasonable control measures. Factors which should be analyzed under the "best efforts" approach include the effluent quality achieved by other similarly situated dischargers, the good faith efforts of the discharger to limit the discharge of the constituent, and the measures necessary to achieve compliance (SWRCB Order WQ 81-5, page 7). The State Water Board has applied the "best efforts" factors in interpreting BPTC. ([s]See SWRCB Order Nos. WQ 79-14, and WQ 2000-07).

In summary, the board may set discharge limitations more stringent than water quality objectives even outside the context of the antidegradation policies. The "best efforts" approach must be taken where a water body is not "high quality" and the antidegradation policies are accordingly not triggered.

B. Application of Resolution 68-16 Requirements to th[is]e Order

GBP Order

The determination of a high quality water within the meaning of the antidegradation policies is water body and constituent-specific.

[As stated above, some]Some water bodies receiving discharge from the GBP are already impaired for some constituents. Those same receiving water bodies meet objectives for particular constituents and would be considered "high quality waters" with respect to those constituents.

The temporary degradation of Mud Slough (north) and the San Joaquin River between Mud Slough (north) and the Merced River is allowed through policies established in the Basin Plan. This temporary degradation is allowed because: 1) the continuation of the GBP discharges diverts drainage away from Salt Slough and the wetland water supply channels listed in Appendix 40, as afforded by the regional drainage management project, and has long-term environmental benefits to the wildlife utilizing this portion of the Pacific Flyway and the Grasslands Ecological Area; 2) the farm-based economy of the area would be adversely affected by the discontinuation of the GBP; and 3) it provides time for the development of regional drainage management capability to meet water quality objectives.

Any application of the antidegradation requirements must account for the fact that at least some of the waters into which the subsurface agricultural wastes discharge are high quality waters for some constituents. Further, the Order provisions should also account for the fact that even where a water body is not high quality (such that discharge into that water body is not subject to the antidegradation policy), the board should, under State Water Board precedent, impose limitations more stringent than the objectives set forth in the Basin Plan, if those limits can be met by "best efforts."

The WDR and MRP for the Grassland Bypass Project are intended to allow a means for [Grassland Area Farmers]the Dischargers to work with GDA growers to implement measures to meet the discharge and receiving limitations, and eventually the water quality objectives for the San Joaquin River. Continuation of the Project will allow water quality to improve by the implementation of "best effort" measures by the [Grassland Area Farmers]GDA growers.

GDA Order

Very little guidance has been provided in state or federal law with respect to applying the antidegradation policy to a program or general permit where multiple water bodies are affected by various discharges, some of which may be high quality waters and some of which may, by contrast, have constituents at levels that already exceed water quality objectives. Given these limitations, the board has used available information regarding the water quality status of groundwater in the Grassland Drainage Area to construct provisions in the GDA Order to meet the substantive requirements of Resolution 68-16.

The GDA Order regulates discharges from thousands of individual fields to groundwater underlying the Grassland Drainage Area. There is no comprehensive, waste constituent–specific information available for groundwater aquifers accepting irrigated agricultural wastes that would allow site-specific assessment of current conditions. Likewise, there are no comprehensive historic data.

As described in section IV.A.3 and IV.A.4, available monitoring conducted by the USGS GAMA in 2010 showed detections of 14 pesticides and pesticide degradates in groundwater within the Delta-Mendota subbasin that are or could be associated with irrigated agricultural activities. Groundwater quality in the Delta-Mendota subbasin in the same study showed maximum nitrate levels in the Delta-Mendota subbasin above the applicable water quality objective were found in production and monitoring wells that sampled groundwater at 200 feet or less below ground level. In the Grassland Drainage Area, there was limited groundwater monitoring, but a nitrate concentration of 12.7 mg/L was found at one monitoring well.

While the lack of historical data prevents the board from being able to determine whether the groundwater represented by these wells are considered “high quality” with respect to nitrates, because it is unknown when the degradation occurred, available data show that currently existing quality of certain water bodies is better than the water quality objectives. For example, deeper groundwaters, represented by municipal supply wells, are generally high quality with respect to pesticides and nitrates. Degradation of such waters can be permitted only consistent with the state and federal antidegradation policies.

Given the significant variation in conditions over the broad areas covered by the GDA Order, any application of the antidegradation requirements must account for the fact that at least some of the waters into which agricultural discharges will occur are high quality groundwater (for some constituents). Further, the GDA Order provisions should also account for the fact that even where a water body is not high quality (such that discharge into that water body is not subject to the antidegradation policy), the board should, under State Water Board precedent, impose limitations more stringent than the objectives set forth in the Basin Plan, if those limits can be met by “best efforts.”

C. Consistency with BPTC and the “Best Efforts” Approach

Due to the numerous commodities being grown, the different water management systems in place and the regional nature of the problem, identification of a specific technology or treatment device as BPTC or “best efforts” has not been accomplished. The Central Valley Water Board recognizes that there is often site-specific, crop-specific, and regional variability that affects the selection of appropriate management practices, as well as design constraints and pollution-control effectiveness of various practices. In addition, the board recognizes that the gains made in previous years in the area served by the GBP are a result of a combination of individual grower improvements, improvements made at the district level, and regional efforts.

Growers need the flexibility to choose management practices that best achieve a management measure’s performance expectations given their own unique circumstances. Management practices developed for agriculture are to be used as an overall system of measures to address nonpoint-source pollution sources on any given site. In most cases, not all of the practices will be needed to address the nonpoint sources at a specific site. Operations may have more than one constituent of concern to address and may need to employ two or more of the practices to address the multiple sources. Where more than one source exists, the application of the practices should be coordinated to produce an overall system that adequately addresses all sources for the site in a cost-effective manner.

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There is no specific set of technologies, practices, or treatment devices that can be said to achieve BPTC/best efforts universally in the watershed.

GBP Order

The GBP needs the flexibility to explore, implement and evaluate control and treatment measure that best achieve performance expectations. These control and treatment measures will operate on a regional basis to lower the discharge loads of selenium, salts and boron. More than one means of control or treatment has been and will likely continue to be required for these constituents in order to meet the water quality objectives for Mud Slough (north) and the San Joaquin River above the Merced River.

