

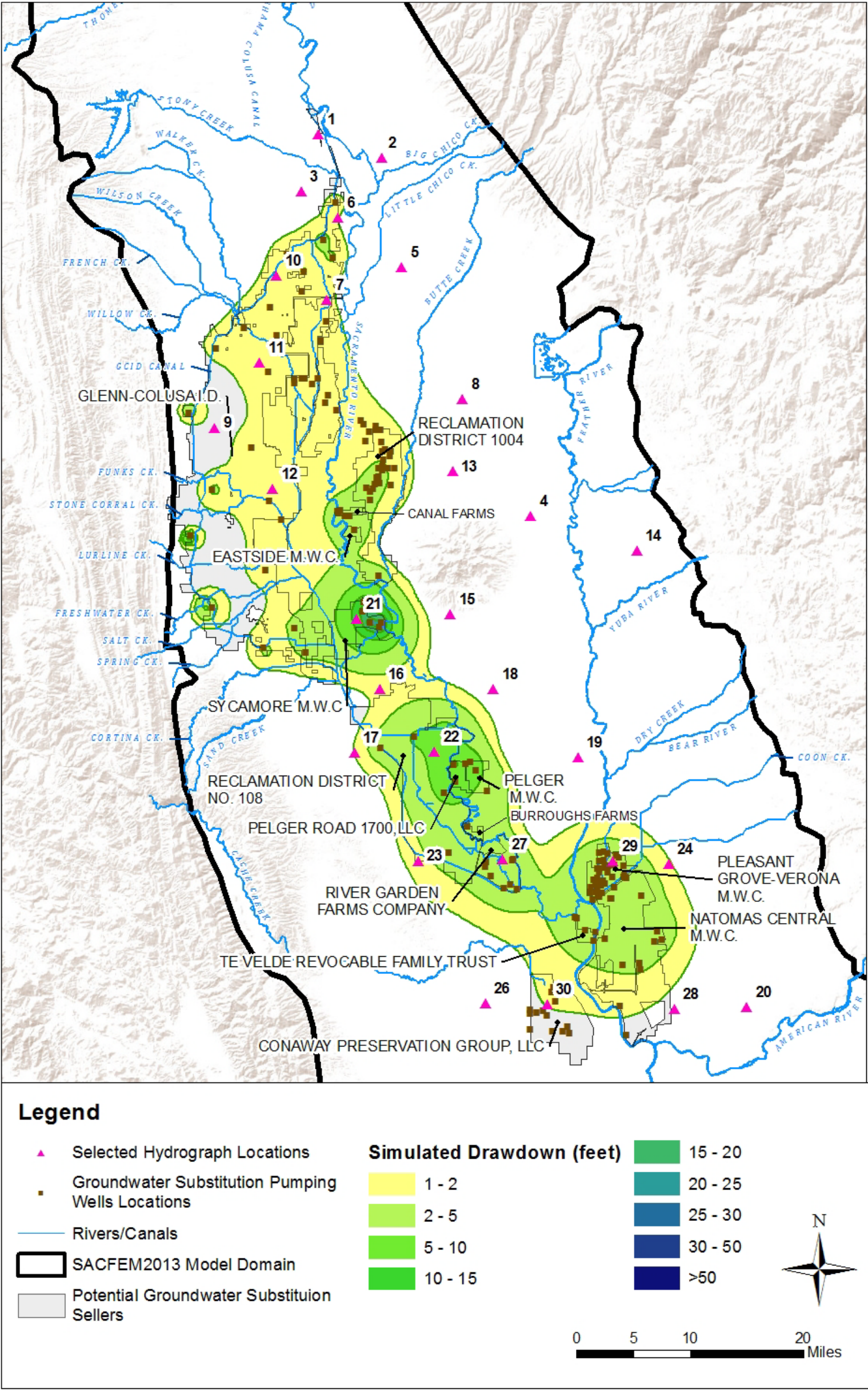


Figure 3-8. Simulated Change in Groundwater Head (approximately 700 to 900 feet bgs), Based on September 1977 Hydrologic Conditions

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Figures 3-9 through 3-11 show simulated groundwater head hydrographs for Location 21 (see Figure 3-5 for location) for both the Baseline and Proposed Action. Figures 3-9 through 3-11 show that groundwater levels are lower under the Proposed Action (blue line) than under the No Action/No Project Alternative (red line). Figure 3-12 shows the change in groundwater level between the baseline and the Proposed Action at each level of the SACFEM2013 model (i.e., varying aquifer depths) near Sycamore MWC. Location 21 was selected because most areas in the model exhibit smaller drawdown changes than those shown in Location 21 (simulated drawdown shown in Figures 3-5 through 3-8). Approximately 60 percent of the pumping near Sycamore MWC (6,780 AF) was concentrated in aquifer model layers 5 and 6 (approximately 480 to 910 ft bgs). The pumping in aquifer layers 5 and 6 resulted in approximately 14 feet of drawdown due to the Proposed Action, as compared to Baseline conditions. Most of the recovery near the pumping zone occurs in the year following the transfer event. Recovery at the water table was more gradual. Groundwater recovery is highly dependent on (1) hydrology of the years following the transfer; (2) proximity of a transfer well to surface water; (3) pumping in the year following the transfer; and (4) aquifer properties. Appendix I, Groundwater Modeling Results, includes simulated groundwater head hydrographs for multiple locations shown in Figure 3-5.

Groundwater substitution under the Proposed Action could result in temporary drawdown that exceeds what would have occurred under the No Action Alternative. Model results show that increased groundwater pumping due to the Proposed Action could cause localized declines of groundwater levels, or cones of depression, that in some instances extend beyond the boundaries of the seller districts (Figures 3-5 through 3-8). Groundwater substitution transfers could result in groundwater declines in excess of seasonal variation and these effects on non-transferring wells could be significant. To reduce these effects, the Mitigation Measure GW-1 (Section 3.3.4.1) specifies that transferring agencies establish monitoring and mitigation programs for groundwater substitution transfers. The requirements of GW-1 would require monitoring of groundwater level within the local pumping area and if effects were reported or occurred, the participating seller agencies in the Sacramento Valley Groundwater basin would compensate for effects or reduce pumping until the groundwater basin recharges as specified in GW-1. Mitigation Measure GW-1 would reduce the impacts to less than significant.

Table 3-8. Water Transfers through Groundwater Substitution under the Proposed Action

Groundwater Basin	Potential Seller	Number of Wells	Pumping Rate (gpm)	Range of Screened Interval (feet)
Redding Area	Anderson Cottonwood Irrigation District	2	1,000 - 5,500	150 - 455
Sacramento Valley	Borroughs Farms	1	4,000	120 - 540
	Canal Farms	3	3,500 - 5,000	65 - 660
	Conaway Preservation Group	14	1,600 - 4,700	144 - 980
	Eastside Mutual Water Company	1	4,720	150 - 240
	Glenn-Colusa Irrigation District	21	Approximately 600	100 – 3,000
	Maxwell Irrigation District	2	3,800	150 - 240
	Natomas Central Mutual Water Company	14	1,000 - 2,500	10 - 952
	Pelger Mutual Water Company	4	1,500 - 5,000	101 - 485
	Pelger Road 1700 LLC	2	3,000 - 3,500	200 - 820
	Pleasant Grove-Verona Mutual Water Company	35	1,500 - 5,000	99 - 260
	Princeton-Codora-Glenn Irrigation District	4	1,000 - 3,000	120 - 330
	Provident Irrigation District	7	Approximately 1,100	100 - 420
	Reclamation District 108	5	1,700 - 5,900	250 - 680
	Reclamation District 1004	28	1,000 - 5,800	56 - 430
	River Garden Farms	8	1,700 - 3,000	170 - 686
	Sycamore Mutual Water Company	5	3,200 - 6,500	160 - 906
	T&P Farms	2	3,500 - 4,000	256 - 862
	Te Velde Revocable Family Trust	5	2,200 - 4,700	115 - 455

Groundwater/Surface Water Interaction

The implementation of groundwater substitution pumping can lower the groundwater table and may change the relative difference between the groundwater and surface water levels. This change could reduce the amount of surface water, as compared to pre-pumping conditions, due to two mechanisms. The mechanisms are:

- Induced leakage. Lowering the groundwater table causes a condition where the groundwater table is lower than the surface water level. This condition causes leakage out of a surface water body and could also increase percolation rates on irrigated lands.
- Interception of groundwater. A pumping well used for groundwater substitution pumping can intercept groundwater that would have discharged to the surface water absent the pumping.

Because these mechanisms may result in a depletion of streamflow, the volume of water actually transferred is not the same as the volume of groundwater pumped through a substitution action. The amount of water that can justifiably be considered to be transferred is the volume of substitution pumping less the amount of induced leakage and the amount of intercepted groundwater flow. The Proposed Action includes measures that would reduce the amount of water that the TCCA receives by an estimated 13 percent depletion factor to prevent any adverse impacts associated with groundwater/surface water interaction, as further described in Chapter 2. This would mitigate potential stream depletion as a result of the Proposed Action. Additionally, the potential effects to fish and riparian vegetation from decreased streamflows are assessed in the Biological Resources section.

Land Subsidence

Excessive groundwater extraction from unconfined and confined aquifers could lower groundwater levels and decrease pore-water pressure in the aquifer. The reduction in pore-water pressure could result in a loss of structural support within clay and silt beds in the aquifer. The loss of structural support could cause the compression of clay and silt beds resulting in a lowering of the ground surface elevation (land subsidence). The compression of fine-grained deposits, such as clay and silt, is largely permanent. Infrastructure damage and alteration of drainage patterns are possible consequences of land subsidence.

Redding Groundwater Basin. Land subsidence has not been monitored in the Redding Groundwater Basin. However, there would be potential for subsidence in some areas of the basin if groundwater levels were substantially lowered. The groundwater basin west of the Sacramento River is composed of the Tehama Formation which has exhibited subsidence in Yolo County. The Tehama formation in the Redding Groundwater Basin has similar hydrogeologic characteristics to that in the Yolo County area, and therefore, may be conducive to subsidence.

The potential for subsidence as a result of the Proposed Action is small if the groundwater substitution pumping is small compared to overall pumping in a region. While the potential for subsidence is small, Anderson-Cottonwood ID will implement the Monitoring Program and Mitigation Plan described below under Mitigation Measure GW-1, which includes subsidence monitoring. The subsidence monitoring will measure changes in the ground surface elevation, whether subsidence is short-term or long-term. The monitoring and mitigation actions would verify that this impact would be less than significant.

Sacramento Valley Groundwater Basin. Most areas of the Sacramento Valley Groundwater Basin have not experienced land subsidence that has caused impacts to the overlying land. However, portions of Colusa and Yolo counties have experienced subsidence. Historically land subsidence occurred in the eastern portion of Yolo County and the southern portion of Colusa County, owing to groundwater pumping and the geology of the area. As much as four feet of land subsidence has occurred east of Zamora over the last several decades. In Yolo County, within Conaway Ranch, DWR observed land subsidence estimated at approximately 0.2 foot from 2012 to 2013 and an additional 0.6 foot from 2013 to 2014 (DWR 2014a). In comparison, slightly less than 0.1 foot of subsidence occurred over the previous 22 years (1991 to 2012). The area between Zamora, Knights Landing, and Woodland has been most affected (Yolo County 2012). Subsidence in this region is generally related to groundwater pumping and subsequent consolidation of loose aquifer sediments.

As mentioned above, most areas of the Sacramento Valley Groundwater Basin have not experienced land subsidence that has caused impacts to the overlying land. Most of the transfers in the Proposed Action do not include groundwater substitution pumping within the areas of Yolo and Colusa counties that have had subsidence issues. Conaway Preservation Group is located in eastern Yolo County near areas of historic subsidence; DWR maintains an extensometer to help monitor potential subsidence issues. Subsidence could occur when groundwater levels fall below historic low water levels, as occurred in 2014. However, groundwater levels have recovered to pre-transfer levels, and Conaway Preservation Group has reduced its pumping to prevent water levels from falling below historic water levels. Additional analysis from Conaway Preservation Group considers non-transfer pumping and finds that overall pumping will be less than what has occurred historically, allowing groundwater levels to stay above historic low water levels (Durbin 2015). Even with this analysis, a transfer in this area could have potentially significant impacts related to land subsidence, but these impacts would be reduced with Mitigation Measure GW-1. Therefore, the effect on potential land subsidence in the Sacramento Valley Groundwater Basin after mitigation would be less than significant.

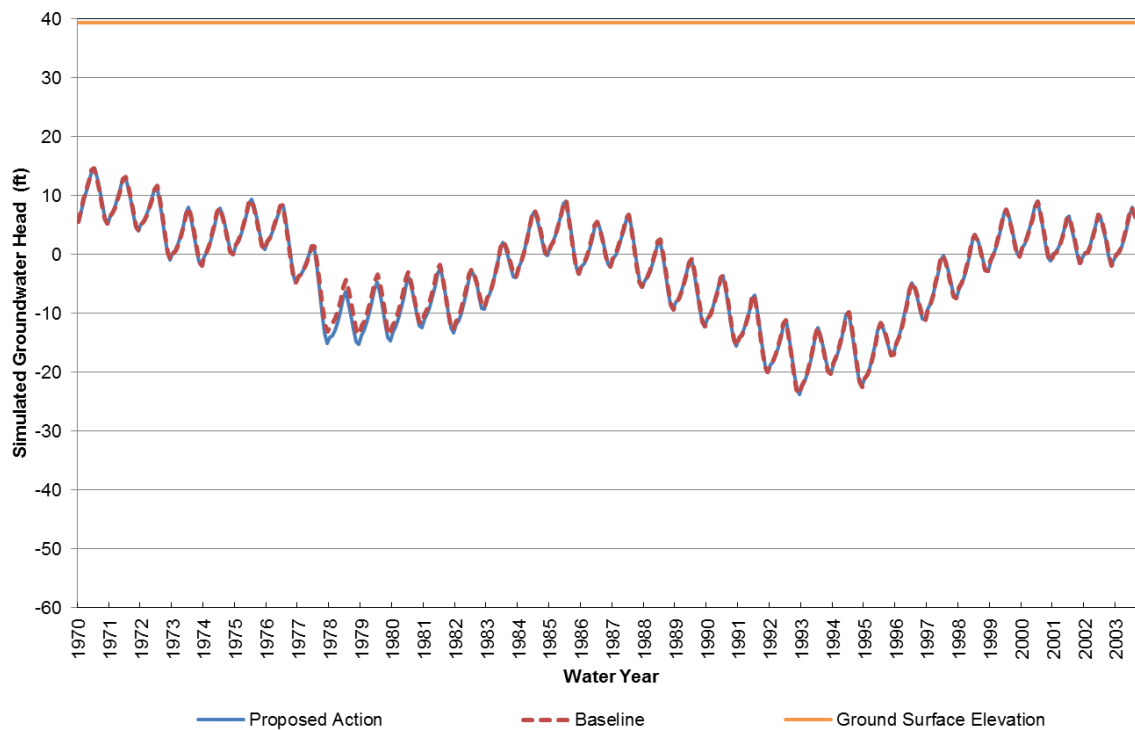


Figure 3-9. Simulated Groundwater Table Elevation (0 to approximately 70 feet bgs) at Location 21 (See Figure 3-12 for Location)

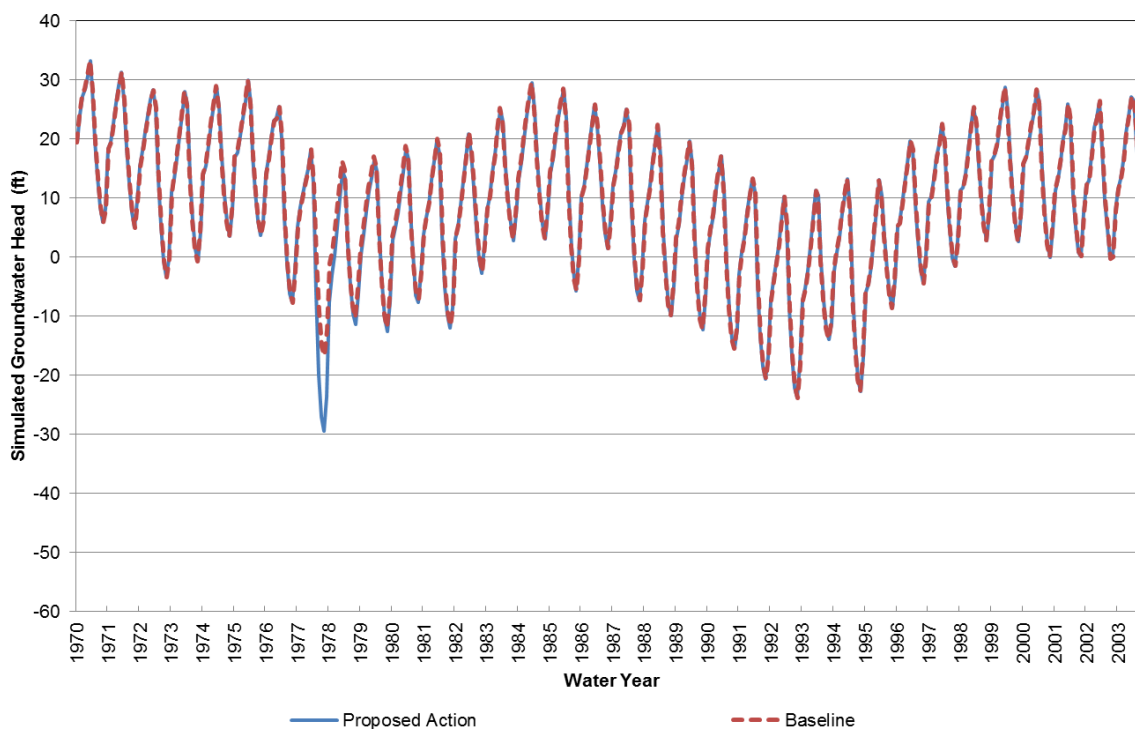


Figure 3-10. Simulated Groundwater Head (approximately 480 to 690 feet bgs) at Location 21 (See Figure 3-12 for Location)

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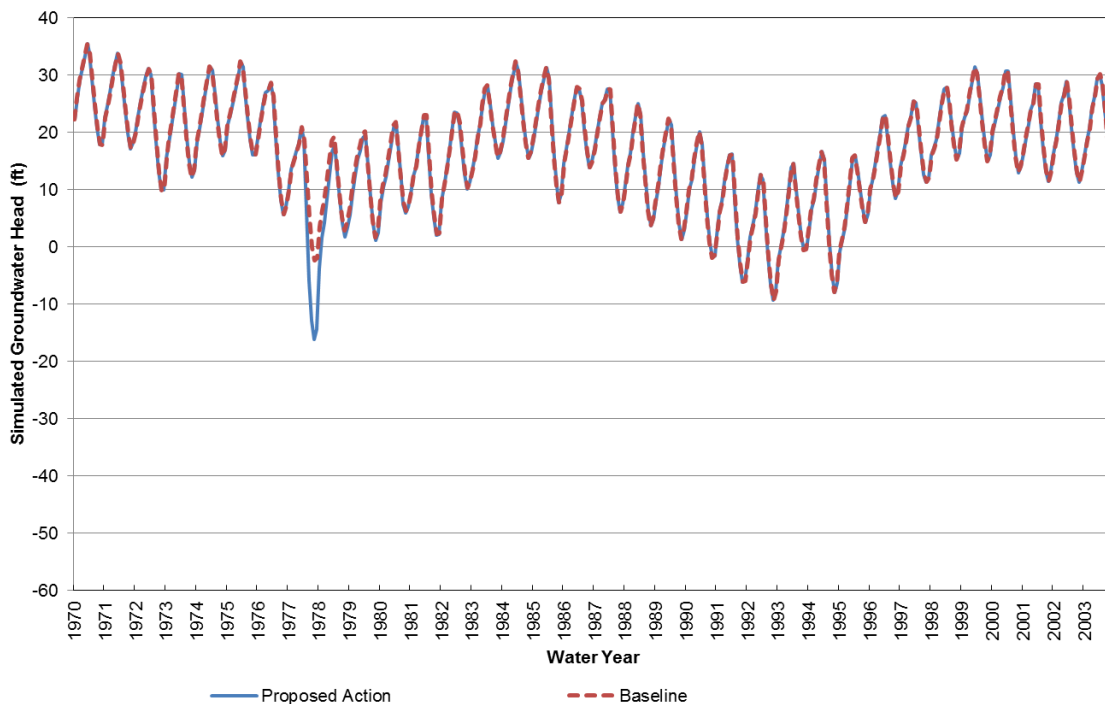


Figure 3-11. Simulated Groundwater Head (approximately 690 to 910 feet bgs) at Location 21 (See Figure 3-12 for Location)

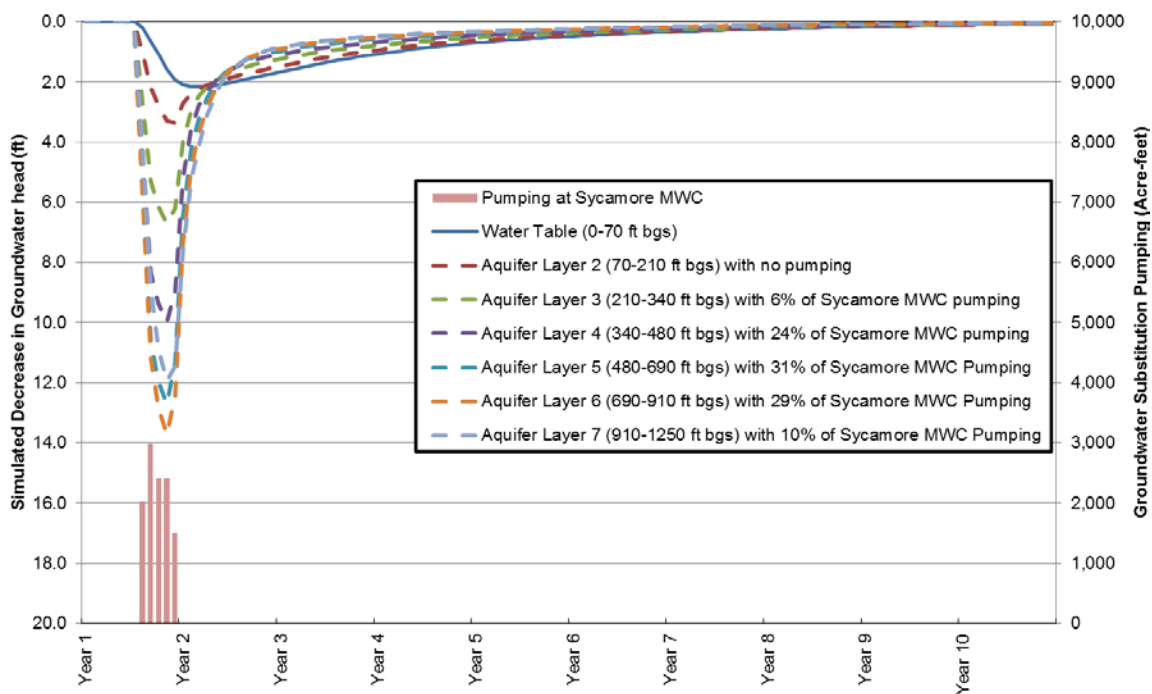


Figure 3-12. Simulated Change in Groundwater Head at Location 21 (near Sycamore MWC) under the Proposed Action

Mitigation Measure GW-1: Monitoring Program and Mitigation Plan

The *DRAFT Technical Information for Preparing Water Transfer Proposals* (Reclamation and DWR 2014) provides guidance for the development of groundwater substitution water transfer proposals. The technical information informs the development of the monitoring and mitigation program for the range of potential transfer activities evaluated in this EA/IS.