There is no specific set of technologies or treatment devices that can be said to achieve BPTC/best efforts universally in the watershed considering the crop variety and factors (e.g., water allocation) affecting individual farms in the Grassland Drainage Area. The Basin Plan in Chapter IV, page IV-31.00 states:

1. "In developing control actions for selenium, the Regional Board will utilize a priority system which focuses on a combination of sensitivity of the beneficial use to selenium and the environmental benefit expected from the action.
2. Control actions which result in selenium load reductions are most effective in meeting water quality objectives.
3. With the uncertainty in the effectiveness of each control action, the regulatory program will be conducted as a series of short-term actions that are designed to meet long-term water quality objectives.
4. Best management practices such as water conservation measures, are applicable to the control of agricultural subsurface drainage."

The efforts of the ~~Grassland Area Farmers~~GDA growers to 1) limit the discharge from the Grassland Drainage Area;
2) the projects initiated under the San Joaquin River Improvement Project; and 3) the reuse of subsurface drainage ~~is~~are considered "best efforts" by the Central Valley Water Board. These efforts have lowered the selenium loading from the GBP to the San Joaquin River so that a section of the San Joaquin River has been delisted for selenium under 303(d).

GDA Order

The GDA Order establishes a set of performance standards that must be achieved and an iterative planning approach that will lead to implementation of BPTC/best efforts. The iterative planning approach will be implemented as two distinct processes, 1) establishment of a baseline set of universal farm water quality management performance standards combined with upfront evaluation, planning and implementation of management practices to attain those goals, and 2) additional planning and implementation measures where degradation trends are observed that threaten to impair a beneficial use or where beneficial uses are impaired (i.e., water quality objectives are not being met). Taken together, these processes are considered BPTC/best efforts. The planning and implementation processes that growers must follow on their farms should lead to the on-the-ground implementation of the optimal practices and control measures to address waste discharge from irrigated agriculture.

1. Farm Management Performance Standards

The GDA Order establishes on-farm standards for implementation of management practices that all growers must achieve. The selection of appropriate management practices must include analysis of site-specific conditions, waste types, discharge mechanisms, and crop types. Considering this, as well as the Water Code 13360 mandate that the Regional Water Board not specify the manner of compliance with its requirements, selection must be done at the farm level. Following are the performance standards that all growers must achieve:

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a. minimize percolation of waste to groundwater,
b. minimize excess nutrient application relative to crop consumption,
c. prevent pollution and nuisance,
d. achieve and maintain water quality objectives and beneficial uses, and
e. protect wellheads from surface water intrusion.

BPTC is not defined in Resolution 68-16. However, the State Water Board describes in ~~their~~its 1995 Questions and Answers, Resolution 68-16: "To evaluate the best practicable treatment or control method, the discharger should compare the proposed method to existing proven technology; evaluate performance data, e.g., through treatability studies; compare alternative methods of treatment or control; and/or consider the method currently used by the discharger or similarly situated dischargers." ~~Measures have been implemented by the Grassland Area Farmers to eliminate tailwater from the Grassland Bypass Channel and to test different technologies for selenium removal at the SJRIPP treatment facility. These measures and other implemented actions to achieve discharge and effluent limitations constitute BPTC/best efforts.~~Available state and federal guidance on management practices may serve as a measure of the types of water quality management goals for irrigated agriculture recommended throughout the state and country (e.g., water quality management goals for similarly situated dischargers). This will provide a measure of whether implementation of the above performance standards will lead to implementation of BPTC/best efforts.

- As part of California's Nonpoint Source Pollution Control Program, the State Water Board, California Coastal Commission, and other state agencies have identified seven management measures to address agricultural nonpoint sources of pollution that affect state waters (*California's Management Measures for Polluted Runoff*, referred to below as "Agriculture Management Measures").[92] The agricultural management measures include practices and plans installed under various NPS programs in California, including systems of practices commonly used and recommended by the USDA as components of resource management systems, water quality management plans, and agricultural waste management systems.

- USEPA's National Management Measures to Control Nonpoint Source Pollution from Agriculture (EPA 841-B-03-004, July 2003~~;),~~),[93] "*is a technical guidance and reference document for use by State, local, and tribal managers in the implementation of nonpoint source pollution management programs. It contains information on the best available, economically achievable means of reducing pollution of surface and ground water from agriculture."*

~~Discharges from the GBP to surface waters consist primarily of subsurface agricultural drainage and stormwater runoff from agricultural lands.~~

Both of the above guidance documents describe a series of management measures, similar to the farm management performance standards and related requirements of the GDA Order. The agricultural management measures described in the state and USEPA reference documents generally include: 1) erosion and sediment control, 2) facility wastewater and runoff from confined animal facilities, 3) nutrient management, 4) pesticide management, 5) grazing management, 6) irrigation water management, and 7) education and outreach. A comparison of the recommendations with the management practices implemented by the ~~Dischargers~~GBP, and ~~GAF is~~the GBP and GDA Orders' requirements are provided below.

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[92] *California's Management Measures for Polluted Runoff* (<http://www.waterboards.ca.gov/water_issues/programs/nps/docs/cammpr/info.pdf>)
[93] *National Management Measures to Control Nonpoint Source Pollution from Agriculture* (<http://water.epa.gov/polwaste/nps/agriculture/agmm_index.cfm>)

Management measure 1, erosion and sediment control. The GBP Order places limits on the maximum flow rate in the San Luis Drain to prevent scouring and the mobilization of drain sediments. The Use Agreement states that "[t]o avoid re-suspending sediment in the Drain, the maximum rate of flow in the Drain shall be 150 cfs" and that "[u]nder normal operations, flows will be slow enough to not cause sediment movement." In addition, [Grassland Area Farmers]GDA growers are not allowed to discharge tailwaters into water district canals[.] that discharge to the Grassland Bypass Channel.

For the GDA Order, this management measure is not applicable since it does not address waste discharges to surface water.

Management measure 2 is not applicable to either Order, as [this Order does]the Orders do not address waste discharges from confined animal facilities.