The objective of Mitigation Measure GW-1 is to avoid significant adverse environmental effects and ensure prompt corrective action in the event unanticipated effects occur. The measure accomplishes this by monitoring groundwater and/or surface water levels during transfers to avoid potential effects. The objectives of this process are to: (1) minimize potential effects to other legal users of water; (2) provide a process for review and response to reported effects to non-transferring parties; (3) assure that a local mitigation strategy is in place prior to the groundwater transfer; and (4) mitigate significant adverse environmental effects. Reclamation will verify that sellers adopt and implement these mitigation measures to avoid potentially significant adverse effects of transfer-related groundwater extraction. In addition, each entity participating in a groundwater substitution transfer must confirm that the proposed groundwater pumping will be compatible with state and local regulations and Groundwater Management Plans (GMPs). As Groundwater Sustainability Plans (GSPs) are developed by Groundwater Sustainability Agencies, potential sellers must confirm that the proposed pumping is compatible with applicable GSPs.

Well Review Process

Potential sellers must submit well data for Reclamation and, where appropriate, DWR review, as part of the transfer approval process. Required information will be detailed in the most current version of the *DRAFT Technical Information for Preparing Water Transfer Proposals*.

Monitoring Program

Potential sellers must complete and implement a monitoring program subject to Reclamation's approval that shall, at a minimum, include the following components:

- ***Monitoring Well Network.*** The monitoring program shall incorporate a sufficient number of monitoring wells, as determined by Reclamation and the sellers in relation to local conditions, to accurately characterize groundwater levels and response in the area before, during, and after transfer pumping takes place. Depending on local conditions, additional groundwater level monitoring may be required near ecological resource areas.
- ***Groundwater Pumping Measurements.*** All wells pumping to replace surface water designated for transfer shall be configured with a permanent instantaneous and totalizing flow meter capable of

accurately measuring well discharge rates and volumes. Flow meter readings will be recorded just prior to initiation of pumping and at designated times, but no less than monthly and as close as practical to the last day of the month, throughout the duration of the transfer.

- *Groundwater Levels.* Sellers will collect measurements of groundwater levels in both participating transfer wells and monitoring wells. Groundwater level monitoring will include measurements before, during and after transfer-related pumping. The seller will measure groundwater levels as follows:
 - Prior to transfer: Groundwater levels will be measured monthly from March in the year of the proposed transfer-related pumping until the start of the transfer (where possible).
 - Start of transfer: Groundwater levels will be measured on the same day that the transfer-related pumping begins, prior to the pump being turned on.
 - During transfer-related pumping: Groundwater levels will be measured weekly throughout the transfer-related pumping period, unless site specific information indicates a different interval should be used.
 - Post-transfer pumping: Groundwater levels will be measured weekly for one month after the end of transfer-related pumping, after which groundwater levels will be measured monthly through March of the year following the transfer.

Sellers thus monitor effects to groundwater levels that may result from the proposed transfer and avoid significant impacts. The primary criteria used to identify potentially significant impacts to groundwater levels are the BMOs set by GMPs. In the Sacramento Valley, several counties have established GMPs to provide guidance in managing the resource.

In areas where quantitative BMOs do not exist, Reclamation, TCCA, and the potential seller(s) will coordinate closely with potentially impacted third parties to collect and monitor groundwater data. If a third party expects that it may be impacted by a proposed transfer, that party should contact Reclamation and the seller with its concern. The burden of collecting groundwater data will not be the responsibility of the third party. If warranted, groundwater level monitoring to address the third-party's concern may be incorporated in the monitoring and mitigation plans required by Mitigation Measure GW-1.

Additionally, to avoid significant effects to vegetation and allow sellers to modify actions before significant effects occur, sellers will monitor groundwater depth data to verify that significant adverse effects to deep-rooted vegetation are avoided. If monitoring data indicate that water levels have dropped below root zones (i.e., more than 10 feet where groundwater was 10 to 25 feet below ground surface prior to starting the transfer of surface water made available from groundwater substitution actions), the seller must implement actions set forth in the mitigation plan. If historic data show that groundwater elevations in the area of transfer have typically varied by more than this amount annually during the proposed transfer period, then the transfer may be allowed to proceed. If there is no deep-rooted vegetation (i.e., oak trees and riparian trees that would have tap roots greater than 10 feet deep) within one-half mile of the transfer wells or the vegetation is located along waterways that will continue to have water during the transfer, the transfer may be allowed to proceed. If no existing monitoring points exist in the shallow aquifer, monitoring would be based on visual observations of the health of these areas of deep-rooted vegetation. If significant adverse impacts to deep-rooted vegetation (that is, loss of a substantial percentage of the deep-rooted vegetation as determined by Reclamation based on site-specific circumstances in consultation with a qualified biologist) occur as a result of the transfer despite the monitoring efforts and implementation of the mitigation plan, the seller will prepare a report documenting the result of the restoration activity to plant, maintain, and monitor restoration of vegetation for 5 years to replace the losses.

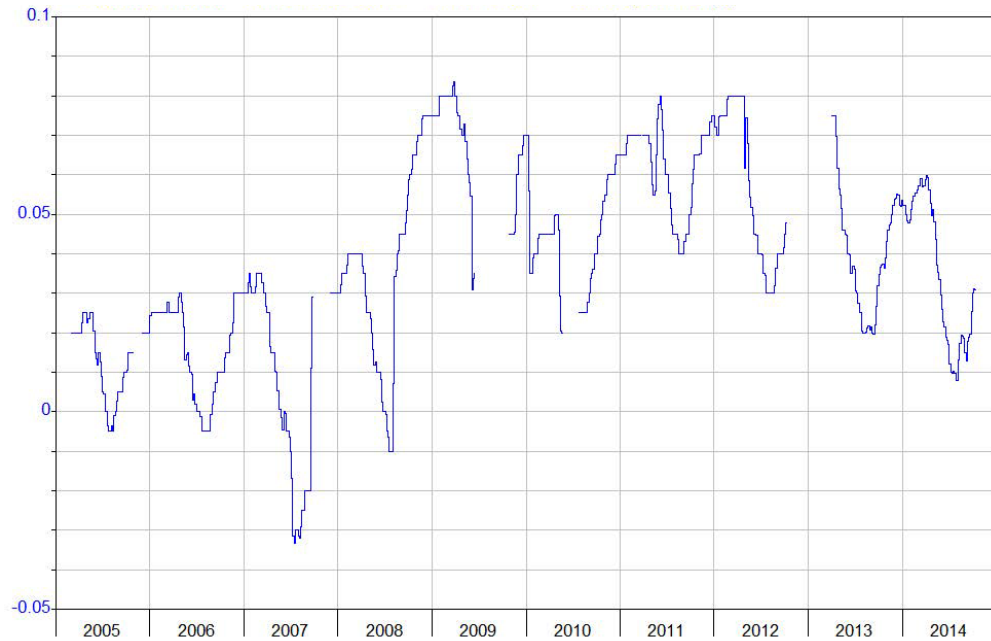
- *Groundwater Quality.* For municipal sellers, the comprehensive water quality testing requirements of Title 22 are considered sufficient for the water transfer monitoring program. Agricultural sellers shall measure specific conductance in samples from each participating production well. Samples shall be collected when the seller first initiates pumping, monthly during the transfer period, and at the termination of transfer pumping.
- *Land Subsidence.* Subsidence monitoring will be required if groundwater levels could decline below historic low levels during the proposed water transfer. Before a transfer, each seller will examine local groundwater conditions and groundwater level changes based on past pumping events or groundwater substitution transfers. This existing information will be the basis to estimate if groundwater levels are likely to decline below historic low levels, which would trigger land surface elevation measurements (as described below).

If the measured groundwater level falls below the historic low level, the seller must confirm the measurement within seven days. If the water level has risen above the historic low level, the seller may continue

transfer pumping. If the measured groundwater level remains below the historic low level, the seller will stop transfer-related pumping immediately or begin land surface elevation measurements in strategic locations within and/or near the transfer-related pumping area. Measurements may include (1) extensometer monitoring, (2) continuous GPS monitoring, or (3) extensive land-elevation benchmark surveys conducted by a licensed surveyor. This data could be collected by the seller or from other sources (such as public extensometer data). Measurements must be completed on a monthly basis during the transfer.

If the land surface elevation survey indicates an elevation decrease between 0.1 foot and 0.2 foot from the initial measurement, the seller could have significant impacts and would need to start the process identified below in the Mitigation Plan. The seller will also work with Reclamation to assess the accuracy of the survey measurements based on current limitations of technology, professional engineering/surveying judgment, and any other data available in or near the transferring area.

The threshold of 0.1 foot was chosen as this value is typical of the elastic (i.e., recoverable) portion of subsidence; the threshold of 0.2 foot was selected considering limitations of current land survey technology. This threshold is supported by a review of data from extensometers within the Sacramento Valley. Figure 3-13 shows the subsidence data from extensometer 22N02W15C002M, in Glenn County. This extensometer has not been identified as having long-term declining trends, but exhibits a small amount of movement (up to about 0.1 foot).



Source: DWR Water Data Library 2014

Figure 3-13. Measured Ground Surface Displacement (in feet) at Extensometer 22N02W15C002M in Glenn County

- *Coordination Plan.* The monitoring program will include a plan to coordinate the collection and organization of monitoring data. This plan will describe how input from third parties will be incorporated into the monitoring program, and will include a plan for communication with Reclamation as well as other decision makers and third parties.
- *Evaluation and Reporting.* The proposed monitoring program will describe the method of reporting monitoring data. At a minimum, sellers will provide data summary tables to Reclamation, both during and after transfer-related groundwater pumping. Post-program reporting will continue through March of the year following the transfer. Sellers will provide a final summary report to Reclamation evaluating the effects of the water transfer. The final report will identify transfer-related effects on groundwater and surface water (both during and after pumping), and the extent and significance, if any, of effects on local groundwater users. It shall include groundwater elevation contour maps for the area in which transfer operations are located, showing pre-transfer groundwater elevations, groundwater elevations at the end of the transfer, and recovered groundwater elevations in March of the year following the transfer. The summary report shall also identify the extent and significance, if any, of transfer-related effects to ecological resources such as fish, wildlife, and vegetation resources.