Management measure 3, nutrient management. As described in the State's Agricultural Management Measures document, *"this measure addresses the development and implementation of comprehensive nutrient management plans for areas where nutrient runoff is a problem affecting coastal waters and/or water bodies listed as impaired by nutrients."* Nutrient management practices implemented to meet performance standards are consistent with this measure.

Where nutrients are causing exceedances of water quality objectives in surface waters, [this]the GBP Order would require development of a detailed SQMP which would address sources of nutrients and require implementation of practices to manage nutrients. [Collectively, these requirements work together in a manner consistent with management measure 3.]

The GDA Order requires nitrogen management plans to be developed by the GDA growers within both high vulnerability and low vulnerability groundwater areas. Nitrogen management plans require farmers to document how their fertilizer use management practices meet performance standard d. Finally, where excess nutrients from irrigated agriculture may be causing exceedances of water quality objectives in groundwater, the GDA Order would require development of a GQMP which would address sources of nutrients, require implementation of practices to manage nutrients, and initiate monitoring to determine if the management practices implemented are effective. Collectively, these requirements work together in a manner consistent with management measure 3.

Management measure 4, pesticide management. As described in the State's Agricultural Management Measures document, this measure *"is intended to reduce contamination of surface water and groundwater from pesticides."* [The Grassland Area Farmers are]Performance standards a, c, d, and e are consistent with this management measure, requiring farmers to implement practices that minimize waste discharge to surface [water]and groundwater (such as pesticides), prevent pollution and nuisance, [and]achieve and maintain water quality objectives[.], and implement wellhead protection measures (GDA Order).

Management measure 5, grazing management[.] is not applicable, as the Grassland Drainage Area contains minimal acreage used for grazing.

Management measure 6, irrigation water management. As described in the state Agricultural Management Measures document, this measure "*promotes effective irrigation while reducing pollutant delivery to surface and ground waters.*" [The Grassland Area Farmers]

For the GBP Order, the GDA growers are not allowed to discharge tailwater into the Grassland Bypass Channel. Control and treatment technologies are being explored to minimize the release of selenium and salts to the discharge point. Reuse of the subsurface drainage is also being utilized to meet [effluent and]discharge limitations and eventually the water quality objective.

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For the GDA Order, performance standards a and c, requiring GDA growers to minimize waste discharge to groundwater which will lead to practices that will also achieve this management measure. For example, a grower may choose to implement efficient irrigation management programs (e.g., timing, uniformity testing), technologies (e.g., tailwater return), or other methods to minimize discharge of waste and percolation to groundwater.

Management measure 7, education and outreach. The GBP Order requires that the Dischargers meet specific performance standards and deadlines. The Dischargers have used education and outreach to the [Grassland Area Farmers]GDA growers in the past to inform growers of projects in the SJRIP and monitoring results for salinity and selenium. It is anticipated that this approach will be used, as necessary, in the future.
[Implementation]
The GDA Order requires that Steering Committee conduct education and outreach activities to inform growers of [actions]program requirements and water quality problems.

Implementation of practices to achieve the [Order's effluent]GBP and [receiving]GDA Orders' water [limitations]quality requirements described above are consistent with the state and federal guidance for management measures. [Implementation of]Because these measures [for]are recommended for similarly situated dischargers (e.g., agriculture), compliance with the requirements of the Order[s] will lead to implementation of BPTC/best efforts by the [Project]growers.

2. Additional Planning and Implementation Measures (SQMPs[)]
[This Order requires]/GQMPs)
The Orders require development of [surface]water quality management plans for surface water (GBP Order) and groundwater (GDA Order) where degradation trends are observed that threaten to impair a beneficial use or where beneficial uses are impaired (i.e., water quality objectives are not being met). SQMPs/GQMPs include requirements to investigate sources[,]; develop strategies to implement practi[on]ces to ensure waste discharges are meeting [the Orders effluent]discharge and receiving water limitations[, (GBP Order) or groundwater receiving water limitations (GDA Order);] and develop/implement a monitoring strategy to provide feedback on the effectiveness of the management plan. In addition, the SQMPs/GQMPs must include actions to "Identify, validate, and implement management practices to reduce loading of COC's [constituents of concern[]]" to the subsurface agricultural discharge[, (GBP Order) or to groundwater (GDA Order),] thereby improving water quality" (see Appendix MRP-1). Under these plans, additional [actions or technology]management practices will be implemented in an iterative manner, to ensure that the [measures]management practices represent BPTC/best efforts and that degradation does not threaten beneficial uses. The SQMPs/GQMPs need to meet the performance standards set forth in [this]the respective Order. The SQMPs/GQMPs are also reviewed periodically to determine whether adequate progress is being made to address the degradation trend or impairment. If adequate progress is not being made, then the Executive Officer can require [field]monitoring studies[., on-site verification of implementation of practices,] or the board may revoke the coverage under [this]the respective Order[. For the GDA Order, discharge would then be regulated through an individual WDR].

In cases where effectiveness of practices in protecting water quality is not known, the data and information gathered through the GQMP and MPEP processes will result in the identification of management practices that meet the performance standards and represent BPTC/best efforts. Since the performance standards also apply to low vulnerability areas with high quality waters, those data and information will help inform the GDA growers and board of the types of practices that meet performance standard requirements.

It is also important to note that in some cases, other agencies may establish performance standards that are equivalent to BPTC and may be relied upon as part of a SQMP/GQMP. For example, the

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Bureau may remove, at its discretion, sediment and organic materials deposited in the Drain at any time during the term of its present Use Agreement; or the practices required under DPR's Groundwater Protection Program are considered BPTC for those pesticides requiring permits in groundwater protection areas, since the practices are designed to prevent those pesticides from reaching groundwater and they apply uniformly to similarly situated dischargers in the area.