Mitigation Plan

Potential sellers must complete and implement a mitigation plan to avoid potentially significant groundwater impacts and ensure prompt corrective action in the event unanticipated effects occur. Mitigation actions could include:

- Curtailment of pumping until natural recharge corrects the issue.
- Lowering of pumping bowls in non-transferring wells affected by transfer pumping.
- Reimbursement for significant increases in pumping costs due to the additional groundwater pumping to support the transfer.
- Curtailment of pumping until water levels rise above historic lows if non-reversible subsidence is detected (based on local data to identify elastic versus inelastic subsidence).
- Reimbursement for modifications to infrastructure that may be affected by non-reversible subsidence.
- Other appropriate actions based on local conditions, as determined by Reclamation.

As summarized above, the purpose of Mitigation Measure GW-1 is to monitor groundwater levels during transfers to avoid potentially significant adverse effects. The mitigation plan will describe how to avoid significant effects and address any significant effects that occur despite the monitoring efforts. The objectives of this process are to: (1) minimize potential effects to other legal users of water; (2) provide a process for review and response to reported effects; and (3) assure that a local mitigation strategy is in place prior to the groundwater transfer. Accordingly, to ensure that mitigation plans will be feasible, effective, and tailored to local conditions, the plan must include the following elements:

- A procedure for the seller to receive reports of purported environmental effects or effects to non-transferring parties;
- A procedure for investigating any reported effect;
- Development of mitigation options, in cooperation with the affected parties, for legitimate significant effects; and
- Assurances that adequate financial resources are available to cover reasonably anticipated mitigation needs.

Mitigation to avoid potentially significant subsidence impacts and ensure prompt corrective action in the event that unanticipated effects occur is described by the following stages.

Stage 1: Groundwater Levels

Irreversible subsidence would not occur if groundwater levels stay above historic low levels for the entire transfer season. As groundwater is pumped from an aquifer, the pore water pressure in the aquifer is reduced. This reduction in pore water pressure increases the effective stress on the structure of the aquifer itself. This increase in effective stress can cause the aquifer structure to deform, or compress, resulting in the subsidence of the ground surface elevation. Subsidence can be irreversible if the reduced effective stress is lower than the historically low effective stress. Typically this would be the result of groundwater levels reaching levels lower than the historical low level.

Before a transfer, each seller will examine local groundwater conditions and groundwater level changes based on past pumping events or groundwater substitution transfers. This existing information will be the basis to estimate if groundwater levels are likely to decline below historic low levels as a result of the proposed transfer. If the pre-transfer assessment indicates that groundwater levels will stay above historic low levels, and this finding is confirmed by monitoring during the transfer-related pumping period, then no additional actions for subsidence monitoring or mitigation are necessary. Sellers would need to proceed to stage 2 for land surface elevation monitoring if the pre-transfer estimates indicate that groundwater levels are anticipated to decline below historic low levels. If monitoring during the transfer-related pumping period (confirmed by two measurements within seven days) indicates that groundwater levels have fallen below historic low levels, sellers must immediately stop pumping from transfer wells in the area that is affected or proceed to stage 2.

Stage 2: Ground Surface Elevations

Stage 2 includes monthly ground surface monitoring during transfer-related pumping if pumping could cause groundwater levels to fall below historic low levels, as described above in the Monitoring Plan. If ground surface elevations decrease between 0.1 and 0.2 foot, the seller will evaluate the accuracy of the information based on the current limitations of technology, professional engineering/surveying judgment, and other local data. If the elevations decline more than 0.2 foot, this change could indicate inelastic subsidence, which would trigger a shift to Stage 3.

Stage 3: Local Investigation

If the threshold of 0.2 foot of ground surface elevation change is exceeded, the seller shall cease groundwater substitution pumping for the transfer until one of the following occurs: (1) groundwater levels recover above historic low groundwater levels; (2) seller completes a more detailed local investigation identifying hydrogeologic conditions that could potentially allow continued

transfer-related pumping from a subset of wells (if the seller can provide evidence that this pumping is not expected to cause additional subsidence); or (3) seller completes an investigation of local infrastructure that could be affected by subsidence (such as water delivery infrastructure, water supply facilities, flood protection facilities, highways, etc.) indicating the local threshold of subsidence that could be experienced before these facilities would be adversely affected. Any option should also consider the effect of non-transfer pumping that may be causing subsidence.

Stage 4: Mitigation

If subsidence effects to local infrastructure occur despite monitoring efforts, then the sellers must work with the lead agencies to determine whether the measured subsidence may be caused by transfer-related pumping. Any significant adverse subsidence effects caused by transfer pumping activities must be addressed. A contingency plan must be developed in the event that a need for further corrective action is necessary. This contingency plan must be approved by Reclamation before transfer-related pumping could continue after Stage 3.

Stage 5: Continued Monitoring

The sellers will continue to monitor for subsidence while groundwater levels remain below historic low levels. If the seller has ceased transfer-related pumping but groundwater levels remain below historic lows, subsidence monitoring will need to continue until the spring following the transfer. The results of subsidence monitoring will be factored into monitoring and mitigation plans for future transfers.

c) Less than Significant

No Action Alternative: Because of dry conditions in 2015, water users in the Sacramento Valley may idle more cropland in response to supply shortages. Under normal farming practices, growers leave fields fallow during some cropping cycles in order to make improvements such as land leveling and weed abatement or to reduce pest problems and build soils. Growers manage potential soil erosion impacts to avoid substantial loss of soils and to protect soil quality (USDA Natural Resources Conservation Service [NRCS] 2009). While growers would not be able to engage in management practices that result in a consumptive use of water on an idled field, they could continue such erosion control techniques as surface roughening tillage to produce clods, ridges, and depressions to reduce wind velocity and trap drifting soil; establishment of barriers at intervals perpendicular to wind direction; or, application of mulch (USDA NRCS 2009). Therefore, cropland idling under the No Action Alternative would not result in substantial soil erosion or sediment deposition into waterways. Impacts to water quality would be less than significant.

Proposed Action: The Proposed Action could include cropland idling in addition to the idling that would occur under the No Action Alternative, which

has the potential to increase sediment erosion into nearby waterways. Similar to the No Action Alternative, growers would implement measures to prevent the loss of topsoil. Additionally, the rice crop cycle and the soil textures in the sellers' areas reduce the potential for wind erosion in this region. The process of rice cultivation includes incorporating the leftover rice straw into the soils after harvest through discing. Once dried, the combination of decomposed straw and clay texture soils typically produces a hard, crust-like surface. If left undisturbed, this surface texture would remain intact throughout the summer, when wind erosion would be expected to occur, until winter rains begin. This surface type would not be conducive to soil loss from wind erosion. During the winter rains, the hard, crust-like surface typically remains intact and the amount of sediment transported through winter runoff would not be expected to increase. Therefore, there would be little-to-no increase in sediment transport resulting from wind erosion or winter runoff from idled rice fields under the Proposed Action and the resultant impact would be less than significant.

d, e, g, h, i, j) No Impact. The Proposed Action and No Action Alternative would not involve any actions that would result in flooding or create runoff water that would exceed the capacity of existing drainage systems or provide a substantial source of polluted runoff.

f) Less Than Significant. Changes in groundwater levels and the potential change in groundwater flow directions could cause a change in groundwater quality through a number of mechanisms. One mechanism is the potential mobilization of areas of poorer quality water, drawn down from shallow zones, or drawn up into previously unaffected areas. Changes in groundwater gradients and flow directions could also cause (or speed) the lateral migration of poorer quality water.

No Action Alternative: Surface water shortages would likely cause some water users to pump additional groundwater. The groundwater pumping could cause water quality concerns, as described above. However, the groundwater pumping would follow historic dry year trends and would not likely change groundwater quality compared to existing conditions.

Proposed Action:

Redding Groundwater Basin. Groundwater in the Redding Groundwater Basin area of analysis is typically of good quality, as evidenced by its low TDS concentrations, which range from 70 to 360 mg/L. Areas of high salinity (poor water quality), are generally found on the western basin margins, where the groundwater is derived from marine sedimentary rock. Elevated levels of iron, manganese, nitrate, and high TDS have been detected in some areas (DWR 2003).

Groundwater extraction under the Proposed Action would be limited to withdrawals during the irrigation season of the 2015 contract year. Since

groundwater in the Redding area is of good quality, adverse effects from the migration of reduced groundwater quality would be anticipated to be minimal.

Sacramento Valley Groundwater Basin. Groundwater quality in the Sacramento Valley Groundwater Basin is generally good and sufficient for municipal, agricultural, domestic, and industrial uses. However, there are some localized groundwater quality issues in the basin. Arsenic was detected above the maximum contaminant level (MCL) in 22 percent of the primary aquifers within the Sacramento Valley. Nutrient concentration within the central Sacramento Valley region was above the MCLs in about three percent of the primary aquifers. In the southern portion of the basin, nutrients were detected above the MCLs in about one percent of the primary aquifers (Bennett et al. 2011).

Groundwater extraction under the Proposed Action would be limited to withdrawals during the irrigation season of the 2015 contract year. Groundwater extraction under the Proposed Action would be limited to short-term withdrawals during the irrigation season and extraction near areas of reduced groundwater quality would not be expected to result in a permanent change to groundwater quality conditions. Consequently, effects from the migration of reduced groundwater quality would be less than significant.

X. LAND USE AND PLANNING -

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

a, b) No Impact. The No Action Alternative and Proposed Action would not involve any construction or new structures that could divide a community or conflict with land use plans, policies, or zoning.

c) No Impact. The No Action Alternative and Proposed Action would not conflict with local policies protecting biological resources or habitat conservation plans.

XI. MINERAL RESOURCES – Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

a, b) No Impact. The No Action Alternative and Proposed Action do not require construction or other activities that would result in the loss of availability of known mineral resources.

XII. NOISE - Would the project result in:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
e) Located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) Within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion:

a, b, c, e, f) No Impact. The No Action Alternative and Proposed Action would not result in the development of any new noise-emitting devices. The Proposed Action would only rely on existing facilities and equipment. No new construction activities would be associated with the Proposed Action and no ground-disturbing actions with the potential to generate groundborne vibrations would occur. Certain wells may be located within an airport land use plan, but there would be no new permanent residents or workers near the wells that could be affected by any plane noise. For private airstrips, the Proposed Action would not expose people in the vicinity to excessive noise levels.

d) Less Than Significant. The No Action Alternative would not increase ambient noise levels. The Proposed Action would result in the temporary operation of existing electric, diesel, and propane driven wells that would result in temporary increases in noise levels. All the wells would be located in rural areas, which are generally removed from noise-sensitive receptors or in a farm setting with typical noise from agricultural operations. The wells would be operated by a willing landowner; therefore, any localized noise levels would be approved by the landowner. Noise impacts from increased well operation would be less than significant.

XIII. POPULATION AND HOUSING

– Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a) No Impact. The No Action Alternative and Proposed Action would not induce population growth. Water transfers would help reduce water shortages, and would not increase the maximum acreage under production or require more farm workers to meet labor demands. No housing would be constructed, demolished, or replaced as a result of water transfers.

b, c) No Impact. The No Action Alternative and Proposed Action would include no construction, demolition, or other activities that could displace existing housing or people and necessitate the construction of replacement housing.

XIV. PUBLIC SERVICES

– Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Fire protection?	☐	☐	☐	☒
b) Police protection?	☐	☐	☐	☒
c) Schools?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Parks?	☐	☐	☐	☒
e) Other governmental facilities (including roads)?	☐	☐	☐	☒

a-e) No Impact. The No Action Alternative and Proposed Action would not create any new demand for public services or require any existing public facilities to be altered. Transferred water would be transported using existing conveyance facilities and pumping stations, and would not require the use of area roads, so there would be no impact to roads or other government facilities. Water transfers would not affect the supplies available to municipalities or other jurisdictions for fire protection, parks, or school use. Therefore, there would be no impact to Public Services or Public Facilities as a result of this project.

XV. RECREATION –

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

a, b) No Impact. The No Action Alternative and Proposed Action would not affect any recreation facilities or require construction or expansion of recreation facilities.

XVI. TRANSPORTATION/TRAFFIC –

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Cause a conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☒
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

a-g) No Impact. The No Action Alternative and Proposed Action would not create any new demand on transportation services. The Proposed Action has no construction activities that would increase the traffic on roads in the project area. The amount of water transferred would be less than what is supplied during normal water years, and so would not create an increase in farm activity in the buyer's area that could increase traffic. There would be no impact to the level of service or air traffic patterns in the project area, nor would there be an

increase to the hazard to design features, inadequate emergency access or parking capacity, or conflict with adopted policies supporting alternative transportation.

XVII. UTILITIES AND SERVICE SYSTEMS - Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

a-g) No Impact. The No Action Alternative and Proposed Action would not create any new demand on utilities or service systems. There would be no impact to utility or service systems resulting from implementing the Proposed Action. Transfers would not require the construction of new water or

wastewater treatment facilities as all water transfers would be done using existing facilities. There would be no increase in demand for wastewater treatment facilities that could exceed existing capacities, and no new storm water drainage facilities would be required under the Proposed Action.

Water transfers would be done within the existing entitlements and resources, and no new water supplies for the sellers would be required. Buyers would also not require new water supplies as the transfers would provide agricultural water in lieu of the limited surface water supplies.

There would be no solid waste generated as a result of the Proposed Action, and therefore no landfill would be required. Therefore, there would be no impact to utilities or other service systems as a result of the Proposed Action.

XVIII. MANDATORY FINDINGS OF SIGNIFICANCE –

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

a) Less than Significant. Water transfers would not have substantial incremental effects to habitat or species relative to the conditions that would occur in response to the dry hydrologic conditions. Environmental Commitments required for 2015 transfers would reduce potential special status species impacts to less than significant. Water transfers would not degrade the quality of the environment or eliminate examples of California history or prehistory.

b) Less than Significant. The cumulative analysis considers other potential water transfers that could occur in the 2015 transfer season, including non-CVP water transfers. The SLDMWA released a draft Long-Term Water Transfer EIS/EIR to analyze potential transfers from 2015 to 2024; the EIS/EIR includes a similar list of sellers as included in this document. For sellers that are included in both documents, the two documents reflect different potential buyers for the same water sources. The transfer quantities identified in the two documents cannot be summed (i.e., it is the same available water which could be transferred). The transfer quantities as identified in Tables 2-2, 2-3, and 2-4 could be purchased by either the SLDMWA Participating Members or TCCA Members Units. However, the Long-Term Water Transfers EIS/EIR includes some sellers that are not included in this EA/IS as potential sellers to TCCA. Those sellers are included in this analysis of potential cumulative impacts.

Table 3-9 lists additional entities who have indicated interest in providing water for transfer to buyers other than TCCA. Water transfer methods could include cropland idling and groundwater substitution (the same as described for the Proposed Action). Transfer methods could also include additional methods such as conservation, where a seller takes a conservation action to reduce irrecoverable water losses, and stored reservoir water, which includes releases of water that would have remained in storage in non-CVP or SWP reservoirs.

Table 3-9. Potential Additional Cumulative Sellers (Upper Limits)

Water Agency	Groundwater Substitution (AF)	Cropland Idling/ Crop Shifting (AF)	Stored Reservoir Release (AF)	Conservation (AF)
American River Area of Analysis				
City of Sacramento	5,000			
Placer County WA			47,000	
Sacramento County WA	15,000			
Sacramento Suburban WD	30,000			
Yuba River Area of Analysis				
Browns Valley ID			5,000	3,100
Cordua ID	12,000			
Feather River Area of Analysis				
Biggs-West Gridley WD		32,190		
Butte WD	5,500	11,500		
Garden Highway MWC	7,500			

Water Agency	Groundwater Substitution (AF)	Cropland Idling/ Crop Shifting (AF)	Stored Reservoir Release (AF)	Conservation (AF)
Gilsizer Slough Ranch	3,900			
Goose Club Farms and Teichert Aggregates	10,000	10,000		
Plumas MWC	5,000	1,750		
Richvale ID		12,000		
South Sutter WD			15,000	
Sutter Extension WD	4,000	11,000		
Tule Basin Farms	7,320			
Western Canal WD		30,000		
Merced River Area of Analysis				
Merced ID			30,000	
Delta Region Area of Analysis				
Reclamation District 2068	4,500	7,500		
Pope Ranch	2,800			
Total	116,820	115,940	97,000	3,100

Key:

AF = acre-feet

ID = Irrigation District

MWC = Mutual Water Company

WA = Water Agency

WD = Water District

Water transfers occur in many dry years to move water to agencies that may be experiencing shortages. Within the last five years, Reclamation approved and facilitated transfers of 79,926 AF in 2009, 31,406 AF in 2013, and 121,610 AF in 2014. Reclamation participated in the monitoring efforts during and after these transfers (as specified in the environmental documents) and did not find significant environmental effects of these transfers or cumulative effects with other transfers. Additionally, non-CVP related transfers continued during this time period. In 2013, transfers from both CVP and non-CVP sources totaled 268,730 AF (DWR 2014b); these transfers include transfers within basins and transfers between basins. About 249,600 AF of these transfers originated in the Sacramento Valley and were transferred to users in other areas of the Sacramento Valley, the Bay Area, the Central Valley, or southern California. In 2014, DWR approved 305,760 AF of temporary and long-term transfer water to be made available for conveyance through the Delta (including about 20,000 AF of water to CVP contractors that is also part of Reclamation's total amount listed above).

These transfers represent a small portion of the Sacramento Valley's overall water supply. Applied water in the Sacramento Valley from 2001 to 2010 has ranged from a low of about 8,196,000 AF in 2005 up to 9,915,000 AF in 2004. The driest year during this period was 2007, when applied water was about 9,868,000 AF (DWR 2013). These figures include applied water from surface water, groundwater, and reuse.

The Proposed Action could have potential cumulatively considerable impacts to air quality, biological resources, and groundwater resources. The cumulative analysis for these resources follows. The Proposed Action would not have cumulatively considerable impacts to other resources evaluated in this EA/IS.

Air Quality

All counties affected by the Proposed Action are located in areas designated nonattainment for the PM₁₀ CAAQS. Additionally, Sacramento, Shasta, Tehama, and Yolo Counties are designated nonattainment for the O₃ CAAQS and Sutter County is designated nonattainment-transitional for the O₃ CAAQS. Nonattainment status represents a cumulatively significant impact within the area. O₃ is a secondary pollutant, meaning that it is formed in the atmosphere from reactions of precursor compounds under certain conditions. Primary precursor compounds that lead to O₃ formation include volatile organic compounds and nitrogen oxides; therefore, the significance thresholds established by the air districts for VOC and NO_x are intended to maintain or attain the O₃ CAAQS and NAAQS. Because no single project determines the nonattainment status of a region, individual projects would only contribute to the area's designation on a cumulative basis.

The significance thresholds developed by the air districts serve to evaluate if a proposed project could either 1) cause or contribute to a new violation of a CAAQS or NAAQS in the study area or 2) increase the frequency or severity of any existing violation of any standard in the area. Air districts recognize that air quality violations are not caused by any one project, but are a cumulative effect of multiple projects. Therefore, the air districts (including the Sacramento Metropolitan AQMD) have developed guidance that indicates a proposed project would be cumulatively considerable if the air quality impacts are individually significant.

Implementation of mitigation measures would reduce the Proposed Action's individual impacts to less than significant. Therefore, air quality impacts would not be cumulatively considerable.

Biological Resources

Transfers under the cumulative condition would result in the idling of more rice fields than those included in the Proposed Action. Most of the cumulative cropland idling transfers would occur in the Feather River area, the majority of which is in Butte and Sutter counties. Rice would be the main crop idled in these counties. RD2068 and Pope Ranch in the Delta region do not have substantial rice acreage; therefore, other crops in these districts would likely be idled for transfers.

As described in the Biological Resources section, rice fields provide habitat for GGS, pacific pond turtle, and migratory birds. For the GGS and pacific pond turtle, rice idling could result in reduced forage and cover habitat, hindered movement, and increased predation risk. For migratory birds, rice idling could

reduce nesting, forage, and rearing habitat. Additional rice idled under the cumulative condition could increase these effects relative to the Proposed Action.

An additional 32,860 acres of rice could be idled under the cumulative condition, based on the cropland idling transfer quantities in Table 3-9 and an ETAW of 3.3 acre-feet per acre for rice. Including the Proposed Action, up to 87,901 acres of rice could be idled cumulatively. The Proposed Action includes Environmental Commitments to reduce potential effects to special status species, including GGS and pacific pond turtle, and migratory birds. Other water transfers facilitated by Reclamation and DWR using Federal and State facilities would be required to have similar conservation measures in place to protect special status species. The Environmental Commitments would reduce potential effects of the Proposed Action to special status species under the cumulative condition, such that the Proposed Action's contribution would not be cumulatively considerable.

Groundwater substitution transfers under the cumulative condition would also result in streamflow depletion and potentially affect flows for fish and natural communities. The transfers included in Table 3-9 are in different areas of the Sacramento Valley than those included in the Proposed Action and would not substantially increase streamflow depletion in any one area. As a result, any losses in streamflows would be minor and effects to fisheries or natural communities would be less than significant under the cumulative condition.

Groundwater Resources

The reduction in recharge due to the decrease in precipitation and runoff in the past years in addition to the increase in groundwater substitution transfers would lower groundwater levels. The groundwater modeling for the Proposed Action suggests that the pumping of groundwater used in lieu of the surface water made available for transfer in addition to the groundwater pumping which would occur as a result of the dry conditions would not cause significant adverse effects to groundwater levels with the implementation of Mitigation Measure GW-1. The additional groundwater substitution transfers in the cumulative condition are in different areas of the Sacramento Valley (focused in the Feather and American river areas rather than the Sacramento River area); therefore, this addition to the cumulative condition is not likely to cause a significant cumulative impact.