The State Water Board indicates in its Questions and Answers, Resolution 68-16: "To evaluate the best practicable treatment or control method, the discharger should ~~…~~evaluate performance data, e.g., through treatability studies..." Water quality management plans, referred to as SQMPs/GQMPs above, institute an iterative process whereby the effectiveness of any set of measures ~~taken to minimize~~/practices in achieving receiving water limitations will be periodically reevaluated as necessary and/or as more recent and detailed water quality data become available. ~~The~~For the GBP Order, the Dischargers are ~~also~~ required ~~in the WDR~~ to submit annually a Drainage Management Plan that details the specific control or treatment methods implemented for subsurface drainage to comply with water quality objectives contained in the Basin Plan for discharges from the GBP. For the GDA Order, the monitoring reports and management plan status reports submitted by the Steering Committee on an ongoing basis will include information on the practices being implemented and, for practices implemented in response to GQMPs, an evaluation of their effectiveness. This process of reviewing data and instituting additional measures/practices where necessary will continue to assure that BPTC/best efforts are implemented and will facilitate the collection of information necessary to demonstrate the performance of the ~~measures.~~measure/practices. This iterative process will also ensure that the highest water quality consistent with maximum benefit to the people of the state will be maintained.

Resolution 68-16 does not require Dischargers or the GDA growers to use technology that is better than necessary to prevent degradation (as evaluated on a constituent by constituent basis). As such, the board presumes that the ~~requirements of this Order~~performance standards required by the GBP and GDA Orders are sufficiently achieving BPTC ~~for constituents and locations~~ where water quality conditions and management practice implementation are already preventing degradation.

Further, since BPTC determinations are informed by the consideration of costs, it is important that discharges in these areas not be subject to the more stringent and expensive requirements associated with GQMPs. Therefore, though growers in "low vulnerability" areas must still meet the farm management performance standards described above, they do not need to incur additional costs associated with GQMPs where there is no evidence of their contributing to degradation of high quality waters.

3. Management Practices Evaluation Program (MPEP) and Other Reporting and Planning Requirements (GDA Order)

In addition to the GQMPs, the GDA Order includes a comprehensive suite of reporting requirements that should provide the board with the information it needs to determine whether the necessary actions are being taken to achieve BPTC and protect water quality, where applicable. These reporting provisions have been crafted in consideration of Water Code section 13267, which requires that the burden, including costs, of monitoring requirements bear a reasonable relationship to the need for and the benefits to be gained from the monitoring. In high vulnerability groundwater areas, the Steering Committee must develop and implement a Management Practices Evaluation Program (MPEP). The MPEP will include evaluation studies of management practices to determine whether those practices are protective of groundwater quality (e.g., that will not cause or contribute to exceedances of water quality objectives) for identified constituents of concern under a variety of site conditions. If the management practices are not protective, new practices must be developed, implemented, and evaluated. Any management practices that are identified as being protective of water quality, or those that are equally effective, must be implemented by growers who farm under similar conditions (e.g., crop type, soil conditions) (see provision IV.B.20 of the GDA Order).

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Farm management performance standards are applicable to both high and low vulnerability areas. The major difference in high and low vulnerability areas is the priority for action. High vulnerability areas may contain both high and low quality waters with respect to constituents discharged by irrigated agriculture, and the MPEP and other reporting, planning, and implementation requirements will determine and require actions to achieve BPTC and best efforts for high and low quality waters, respectively. Because low vulnerability areas present less of a threat of degradation or pollution, additional time is provided, or a lower level of review and certification is required, for some of the planning and reporting requirements. Also, while an MPEP is not required for the low vulnerability areas, the actions required by the MPEP must be implemented as applicable by growers in both high and low vulnerability areas, and will therefore result in the implementation of BPTC and best efforts in high and low vulnerability areas, and will inform evaluation of compliance with performance standards in all areas. The GDA Order requires implementation of actions that achieve BPTC and best efforts for both high and low quality waters, respectively.

To determine whether a degradation trend is occurring[.] for groundwater, a trend monitoring program is required in both "low vulnerability" and "high vulnerability" areas. The trend monitoring for the low vulnerability areas is required to help the board determine whether any trend in degradation of groundwater quality is occurring. For pesticides in groundwater, the board will initially rely on the information gathered through the Department of Pesticide Regulation's monitoring efforts to determine whether any degradation related to pesticides is occurring. If the available groundwater quality data (e.g., nitrates, pesticides) in a low vulnerability area suggest that degradation is occurring that could threaten to impair beneficial uses, then the area would be re-designated as a high vulnerability area.

The Steering Committee is required to prepare a Groundwater Quality Assessment Report (GAR) and update that report every five years. The GAR will include an identification of high vulnerability and low vulnerability areas, including identification of constituents that could cause degradation. The initial submittal of the GAR will include a compilation of water quality data, which the board and the Steering Committee will use to evaluate trends. The periodic updates to the GAR will require the consideration of data collected by the Steering Committee, as well as other organizations, and will also allow the board and the Steering Committee to evaluate trends. The GAR will provide a reporting vehicle for the board to periodically evaluate water quality trends to determine whether degradation is occurring. If the degradation triggers the requirement for a GQMP, then the area in which the GQMP is required would be considered "high vulnerability" and all of the requirements associated with a high vulnerability area would apply to those growers.

All GDA growers will also need to report on their management practices through the farm evaluation process. In addition, all growers will need to prepare nitrogen management plans prepared in accordance with the nitrogen management plan templates approved by the Executive Officer. The plans require growers to document how their fertilizer use management practices minimize excess nutrient application relative to crop consumption. The planning requirements are phased according to threat level such that growers in low vulnerability areas have more time to complete their plans than those in high vulnerability areas. growers in high vulnerability areas will need to submit nitrogen management plan summary reports. Through the farm evaluation, the grower must identify "…on-farm management practices implemented to achieve the GDA Order's farm management performance standards" In addition, the nitrogen management plan summary reports required in high vulnerability areas will include, at a minimum, information on the ratio of total nitrogen available for crop uptake to the estimated crop consumption of nitrogen. Nitrogen management plans and nitrogen management plan summary reports provide indicators as to whether the grower is meeting the performance standard to minimize excess nutrient application relative to crop consumption of nitrogen. The MPEP study process would be used to determine whether the nitrogen consumption ratio meets the performance standard of the GDA Order.

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D. Summary

The GBP Order Dischargers are required to implement measures to meet the above goals and periodically review the effectiveness of implemented measures and make improvements where necessary. Also, the Order requires water quality monitoring and assessments aimed to identify trends, evaluate effectiveness of management practices, and detect exceedances of water quality objectives. The process of periodic review of SQMPs, review of monitoring data, and updates to the Drainage Management Plan provides mechanisms for the board to better ensure that the Dischargers are meeting the requirements of the Order.