Reclamation requires well review, monitoring, and mitigation to reduce effects to third party groundwater users for approval of transfers. Only wells that meet the requirements outlined in the *DRAFT Technical Information for Preparing Water Transfer Proposals* (Reclamation and DWR 2014) will be allowed to participate in a transfer. Reclamation will not approve transfers if appropriate monitoring and mitigation does not occur. Monitoring and mitigation programs would reduce cumulative groundwater effects. Reclamation will verify that monitoring and mitigation are appropriately implemented and groundwater

effects do not occur. Coordination of groundwater programs in the Sacramento Valley would also minimize and avoid the potential for cumulative effects to groundwater resources. DWR is involved in multiple groundwater programs in the Sacramento Valley, including monitoring programs. Reclamation will work with DWR to track program activities, collect and combine data, and assess potential groundwater effects. Because of the required groundwater monitoring and mitigation for transfer approval and agency coordination, the Proposed Action would not result in a cumulatively considerable contribution to effects on groundwater.

c) No Impact. The Proposed Action would not result in environmental effects that cause substantial adverse impacts to human beings. Effects in the sellers' area would be temporary, occurring in only 2015, and do not present a substantial risk to water supplies to human beings. The Proposed Action would provide additional water to the buyers' area, which would benefit agricultural production and the regional economies in the buyers' area. There would be no long-term effects of the Proposed Action.

Chapter 4

Other Federal Environmental Compliance Requirements

In addition to resources analyzed in Chapter 3, Department of the Interior Regulations, Executive Orders, and Reclamation guidelines require a discussion of the following additional items when preparing environmental documentation.

4.1 Indian Trust Assets (ITAs)

ITAs are defined as legal interests in property held in trust by the U.S. government for Indian tribes or individuals, or property protected under U.S. law for federally recognized Indian tribes or individuals. ITAs can include land, minerals, federally-reserved hunting and fishing rights, federally-reserved water rights, and in-stream flows associated with a reservation or Rancheria. By definition, ITAs cannot be sold, leased, or otherwise encumbered without approval of the U.S. The following ITAs overlay the boundaries of the Sacramento Valley Groundwater Basin:

- Auburn Rancheria
- Chico Rancheria
- Colusa
- Cortina
- Paskenta
- Rumsey

Groundwater substitution is the only transfer method under the Proposed Action that could affect ITAs. Auburn Rancheria, Cortina, and Rumsey lie on the border of the basin, where groundwater levels would be less affected by proposed groundwater pumping. Groundwater modeling in the Sacramento Valley Groundwater Basin shows that there would be essentially no effect to groundwater table elevations from groundwater substitution transfers near the Chico Rancheria, and Paskenta sites (see Figure 4-1). The Colusa Rancheria is near an area of potential drawdown; however, the drawdown is on the opposite side of the river from the Colusa Rancheria. The changes in groundwater levels near the Colusa Rancheria would be negligible and would not affect groundwater pumping.

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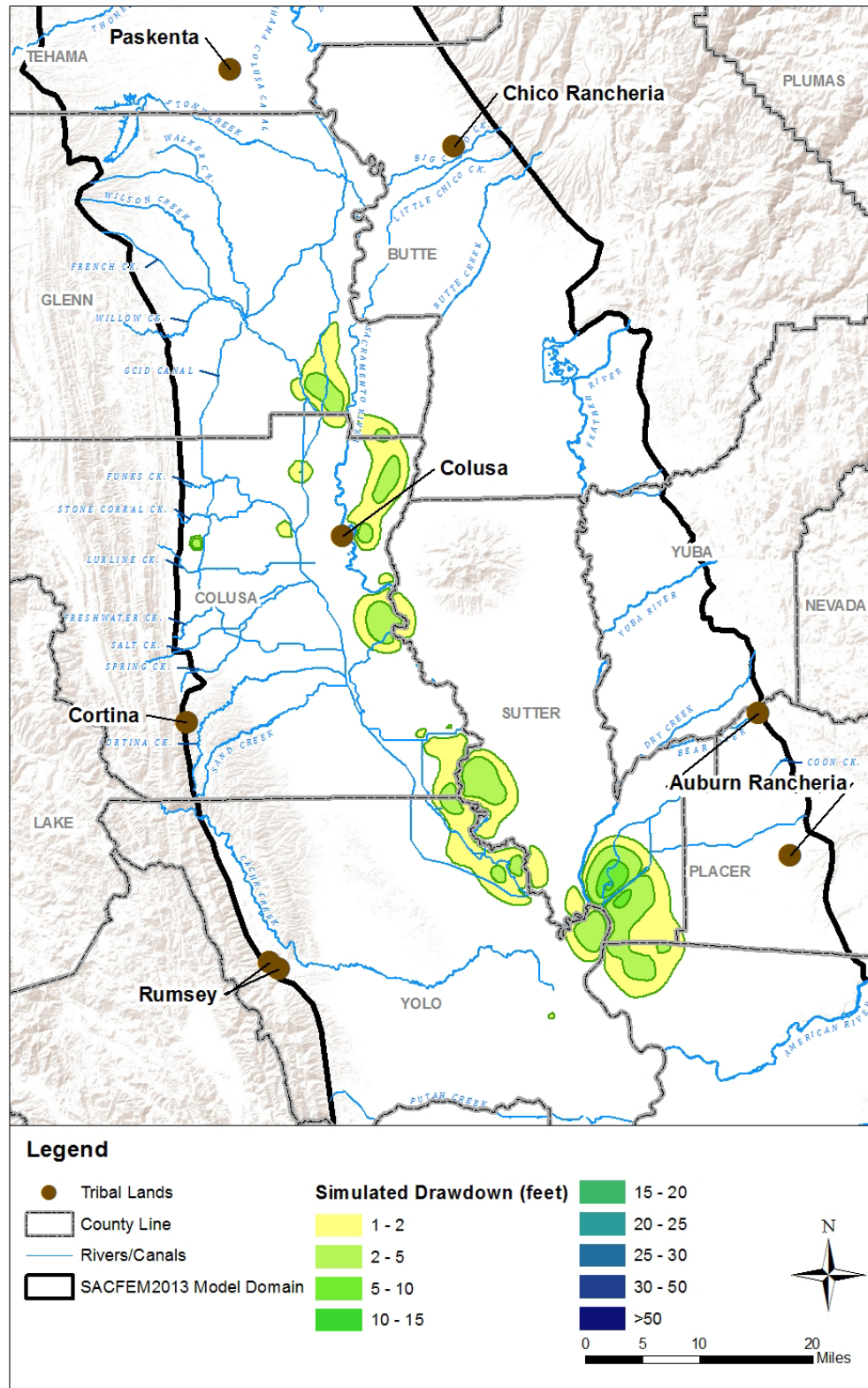


Figure 4-1. Groundwater Effects to ITAs in the Sacramento Valley Groundwater Basin

The Redding Rancheria falls within the Redding Groundwater Basin, which is where groundwater substitution transfers would occur by Anderson-Cottonwood ID. The groundwater evaluation concludes that there would not be significant effects to groundwater elevations in the Redding Groundwater Basin based on past pump tests and that Anderson-Cottonwood ID would develop and implement a Monitoring Program and Mitigation Plan because of the uncertainty of changes in groundwater levels in a critical water year. As a result, there would be no effects to the Redding Rancheria.

Because groundwater substitution transfers would not affect groundwater table elevations near the ITA sites, the Proposed Action would not affect ITAs.

4.2 Indian Sacred Sites

As defined by Executive Order 13007: Indian Sacred Sites, a sacred site “means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.” The affected environment for the Proposed Action does not include Federal land; therefore, there is no potential for Indian Sacred Sites to be affected by the Proposed Action.

4.3 Socioeconomics

Agriculture is a primary industry in the counties in Colusa, Glenn, Sutter, and Yolo counties (the counties where cropland idling could occur). In 2012, the combined value of agricultural production in the four counties was approximately \$2.6 billion. Colusa County had a gross value of agricultural production at \$711,592,000; followed by Glenn County at \$696,262,000, Yolo County at \$645,767,000, and Sutter County at \$527,004,000 (California Department of Food and Agriculture 2014). Table 4-1 summarizes the regional economy in 2013 for Glenn, Colusa, Sutter, and Yolo counties. The counties were combined into one region because many of the participating sellers’ service area cross county boundaries and the regional economies are generally similar with respect to the major industries. It is important to note that Yolo County represents a significant portion of the employment, labor income, and output in the region because of its proximity to the urban Sacramento area and economic activities associated with the University of California at Davis.

Table 4-1. Summary of 2013 Regional Economy in Glenn, Colusa, Sutter, and Yolo Counties

	Glenn Employment	Glenn Earnings	Colusa Employment	Colusa Earnings	Sutter Employment	Sutter Earnings	Yolo Employment	Yolo Earnings
Total	12,340	\$685,277	11,621	\$806,396	44,233	\$1,934,557	122,288	\$7,654,165
Farm	2,151	\$248,578	1,966	\$335,469	2,973	\$249,322	2,786	\$288,625
Nonfarm	10,189	\$436,699	9,655	\$470,927	41,260	\$1,685,235	119,502	\$7,365,540
Private nonfarm	8,139	\$295,251	7,467	\$331,145	36,725	\$1,350,830	81,422	\$3,979,603
Forestry, fishing, and related activities	(D)	(D)	(D)	(D)	1,616	\$52,605	3,248	\$118,095
Mining	(D)	(D)	(D)	(D)	171	\$12,347	361	\$18,635
Utilities	63	\$7,228	56	\$7,683	77	\$10,035	(D)	(D)
Construction	478	\$22,092	230	\$14,696	1,966	\$93,376	4,102	\$281,472
Manufacturing	682	\$36,599	1,073	\$68,010	1,841	\$103,331	5,784	\$466,192
Wholesale trade	317	\$19,663	910	\$74,846	1,301	\$99,438	(D)	(D)
Retail trade	1,022	\$29,913	662	\$23,974	5,894	\$184,380	9,104	\$342,027
Transportation and warehousing	632	\$31,741	443	\$17,278	2,020	\$90,666	6,517	\$386,931
Information	(D)	(D)	30	\$1,354	335	\$15,286	1,279	\$86,660
Finance and insurance	265	\$10,064	191	\$8,104	1,564	\$48,079	2,737	\$138,820
Real estate and rental and leasing	351	\$4,017	433	\$9,880	3,052	\$51,235	4,319	\$116,072
Professional, scientific, and technical services	289	\$8,868	216	\$5,494	1,821	\$65,013	7,777	\$425,038
Management of companies and enterprises	0	\$0	0	\$0	641	\$11,323	1,478	\$106,306
Administrative and waste management services	280	\$8,636	340	\$9,690	2,437	\$67,796	4,069	\$113,471
Educational services	(D)	(D)	(D)	(D)	373	\$5,213	1,385	\$23,979
Health care and social assistance	(D)	(D)	(D)	(D)	5,164	\$266,013	9,683	\$490,845
Arts, entertainment, and recreation	139	\$2,800	95	\$1,098	940	\$10,996	1,978	\$26,746
Accommodation and food services	646	\$11,761	666	\$13,854	2,907	\$59,594	6,297	\$135,314
Other services, except public administration	777	\$27,267	475	\$16,245	2,605	\$104,104	5,373	\$202,612
Government and government enterprises	2,050	\$141,448	2,188	\$139,782	4,535	\$334,405	38,080	\$3,385,937

Source: U.S. Bureau of Economic Analysis 2014

(D) Not shown to avoid disclosure of confidential information, but the estimates for this item are included in the totals.

While the 2015 water year, which extends from October 1, 2014 through September 30, 2015, is only partially complete, the state continues to face drought conditions and potential water shortages. The dry conditions from 2012 through 2014 have affected reservoir storage coming into water year 2015. For example, storage in Shasta Reservoir was about 2,598,000 acre-feet (AF) on February 26, 2015, which is 79 percent of average at this time of year (California Data Exchange Center 2015)

Facing a water shortage, growers would take actions to protect permanent crops first to protect their investments. If available, growers would likely pump groundwater to substitute for reduced surface water supplies. If groundwater is not available, growers would idle field crops and use available surface water to irrigate permanent crops. Cropland idling in other districts would also occur under the No Action Alternative, but estimates are unavailable at this time because other districts have not yet considered what actions they will take to address water shortages this year.

In the TCCA buyer area, growers generally do not have access to groundwater supplies to irrigate crops. Water shortages to the TCCA Member Units may be severe enough that growers would not have the available water needed to irrigate permanent crops. This could cause permanent crops to die or be permanently damaged. Damage to and loss of permanent crops would have long-term adverse effects to the regional economy in the Sacramento Valley. If the crop is lost, growers would lose annual revenues earned from sales and their initial investments to establish the crop. These economic effects would last beyond 2015. There may also be increased costs to remove the crops and prepare the land for subsequent planting. These would be adverse economic impacts under the No Action Alternative.

Under the Proposed Action, a maximum of 55,041 acres of rice could be idled in addition to rice acres idled as a result of the drought. Under the Proposed Action, growers selling water for transfers would be compensated for their expected losses in income that they would have received for selling a crop. As a result, growers would not experience a net loss in income and would presumably receive more revenue than if the crop were produced, which would be an economic benefit to participating growers.

Adverse regional economic effects would occur to businesses and individuals who support farming activities, such as farm workers, fertilizer and chemical dealers, wholesale and agricultural service providers, truck transport, and others involved in crop production and processing. These businesses and individuals would not receive compensation from the water transfer. Cropland idling would result in direct effects to employment, labor income and output. This analysis estimates effects to employment to represent the magnitude of potential economic effects of the proposed cropland idling. There would be similar relative effects to labor income and output to the regional economy.

The transfer water would be used to irrigate permanent crops in Tehama, Glenn, Colusa, and Yolo counties that would have little or no water under the No Action Alternative. This would offset some of the economic effects of cropland idling because water would be used to irrigate crops within the same economic region and there would be fewer leakages outside the region. For example, some farm workers could travel within the region to the crops that would be irrigated with transferred water and they would not lose their jobs as a result of idling. Some businesses that support the region would also experience less of a decline in sales because the transferred water would be used locally and farm related supplies would still be purchased. Because the buyers and sellers are within the same or proximate economic region, there would be fewer adverse economic effects of cropland idling than if the sellers were more geographically separated.

Rice production provides approximately 2.5 farm jobs per 1,000 acres (University of California Cooperative Extension 2012). Based on the maximum acreages proposed for idling as a result of the Proposed Action, the direct effects of rice idling would be approximately 138 jobs lost in Colusa, Glenn, Sutter, and Yolo counties. These job losses would largely occur in the agricultural sector. Some of these direct effects may be offset if farm workers can shift from working fields that are idled to fields where the transfer water is being used.

There would also be secondary regional economic impacts as a result of increased idling. Secondary effects occur because of the linkages among industries and include effects to employment, income, and output of support industries and as a result of reduced household spending. Secondary effects would occur to agricultural support businesses that would have reduced sales because growers would not purchase inputs or rent equipment. Transportation businesses and rice mills would also be affected because there would be less rice harvested.

At the regional level, the direct and secondary economic effects would not be substantial. Relative to the baseline economy, the effects would be minor. Further, the Proposed Action would last for one year and growers could put the land back into agricultural production in the subsequent year if water supplies increase. Therefore, economic effects from cropland idling would be a temporary effect.

Effects may be more adverse in local communities. Rural communities have a much smaller economic base, and any changes to economic levels would be more adverse relative to a large regional economy. Water Code Section 1745.05(b) requires a public hearing under some circumstances in which the amount of water from land idling exceeds 20 percent of the water that would have been applied or stored by the water supplier absent the water transfer in any given hydrologic year. Third parties would be able to attend the hearing and could argue to limit the transfer based on its economic effects.

In the buyer area, water transfers under the Proposed Action would provide water for irrigation that would help maintain crop production. Even with transfers, growers would continue to face water shortages and take actions to address reduce supplies. Transfer water would be used to irrigate permanent crops to keep them alive through the dry year and support long-term production. Permanent crops are typically more labor intensive and have higher value than field crops. Continued irrigation of permanent crops through the 2015 irrigation season would support farm labor and provide revenue to the region through 2015 and in the long-term. Transfer water would help local farm economies in the TCCA area of the Sacramento Valley by providing employment and wages to farm laborers. Transfers would protect growers' investments in permanent crops and farm income. Transfers would provide long-term economic benefits by keeping permanent crops alive through the 2015 dry conditions. If permanent crops do not survive through 2015, there would be substantial long-term adverse economic effects to the buyer area by reducing employment and income in subsequent years. The Proposed Action would benefit the regional economy in the buyer area.

4.4 Environmental Justice

The 1994 Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires all Federal agencies to conduct "programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin." Cropland idling could affect farm labor employment by temporarily reducing the amount of agricultural land in production or the number of farm workers needed to work existing land. Table 4-3 shows 2012 demographics and income in the counties where cropland idling could occur. In 2012, Colusa County had a Hispanic population greater than 50 percent. All counties had a lower median household income and higher unemployment rate relative to the state; and, Glenn, Sutter, and Yolo counties had a higher poverty rate than the state. These statistics indicate a potential for environmental justice effects in the seller area.

Table 4-2. 2012 Demographics and Income in Transferring Counties

	CA	Colusa	Glenn	Sutter	Yolo
Population	38,332,521	21,358	27,940	95,350	204,593
Ethnicity¹ (%)					
Hispanic or Latino	38.4	57.5	39.5	29.6	31.3
Race² (%)					
White	73.5	91.6	90.1	74.5	76.3
African American	6.6	1.2	1.1	2.4	3.0
American Indian	1.7	2.7	3.0	2.3	1.8
Asian	14.1	1.8	2.9	16.2	13.5
Pacific Islander	0.5	0.6	0.2	0.4	0.6
Multirace	3.7	2.1	2.7	4.2	4.9
Poverty Rate (2009-2013)³ (%)	15.9	12.5	18.8	16.7	19.1
Unemployment Rate⁴ (%)	10.4	20.1	14.3	17.5	11.3
Median Household Income (2009-2013)	\$61,094	\$52,158	\$43,023	\$50,408	\$55,918

Source: Employment Development Department (EDD) 2014, U.S. Census Bureau 2014.

Notes:

- ¹ The U.S. Census Bureau classifies Hispanic or Latino as an ethnicity, and surveys for this percentage across all races; therefore, the actual percentage of persons of only Hispanic or Latino origin could be smaller than the stated percentage (U.S. Census Bureau 2014).
- ² A minority is defined as a member of the following population groups: American Indian/Alaskan Native, Asian or Pacific Islander, Black (non-Hispanic), or Hispanic (U.S. Census Bureau 2014).
- ³ The U.S. Census Bureau classifies families and persons as *below poverty* "if their total family income or unrelated individual income was less than the poverty threshold" as defined for all parts of the country by the federal government (U.S. Census Bureau 2014).
- ⁴ Civilian labor force is defined as all civilians 16 years or older employed or looking for work, and not in institutions. Data for unemployment rates were collected from EDD and are 2012 Annual Average (EDD 2014).
- ⁵ Household income is defined by the U.S. Census Bureau as "the sum of money income received in the calendar year by all household members 15 years old and over" (U.S. Census Bureau 2014).

Table 4-3 shows 2003-2013 farm employment in the counties that could idle cropland. Farm employment would be the most directly affected by cropland idling transfers.

Table 4-3. Farm Employment, 2003-2013

	Colusa, Glenn, Sutter and Yolo Counties	Annual Percent Change
2003	11,480	--
2004	11,330	-1%
2005	11,390	1%
2006	11,390	0%
2007	12,080	6%
2008	12,310	2%
2009	12,580	2%
2010	12,950	3%
2011	13,270	2%
2012	13,440	1%
2013	13,140	-2%

Source: EDD 2014

Economic effects in the buyers' and sellers' areas as a result of the reduced supplies in this critical hydrologic year under the No Action Alternative are described in Section 4.3. These effects would also be relevant for environmental justice issues. In the TCCA area, reduced water supplies could cause long-term damage to or loss of permanent crops, which would reduce farm worker employment for the long-term. This could result in a disproportionate impact to low income and minority workers under the No Action Alternative. In the sellers' area, field crops would likely be idled in response to water shortages and available surface water supplies would be shifted to irrigate permanent crops. There would be some losses in employment of low income and minority workers on field crops, but employment needs for labor-intensive permanent crops would remain unchanged. Effects in the sellers' area would be temporary.

Under the Proposed Action, cropland idling transfers could disproportionately and adversely affect minority and low-income farm workers by reducing agricultural production. A maximum of 55,041 acres of rice could be idled under the Proposed Action. Based on the maximum idling acreage under the Proposed Action, approximately 138 farm workers jobs would be lost in Glenn, Colusa, Sutter, and Yolo counties (1 percent of total 2013 farm employment). This magnitude of job losses is within historic annual fluctuations in farm worker employment. Annual changes in farm worker employment from 2002 to 2013 were 2 percent or greater in 6 years (EDD 2014). All farm worker effects would be temporary and only occur during the 2014 crop season. Cropland idling under the Proposed Action would not result in an adverse and disproportionately high effect to farm employment.

Water transfers under the Proposed Action would provide water to agricultural users in the buyers' area. Increased water supply would mostly be used to irrigate permanent crops that would not otherwise be irrigated due to water shortages under the No Action Alternative. This would provide employment for the labor intensive, permanent crops, which would provide farm employment for low income and minority workers. This would be a beneficial effect to environmental justice populations.

4.5 Consultation and Coordination

4.5.1 2015 Stakeholder Involvement

Reclamation and the TCCA continue to coordinate with interested sellers to implement water transfers in 2015. Reclamation has also coordinated with DWR on water transfers and use of SWP facilities. Tables 2-1 and 2-2 are the result of coordination among agencies.

4.5.2 Resource Agency Involvement

Reclamation and the TCCA have been coordinating efforts with USFWS to help the USFWS understand the Proposed Action and transfers that could occur. Reclamation has also met with California Department of Fish and Wildlife and solicited their input on the environmental commitments. Reclamation will submit a Biological Assessment for USFWS review under Section 7 of the ESA.

4.5.3 Public Comments

Reclamation and the TCCA released the Draft EA/IS for a 20 day public review period, beginning on March 3, 2015. Appendix A includes the comments received and associated responses, and Appendix B includes copies of the comment letters.