The GBP Order is designed to achieve site-specific antidegradation and antidegradation-related requirements through implementation of BPTC/best efforts as appropriate and monitoring, evaluation, and reporting to confirm the effectiveness of the BPTC/best efforts measures in achieving their goals. The GBP Order relies on implementation of control and treatment technologies that constitute BPTC/best efforts, based to the extent possible on existing data, and requires the water quality monitoring to ensure that the selected measures in fact constitute BPTC where degradation of high quality waters is or may be occurring, and best efforts where waters are already degraded. For the GBP Order, the Basin Plan sets performance goals to meet water quality objectives while these measures are being implemented.

~~This~~The GDA growers are required to implement measures/practices to meet the above performance standards and periodically review the effectiveness of implemented practices and make improvements where necessary. growers in both high and low vulnerability areas will identify the practices they are implementing to achieve water quality protection requirements as part of farm evaluations and nitrogen management plans. Growers in high vulnerability areas have additional requirements associated with the GQMPs, implementing practices identified as protective through the MPEP studies, and reporting on their activities more frequently.

Also, the GDA Order ~~allows limited~~requires water quality monitoring and assessments aimed to identify trends, evaluate effectiveness of management practices, and detect exceedances of water quality objectives. The requirements were designed in consideration of Water Code section 13267. The process of periodic review of GQMPs provides a mechanism for the board to better ensure that growers are meeting the requirements of the GDA Order, if the Steering Committee-led efforts are not effective in ensuring receiving water limitations are achieved.

Requirements for individual farm evaluations, nitrogen management plans, management practices tracking and water quality monitoring and reporting are designed to ensure that degradation is minimized and that management practices are protective of water quality. These requirements are aimed to ensure that all irrigated lands are implementing management practices that minimize degradation, the effectiveness of such practices is evaluated, and feedback monitoring is conducted to ensure that degradation is minimized. Even in low vulnerability areas where there is no information indicating degradation of a high quality water, the farm management performance standards act as a preventative requirement to ensure degradation does not occur. The information and evaluations conducted as part of the GQMP process will help inform those growers in low vulnerability areas of the types of practices that meet the performance standards. In addition, even growers in low vulnerability groundwater areas must implement practices (or equivalent practices) that are identified as protective through the MPEP studies (where these practices are applicable to the growers' site conditions). The farm evaluations and nitrogen management plan requirements for low vulnerability areas provide indicators as to whether growers are meeting applicable performance standards. The required monitoring and periodic reassessment of vulnerability designations will allow the board to determine whether degradation is occurring and whether the status of a low vulnerability area should be changed to high vulnerability, and vice versa.

The GDA Order is designed to achieve site-specific antidegradation and antidegradation-related requirements through implementation of BPTC/best efforts as appropriate and monitoring, evaluation, and reporting to confirm the effectiveness of the BPTC/best efforts measures in achieving their goals.

The Order relies on implementation of practices and treatment technologies that constitute BPTC/best efforts and requires monitoring of water quality and evaluation studies to ensure that the selected practices in fact constitute BPTC where degradation of high quality waters is or may be occurring, and best efforts where waters are already degraded. Because the State Water Board has not distinguished between the level of treatment and control required under BPTC and what can be achieved through best efforts, the requirements of the GDA Order for BPTC/best efforts apply equally to high quality waters and already degraded waters.

The GBP and GDA Orders allow degradation of existing high quality waters while best efforts measures ~~are being implemented. The Basin Plan sets performance goals to meet water quality objectives while these measures~~ /practices are being implemented. ~~This limited~~The degradation is consistent with maximum benefit to the people of the state for the following reasons:

- At a minimum, ~~this~~the GBP Order requires that the ~~effluent~~discharge and receiving waters achieve and maintain compliance with the discharge limitations in the Basin Plan ~~.~~and protect existing beneficial uses~~.~~; The GDA Order requires that irrigated agriculture achieve and maintain compliance with water quality objectives and beneficial uses;
- The requirements implementing the ~~Order~~ GBP and GDA Orders will result in use of BPTC where irrigated agricultural waste discharges may cause degradation of high quality waters~~.~~; ~~W~~where waters are already degraded, the requirements will result in the pollution controls that reflect the "best efforts" approach. ~~Confirmation of~~ Because BPTC~~/best efforts~~ will be ~~shown~~implemented, any lowering of water quality will be accompanied by ~~monitoring data.~~implementation of the most appropriate treatment or control technology;
- Central Valley communities depend on irrigated agriculture for employment (PEIR, Appendix A). Widespread to total elimination of farming would result in loss of these jobs, which would disproportionally impact already disadvantaged communities that depend on farm jobs and the farm economy. The total output of the agricultural sector, including support services, could be substantially reduced if no degradation were allowed;
- The state and nation depend on Central Valley agriculture for food (PEIR, Appendix A). As stated in the PEIR, one goal of the GDA Order is to maintain the economic viability of agriculture in California's Central Valley. Failing to authorize degradation of high quality waters could result in a significant loss of farmland;
- Consistent with the ~~Order's~~ stated goal of ensuring ~~subsurface~~that irrigated agricultural discharges do not impair access to safe and reliable drinking water, the ~~Order protects~~Orders protect high quality waters relied on by local communities from degradation ~~of their water supplies~~ by current measures/practices on irrigated lands in the Grassland Drainage Area. The ~~Order is~~GBP and GDA Orders are designed to prevent ~~subsurface~~irrigated lands discharges ~~from the Grassland Drainage Area~~ from causing or contributing to exceedances of water quality objectives, which include maximum contaminant levels for drinking water. ~~The~~The GDA Order imposes more stringent requirements in areas deemed "high vulnerability" based on threat to groundwater beneficial uses, including the domestic and municipal supply use. The GDA Order also is designed to detect and address exceedances of water quality objectives, if they occur, in accordance with the compliance time schedules provided therein~~. Therefore, local communities should not incur any additional treatment costs associated with the limited degradation authorized by this Order; and~~;
- The GBP Order includes performance standards that will work to prevent further degradation of surface water quality~~.~~;
- ~~The~~ Because the GDA Order prohibits degradation above a water quality objective and establishes representative a groundwater monitoring program to determine whether irrigated

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agricultural waste discharges are in compliance with the GDA Order's receiving water limitations, local communities should not incur any additional treatment costs associated with the degradation authorized by the GDA Order. In situations where water bodies are already above water quality objectives and communities are currently incurring treatment costs to use the degraded water, the requirements [of the Order]established by the GDA Order will institute time schedules for reductions in irrigated agricultural sources to achieve the GDA Order's receiving water limitations; therefore, the GDA Order will, over time, work to reduce treatment costs of such communities; and

- The GDA Order requires GDA growers to achieve water quality management practice performance standards and includes farm management practices monitoring to ensure practices are implemented to achieve these standards. The iterative process whereby growers implement practices to achieve farm management performance standards, coupled with representative groundwater monitoring feedback to assess whether the practices are effective, will prevent degradation of groundwater quality above water quality objectives. The requirement that GDA growers not cause or contribute to exceedances of water quality objectives is a ceiling. Achieving the farm management performance standards will, in many instances, result in preventing degradation or degradation well below water quality objectives.

The requirements of the GBP and GDA Orders and the limited degradation that would be allowed are consistent with State Water Board Resolution 68-16. The requirements of the Orders will result in the implementation of [best efforts]BPTC necessary to assure [no further degradation of]the highest water quality consistent with the maximum benefit to the people of the state. The water limitations in sections II of the GBP Order[,] and section III of the GDA Order; the compliance schedules in section II and the Basin Plan[,] for the GBP Order and section XII of the GDA Order; and the Monitoring and Reporting Program's requirements to track compliance [with the Order,]for both Orders are designed to ensure that further degradation of water quality will not occur and that [the] limited degradation will not unreasonably affect beneficial uses, or cause a condition of pollution or nuisance. Finally, the iterative process of reviewing data and instituting additional management measures [when]/practices where necessary will ensure that the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

[XIII.]XVI. California Water Code Section 13141 (GBP Order)

The [Phase III]EIR/EIS for the 2009 Use Agreement examined the socioeconomic impacts to the region under three scenarios: 1) No Action Alternative; 2) Proposed Action; and 3) Alternate Action. The No Action Alternative assumed termination of the GBP. The Proposed Action would implement the 2009 Use Agreement conditions for the GBP. The Alternative Action examined a continuation of the GBP, but at the level set in the 2001 Use Agreement.

The key farm-level variable used for measurement of impact significance was farm profit. Farm profit summarizes the effects of an alternative on the long-run viability of farming in the area and was measured relative to estimated 2007 existing conditions. All three alternatives examined the projected effects from 2010 to 2019. Each alternative had negative annual impacts when compared to the 2007 existing conditions. The most extreme impact was the No Action Alternative which soil and water salinity would increase, crop yields and revenues would decline, acreages would shift among crops, but total cropped acreage would remain very similar between 2010 and 2019. The economic impact between the Proposed Alternative and the Alternative Action were insignificant.

The Alternative Action would not lower selenium levels below those set in the 2001 Use Agreement. The Proposed Action would lower these levels in accordance with the 2009 Use Agreement, which would lower selenium loading significantly below the TMML and [improve]eventually achieve the water quality [of] objectives in Mud Slough (north) and the [lower]San Joaquin River[.] above the Merced River.

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XVII. California Water Code Sections 13141 and 13241 (GDA Order)

The total estimated annual average cost of compliance with the GDA Order, e.g., summation of costs for administration, monitoring, reporting, tracking, implementation of management practices, is approximately $16.20 per acre. The total estimated average cost of compliance associated with the GDA Order is $1,572,000per year. These estimates are based on the costs for the Western Tulare Lake Basin Order, since the GDA has similar farming crop types, management practices, and geohydrological features with the Westlands area.

Approximately $11.82 of the estimated $16.20 per acre annual cost of the GDA Order is associated with implementation of water quality management practices (see discussion below for a breakdown of estimated costs). The GDA Order does not require that growers implement specific water quality management practices.[94] Many of the management practices that have water quality benefits can have other economic and environmental benefits (e.g., improved irrigation can reduce water and energy consumption, as well as reduce runoff). Management practice selection will be based on decisions by individual growers in consideration of the unique conditions of their irrigated agricultural lands, water quality concerns, and other benefits expected from implementation of the practice. As such, the cost estimate is an estimate of potential, not required costs of implementing specific practices. Any costs for water quality management practices will be based on a market transaction between growers and those vendors or individuals providing services or equipment and not based on an estimate of those costs provided by the board. The cost estimates include estimated fees the Steering Committee may charge to prepare the required reports and conduct the required monitoring, as well as annual permit fees that are charged to permitted dischargers for permit coverage. In accordance with the State Water Board's Fee Regulations, the current annual permit fee charged to growers covered by the GDA Order is $0.75/acre. There are a number of funding programs that may be available to assist growers in the implementation of water quality management practices through grants and loans (e.g., Environmental Quality Incentives Program, State Water Board Agricultural Drainage Management Loan Program). Following is a discussion regarding derivation of the cost estimate for the GDA Order.

The GDA Order, which implements the Long-term ILRP within the Grassland Drainage Area, is based mainly on Alternatives 2 and 4 of the PEIR, but does include elements from Alternatives 2-5. The GDA Order contains the groundwater management plans similar to Alternative 2 of the PEIR; farm planning, management practices tracking, nitrogen tracking, and regional groundwater monitoring similar to Alternative 4 of the PEIR; recommendation/certification requirements similar to Alternative 3; prioritized installation of groundwater monitoring wells similar to Alternative 5; and a prioritization system based on systems described by Alternatives 2 and 4. Therefore, potential costs of these portions of the GDA Order are estimated using the costs for these components of Alternative 2 and Alternative 5 given in the *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program* (Economics Report).[95] Table 7 summarizes the major regulatory elements of the GDA Order and provides reference to the PEIR alternative basis.