Chapter 5 References

- Anderson-Cottonwood Irrigation District (Anderson-Cottonwood ID). 2011. Anderson-Cottonwood Irrigation District Integrated Regional Water Management Program- Groundwater Production Element Project. August 2011.
- _____. 2013. Initial Study and Proposed Negative Declaration for Anderson-Cottonwood Irrigation District's 2013 Water Transfer Program. April 2013.
- _____. 2014. Final Water Transfer Monitoring Summary Report 2013 Water Transfer Agreement SWPAO #13-707 Anderson-Cottonwood Irrigation District. May.2014.
- Bennett, George L., V, Miranda S. Fram and Kenneth Belitz. 2011. Status of Groundwater Quality in the Southern, Middle, and Northern Sacramento Valley Study Units, 2005-2008: California GAMA Priority Basin Project. Available from <http://pubs.usgs.gov/sir/2011/5002/pdf/sir20115002.pdf> [Accessed on January 22, 2015].
- Brush, C.F., Dogrul, E.C., and Kadir, N.T. 2013. Development and Calibration of the California Central Valley Groundwater-Surface Water Simulation Model (C2VSim), Version 3.02-CG. Available at: http://baydeltaoffice.water.ca.gov/modeling/hydrology/C2VSim/download/C2VSim_Model_Report_Final.pdf [Accessed on February 11, 2015].
- Bureau of Reclamation (Reclamation). 2010. 2010-2011 Water Transfer Program Final Environmental Assessment (2010-2011 WTP EA).
- Bureau of Reclamation and California Department of Water Resources (Reclamation and DWR). 2014. DRAFT Technical Information for Preparing Water Transfer Proposals. Available from http://www.water.ca.gov/watertransfers/docs/2015_Water_Transfer_White_Paper.pdf [Accessed on January 20, 2015].
- _____. 2015. Central Valley Project and State Water Project Drought Contingency Plan January 15, 2015 – September 30, 2015. Available from http://www.waterboards.ca.gov/waterrights/water_issues/programs/drou

[gh/ docs/2015_drought_contingency_plan.pdf](#) [Accessed on January 30, 2015]

Byron Buck & Associates. 2009. "Comparison of Summertime Emission Credits from Land Fallowing Versus Groundwater Pumping." Memorandum from Byron Buck to Teresa Geimer, Drought Water Bank Manager. May 18.

California Air Resources Board (CARB). 2013. State Area Designations. Available from <http://www.arb.ca.gov/desig/adm/adm.htm> [Accessed on January 19, 2015].

_____. 2014. California Greenhouse Gas Emission Inventory: 2000-2012. May. Available from http://www.arb.ca.gov/cc/inventory/pubs/reports/ghg_inventory_00-12_report.pdf [Accessed on January 19, 2015].

California Data Exchange (CDEC). 2015. Daily Reservoir Storage Summary. Available from <http://cdec.water.ca.gov/cgi-progs/current/RES> [Accessed on February 26, 2015].

California Department of Conservation. 1997. California Agricultural Land Evaluation and Site Assessment Model.

_____. 2007. California Geologic Survey Fault Rupture Zones in California; Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zone Maps. Special Publication 42, Interim Revision 2007. Available from <ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sp/Sp42.pdf> [Accessed on January 21, 2015].

California Department of Food and Agriculture. 2014. California Agricultural Commissioners Reports. Available from http://www.nass.usda.gov/Statistics_by_State/California/Publications/AgComm/Detail/ [Accessed on January 26, 2015].

California Department of Water Resources (DWR). 2003. California's Groundwater: Bulletin 118, Update 2003. October.

_____. 2013. Final California Water Plan Update 2013, Sacramento River Hydrologic Regional Report. Available from http://www.waterplan.water.ca.gov/docs/cwpu2013/Final/Vol2_SacramentoRiverRR.pdf [Accessed on January 22, 2015].

_____. 2014a. http://www.water.ca.gov/waterdatalibrary/docs/Hydstra/docs/09N03E08C004M/POR/GROUND_SURFACE_DISPLACEMENT_POINT_PLOT.PNG [Accessed on February 11, 2015].

- _____. 2014b. 2012/2013 Transfer Activity. Available from http://www.water.ca.gov/watertransfers/docs/2014/2012-2013_Transfers_Charts.pdf. [Accessed on January 22, 2015].
- _____. Water Data Library 2014, Available at: <http://www.water.ca.gov/waterdatalibrary/docs/Hydstra/index.cfm?site=22N02W15C002M>. Accessed March, 2015.
- _____. 2015. Groundwater Information Center. http://www.water.ca.gov/groundwater/maps_and_reports/northern_region/GroundwaterLevel/gw_level_monitoring.cfm [Accessed on January 9, 2015].
- CH2M Hill. 2003. Draft Redding Basin Water Resources Management Plan Phase 2C Report. Prepared for Redding Area Water Council. May **as cited in** Anderson-Cottonwood Irrigation District (ACID) 2011. Anderson-Cottonwood Irrigation District Integrated Regional Water Management Program- Groundwater Production Element Project. August 2011.
- _____. 2007. Redding Basin Water Resources Management Plan Environmental Impact Report. January.
- Conaway PG. 2014. Final report of 2013 Water Transfer Monitoring for Conaway Preservation Group. June 30, 2014.
- Department of Fish and Wildlife (DFW). 2015a. State and Federally Listed Endangered and Threatened Animals in California.
- _____. 2015b. Fully Protected Animals. Available from http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html#Reptiles [Accessed on January 19, 2015].
- _____. 2015c. California Natural Diversity Database. Special Animals List. January 2015.
- Durbin, Timothy J. 2015. Technical Memorandum: Evaluation of Subsidence Potential for Proposed Conaway Ranch 2015 Groundwater Substitution Transfer. February 10, 2015.
- Employment Development Department (EDD). 2012. Employment by Industry data. Available from http://www.labormarketinfo.edd.ca.gov/LMID/Employment_by_Industry_Data.html [Accessed on January 22, 2015].
- _____. 2014. Monthly Labor Force Data for Counties. Annual Average 2012 – Revised. March 19, 2014 Available from

<http://www.calmis.ca.gov/file/lfhist/12aacou.pdf> [Accessed on January 22, 2015].

Eastside MWC.2014. Final Report of 2013 Water Transfer Monitoring for Eastside Mutual Water Company. June 30, 2014.

Faunt, C.C., ed. 2009. Groundwater Availability of the Central Valley Aquifer, California: U.S. Geological Survey Professional Paper 1766, 225 p.

Feather River Air Quality Management District. 2010. Indirect Source Review Guidelines: A Technical Guide to Assess the Air Quality Impact of Land Use Projects Under the California Environmental Quality Act. Available from <http://www.fraqmd.org/CEQA%20Planning.html> [Accessed on January 20, 2015].

Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland. 2007. Changes in Atmospheric Constituents and in Radiative Forcing. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Glenn County. 1993. Glenn County General Plan. Volume III – Setting. June 15. Available from http://gcplanupdate.net/_documents/docs/VOLUME%20III-SETTING-1.pdf [Accessed on January 20, 2015].

Pelger MWC.2014. Final Report of 2013 Water Transfer Monitoring for Pelger Mutual Water Company. June 30, 2014.

Pleasant Grove-Verona MWC. 2014. Final Report of 2013 Water Transfer Monitoring for Pleasant Grove-Verona Mutual Water Company. June 30, 2014.

Reclamation District 1004. 2014. Final Report of 2013 Water Transfer Monitoring for Reclamation District No.1004. June 30,2014.

Sacramento Metropolitan Air Quality Management District. 2014a. Sacramento Metropolitan AQMD Thresholds of Significance Table. November. Available from <http://www.airquality.org/ceqa/cequguideupdate/Ch2TableThresholds.pdf> [Accessed on January 21, 2015].

_____. 2014b. CEQA Guide to Air Quality Assessment. Chapter 8: Cumulative Air Quality Impacts. November. Available from

- <http://www.airquality.org/ceqa/cequguideupdate/Ch8CumulativeFinal.pdf> [Accessed on January 21, 2015].
- State Water Resources Control Board (SWRCB). 1999. A Guide to Water Transfers. July 1999. Draft. Division of Water Rights State Water Resources Control Board. Available from http://www.waterboards.ca.gov/waterrights/water_issues/programs/water_transfers/docs/watertransferguide.pdf [Accessed on January 20, 2015].
- _____. 2011. The California 2010 303(d) list (with sources). Available from http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml [Accessed on: January 20, 2015].
- The Climate Registry. 2014a. 2014 Climate Registry Default Emission Factors. Available from <http://www.theclimateregistry.org/downloads/2013/04/2013-Climate-Registry-Default-Emissions-Factors.pdf> [Accessed on January 22, 2015].
- _____. 2014b. Utility-Specific Emission Factors. Available from <http://www.theclimateregistry.org/resources/protocols/general-reporting-protocol/> [Accessed on January 22, 2015].
- Te Velde Revocable Family Trust. 2014. Final Report of 2013 Water Transfer Monitoring for David and Alice Te Velde Revocable Family Trust. June 30, 2014.
- United States Census Bureau. 2014. State and County Quick Facts. Available from <http://quickfacts.census.gov/qfd/states/06000.html> [Accessed on January 26, 2015].
- United States Department of Agriculture. 2013a. Natural Resource Conservation Service (NRCS) and the University of California, Davis Agriculture and Natural Resources Department. SoilWeb online soil survey data, Available from <http://casoilresource.lawr.ucdavis.edu/gmap/> [Accessed on January 21, 2015].
- _____. 2013b. Summary Report: 2010 National Resources Inventory, Natural Resources Conservation Service, Washington, D.C, and Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa. Available from http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1167354.pdf. [Accessed on January 21, 2015].
- USDA NRCS. 2009. Farm and Ranchlands Protection Program. Programmatic Environmental Assessment. January 2009. Available from

http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1042340.pdf [Accessed on January 22, 2015].

United States Environmental Protection Agency. 2014a. The Green Book Nonattainment Areas for Criteria Pollutants. July 2. Available from <http://www.epa.gov/oaqps001/greenbk/> [Accessed on January 19, 2015].

_____. 2014b. Emissions & Generation Resource Integrated Database (eGRID), Ninth edition with year 2010 data (Version 1.0). Available from: <http://www.epa.gov/cleanenergy/energy-resources/egrid/> [Accessed on February 11, 2015].

United States Fish and Wildlife Service (USFWS). 2010. Endangered Species Consultation on the Bureau of Reclamation's Proposed Central Valley Project Water Transfers Program for 2010- 2011.

_____. 2015. Species Listed in California. Available from http://ecos.fws.gov/tess_public/reports/species-listed-by-state-report?state=CA&status=listed [Accessed on January 19, 2015].

United States Geologic Survey (USGS). 2014. Sacramento River monitoring information at Colusa. Available from http://waterdata.usgs.gov/nwis/monthly?referred_module=sw&site_no=11389500&por_11389500_2=2209368,00060,2,1921-04,2013-01&start_dt=1976-10&end_dt=1977-09&format=html_table&date_format=YYYY-MM-DD&rdb_compression=file&submitted_form=parameter_selection_list [Accessed on January 21, 2015].

University of California - Cooperative Extension (UCCE). 2012. Sample Costs to Produce Rice, Sacramento Valley, Rice Only Rotation. Available from <http://coststudies.ucdavis.edu> [Accessed on January 26, 2015].

Yolo County. 2012: Final Environmental Impact Report on the Environmental Education and Sustainability Park. Available from <http://www.yolocounty.org/home/showdocument?id=20521>. See page 3.6-4. [Accessed on January 20, 2015].

Yolo-Solano Air Quality Management District. 2007. *Handbook for Assessing and Mitigating Air Quality Impacts*. July 11. Available from <http://www.ysaqmd.org/documents/CEQAHandbook2007.pdf> [Accessed on January 21, 2015].