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Table 7: Summary of regulatory elements

Order elements	Equivalent element from Alternatives 2-5
Third-party administration	Alternative 2
Farm evaluation Nitrogen management plans	Alternative 4: farm water quality management plan and certified nutrient management plan

[94] Per Water Code section 13360, the Central Valley Water Board may not specify the manner in which a grower complies with water quality requirements.

[95] ICF International. 2010. *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program.* Draft. July. (ICF 05508.05.) Sacramento, CA. Prepared for: Central Valley Regional Water Quality Control Board, Sacramento, CA

Groundwater management plans	Alternative 2: groundwater management plans
Trend groundwater quality monitoring	Alternative 4: regional groundwater quality trend monitoring
Management practices evaluation program	Alternative 4: regional groundwater monitoring, targeted site-specific studies to evaluate the effects of changes in management practices on groundwater quality, and Alternative 5: installation of groundwater monitoring wells at prioritized sites
Management practice reporting	Alternative 4: tracking of practices
Nitrogen management plan summary reporting	Alternative 4: nutrient tracking
Management practices implementation	Alternative 2 or 4: management practice implementation

The administrative costs of the GDA Order are estimated to be similar to the costs shown for Alternative 2 in Table 2-19 of the Economics Report. Additional costs have been included for third-party preparation of the monitoring report. Farm evaluation and nitrogen management planning (farm planning) costs are estimated using the costs for farm planning (page 2-22, Economics Report, $2,500 per grower plus an additional annual cost for updating farm planning documents and associated reporting). Total trend groundwater monitoring and reporting costs are estimated using regional groundwater monitoring costs and planning costs given on page 2-20 and Table 2-14 of the Economics Report, respectively.[96] Additional cost estimates have been included for the groundwater quality assessment report and management practices evaluation program. Costs for installation of groundwater monitoring wells are estimated using the costs shown in Table 2-15 of the Economics Report. Tracking costs of management practices and nitrogen management plan information are estimated to be similar to the costs shown for Alternative 4 in Table 2-21 of the economics report –under "tracking." Management practices costs have been estimated for the Delta-Mendota Canal Watershed (pages 3-60 to 3-65, Existing Conditions Report) generally using the methodology outlined in pages 2-6 to 2-16 of the Economics Report. Estimated average annualized costs per acre of the GDA Order are summarized below in Table 8.

Table 8: Estimated annual average per acre cost* of the GDA Order in the Grassland Drainage Area.

	GDA Order
Administration	$1.49
Farm planning	$0.45
Monitoring/reporting/tracking	$2.44
Management practices*	$11.82
Total**	$16.20

* Costs are an estimate of *potential*, not required costs of implementing specific practices for groundwater.
** Totals may not add up due to rounding.

The Basin Plan includes an estimate of potential costs and sources of financing for the long-term irrigated lands program. The estimated costs were derived by analyzing the alternatives evaluated in the PEIR using the cost figures provided in the Economics Report. The Basin Plan cost estimate is provided as a range applicable to implementation of the program throughout the Central Valley. The Basin Plan's estimated total annualized cost of the irrigated lands program is $216 million to $1.3 billion, or $27 to $168 per acre.[97] The estimated total annual cost of the GDA Order of $1,572,000 ($16.20 per acre) falls below the estimated cost range for the irrigated lands program as described in the Basin Plans when considering per acre costs ($27-$168 per acre). The estimate is lower primarily due to the GDA Order covering only groundwater rather than surface water and groundwater.

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[96] Surface water monitoring costs were not included in the GDA Order's estimates.
[97] Per acre average cost calculated using an estimate for total irrigated agricultural acres in the Central Valley (7.9 million acres, Table 3-3, Economics Report).

The estimated total average annual cost per acre of Alternative 4 in the Grassland Drainage Area is $121 (generally applicable to the Western San Joaquin River Watershed). The GDA Order based substantially on Alternative 4 but covering only groundwater, is expected to have a lower average annual cost to growers and less overall economic impacts than described in the Economics Report.[98]

~~XIV.~~XVIII. California Water Code Section 13263

California Water Code section 13263 requires that the Central Valley Water Board consider the following factors, found in section 13241, when considering adoption of waste discharge requirements.

(a) *Past, present, and probable future beneficial uses of water*
The Central Valley Water Board's Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Basin Plan) identifies applicable beneficial uses of surface water and groundwater within the Sacramento and San Joaquin River ~~Basin, including~~Basins.

In the Grassland Watershed~~.~~ ~~I~~identified beneficial uses for Salt Slough, Mud Slough (north) and wetland water supply channels include irrigation,[99] stock watering, contact recreation, other noncontact recreation, warm freshwater habitat, warm spawning, wildlife habitat, commercial use, and shellfish. The ~~Order protects~~GBP and GDA Orders protect the beneficial uses identified in the Basin Plan. Applicable past, present, and probable future beneficial uses of the Grassland Watershed waters were considered by the Central Valley Water Board as part of the Basin Planning process and are reflected in the Basin ~~Plans themselves. Mud Slough, the San Joaquin River and the wetland supply channels, the water bodies subject to discharges from the area served by the GBP, are all listed in the Basin Plan along with their designated beneficial uses.~~Plan itself.

For the GBP Order, Mud Slough (north), the San Joaquin River and the wetland supply channels, the water bodies subject to discharges from the area served by the GBP, are all listed in the Basin Plan along with their designated beneficial uses.The GDA Order is a general order applicable to a wide geographic area. Therefore, it is appropriate to consider beneficial uses as identified in the Basin Plans and applicable policies, rather than a site specific evaluation that might be appropriate for WDRs applicable to a single discharger.

(b) *Environmental characteristics of the hydrographic unit under consideration, including the quality of water available thereto*
Environmental characteristics of the Grassland watershed ~~have been~~were considered in the development of ~~this~~the GBP Order. This information is contained in the *August 2009 Environmental Impact Statement and Environmental Impact Report for the Grassland Bypass Project, 2010-2019*.

For the GDA Order, the environmental characteristics of the Grassland Drainage Area were considered in the development of irrigated lands program requirements as part of the Central Valley Water Board's 2008 *Irrigated Lands Regulatory Program Existing Conditions Report* and the PEIR. In these reports, existing water quality and other environmental conditions throughout the Central Valley have been considered in the evaluation of six program alternatives for regulating waste discharge

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[98] The estimated average cost of the GDA Order is less than the cost estimated for Alternative 4 because the GDA Order is based on components of other alternatives in addition to alternative 4. Another reason for the reduced cost is due to an estimate of the existing level of advanced irrigation management practice implementation (e.g. pressurized systems, tailwater recovery systems, etc.). It is estimated that many growers within the GDA Order's coverage area are already implementing these or similar advanced irrigation practices because the water districts in the GDA do not allow growers to discharge tailwater into the Grassland Bypass Channel. The use of Alternative 4's potential economic impacts provides a conservative measurement of the GDA Order's potential economic effects.

[99] Basin Plan footnote for Mud Slough (north) and wetland water supply channels states "[e]levated natural salt and boron concentrations may limit this use to irrigation of salt and boron tolerant crops. Intermittent low flow conditions may also limit this use."

from irrigated lands. The GDA Order's requirements are based on the alternatives evaluated in the PEIR.

(c) *Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area*

~~This Order provides~~The GBP and GDA Orders provide a process to review these factors during implementation of water quality management plans (SQMPs~~).~~ /GQMPs).

The GBP Order requires that agricultural subsurface discharges to surface water do not cause or contribute to an exceedance of applicable discharge limitations set in the Basin Plan or to water quality objectives. SQMPs are required in areas where discharge limitations or water quality objectives are not being met and are not being addressed by existing SQMPs. Under these plans, sources of waste must be estimated along with background water quality to determine what options exist for reducing waste discharge to ensure that the ~~Project~~GBP is in compliance with water limitations and objectives. The SQMPs must be designed to ensure that agricultural subsurface discharges do not cause or contribute to an exceedance of water limitations or a water quality objective set in the Basin Plan, and meet other applicable requirements of the GBP Order, including, but limited to, section II.

The GDA Order requires that discharges of waste from irrigated lands to groundwater do not cause or contribute to an exceedance of applicable water quality objectives. GQMPs are required in areas where water quality objectives are not being met –where irrigated lands are a potential source of the concern, and in areas where irrigated agriculture may be causing or contributing to a trend of degradation that may threaten applicable beneficial uses. GQMPs are also required in high vulnerability groundwater areas. Under these plans, sources of waste must be estimated along with background water quality to determine what options exist for reducing waste discharge to ensure that irrigated lands are not causing or contributing to the water quality problem. The GQMPs must be designed to ensure that waste discharges from irrigated lands do not cause or contribute to an exceedance of a water quality objective and meet other applicable requirements of the GDA Order, including, but not limited to, section III.

(d) *Economic considerations*

~~The~~For the GBP Order, the EIR/EIS for the ~~Project~~GBP from 2010 to 2019 anticipated economic effects to be farm income linked to farm investment and consumption. Regional economic activity would be affected due to the linkages between production agriculture and a myriad of other sectors of the economy. ~~This~~The GBP Order allows for the continuation of farm activities and the use of the Drain. Costs for ~~this~~the GBP Order into Phase III of the Project are borne by the farmers in the Grassland Drainage Area. Implementation of ~~this~~the GBP Order is expected to increase farm profits from crop production compared to the No Action alternative (no use agreement for the Drain) until 2015 when an anticipated treatment facility is operational and annual costs will decrease farm profits. The decrease in profits is estimated to fall slight below profits from the No Action alternative for the period from 2015 to 2019. ~~This~~The GBP Order will not unreasonably affect the ~~Grassland Area Farmers~~GDA growers or region adversely.

For the GDA Order, the PEIR was supported by the *Draft Technical Memorandum Concerning the Economic Analysis of the Irrigated Lands Regulatory Program* (Economics Report). An extensive economic analysis was presented in this report to estimate the cost and broader economic impact on irrigated agricultural operations associated with the five alternatives for the irrigated lands program, including the lands regulated by the GDA Order. Central Valley Water Board staff was also able to use that analysis to estimate costs of a sixth alternative, since the sixth alternative fell within the range of the five alternatives. This cost estimate is found in Appendix A of the PEIR. The GDA Order is based on the alternatives evaluated in the PEIR, which is part of the administrative record. Therefore, potential economic considerations related to the GDA Order have been considered as part

of the overall economic analysis for implementation of the long-term irrigated lands regulatory program. The GDA Order is a single action in a series of actions to implement the ILRP in the Central Valley region. Because the GDA Order has been developed from the alternatives evaluated in the PEIR, economic effects will be within the range of those described for the alternatives.

(e) *The need for developing housing within the region*

[This]The GBP Order establishes waste discharge requirements for subsurface agricultural discharges and stormwater runoff from the area served by the Grassland Bypass Project, where the land use is primarily irrigated agriculture. [The]The GDA Order establishes waste discharge requirements to groundwater for irrigated lands in the Grassland Drainage Area. Neither Order is[not] intended to establish requirements for any facilities that accept wastewater from residences or stormwater runoff from residential areas. [This Order]The GBP and GDA Orders will not affect the development of housing within the region.

(f) *The need to develop and use recycled water*

[This Order does not establish any requirements for the use or purveyance of recycled wastewater.] Neither Order establishes any requirements for the use or purveyance of recycled wastewater. Where an agricultural operation may have access to recycled wastewater of appropriate quality for application to fields, the operation would need to obtain appropriate waste discharge requirements from the Central Valley Water Board prior to initiating use. This need to obtain additional waste discharge requirements in order to recycle wastewater on agricultural fields instead of providing requirements under the GDA Order may complicate potential use of recycled wastewater on agricultural fields. The SJRIP treatment facility will treat subsurface drainage and plans to recycle the treated lower selenium/salt effluent back into the fields where the drainage originated. No waste discharge requirements will be required for this pilot facility since the discharge will be recycled into essentially a closed loop system (see Figure [12).]16). Once the closed loop system is terminated and recycled water from the treatment facility is recycled, waste discharge requirements will be required.

[The GAF and water districts have been recycling water by using tailwater recovery systems and by blending subsurface drainage with irrigation water. The subsurface drainage is also recycled to wet roads for dust controls.]

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