DRAFT
Technical Information for Preparing Water Transfer Proposals

Information to Parties Interested In Making Water Available for Water Transfers in 2014

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AND

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List of Acronyms and Abbreviations

µS/cm	micro Siemens/centimeter
af	acre-feet
bgs	below ground surface
BMPs	best management practices
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CDFW	California Department of Fish and Wildlife
COA	Coordinated Operating Agreement
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
D-1641	State Water Resources Control Board Decision 1641
Delta	Sacramento-San Joaquin River Delta
DWR	California Department of Water Resources
FESA	Federal Endangered Species Act
ETAW	evapotranspiration of applied water
GIS	geographic information system
GPS	global positioning system
NAD83	North American Datum 1983
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
PG&E	Pacific Gas and Electric
POC	point of contact
Projects	Central Valley Project and State Water Project
Project Agencies	California Department of Water Resources and Bureau of Reclamation, Mid-Pacific Region
Reclamation	Bureau of Reclamation, Mid-Pacific Region
SDF	streamflow depletion factor
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	total dissolved solids
USFWS	U.S. Fish and Wildlife Service

Section 1. General Information for Water Transfers

1.1 Introduction

The California Department of Water Resources (DWR) and Bureau of Reclamation, Mid-Pacific Region (Reclamation), referred to collectively as Project Agencies, prepared this technical information to help facilitate temporary water transfers (duration of up to 1 year) in 2014 that require conveyance through Project Agencies' facilities or otherwise require Project Agency approval.

While the technical information contained in this document may be used to inform the development of longer-term transfer proposals, multi-year or long-term transfers typically require the transfer proponents to provide a more rigorous analysis than that requested for temporary transfers, and the Project Agencies may require additional information beyond that specified in this document. The Project Agencies evaluate each transfer on a case-by-case basis considering the specific conditions for each individual transfer.

Any transfer of non-project water requiring conveyance through Project Agencies' facilities will require a "conveyance agreement" or a "letter agreement" with the water transfer proponent, the buyer, and either DWR or Reclamation. Water transfer proponents who provide the technical information requested in this document will help Project Agencies review transfer proposals and develop their respective "conveyance contracts" or "letters of agreement." Project Agencies will review each water transfer proposal using the information provided by the water transfer proponents and other available information.

The basis upon which transfer approval is made by the Project Agencies and to which the information in this technical document relates are principally Project Agency water rights, Project Agency water supply, water service and/or repayment contracts, Section 3405(a) of the Central Valley Project Improvement Act (CVPIA), Water Code Section 1810, the Coordinated Operating Agreement (COA)[1], and other State Water Project (SWP) contracts. Other legal requirements, such as the National Environmental Policy Act (NEPA) and the California Environmental Quality Act

[1] This an agreement between the United States of America and the State of California for coordinated operations of the Central Valley Project and the State Water Project. This agreement is known as the Coordinated Operating Agreement (COA).

(CEQA) may also apply to water transfers; however, their internal requirements are not addressed by this technical document.[2]

The approval criterion to which the information in this document chiefly pertains is the avoidance of legal injury, through the determination of whether the water proposed for transfer is legally transferable. Much of the information required in this document is necessary for the Project Agencies to determine if the proposed transfer would cause legal injury to downstream water users. This determination, frequently referred to as a "real water determination," is the net addition of water to the downstream system that would not be available but for the transferor's concurrent reduction of his own consumptive use of that water. Only that portion of the proposed transfer that is determined to represent real water is transferrable. Depending on the measures used to make water available for transfer, real water consists primarily of the transferor's reduction in the evapotranspiration of applied water (ETAW), reduction in applied water lost to saline sinks or to other unusable sources, or increased releases from storage reservoirs. The amount of real water savings is the amount of water under the transferor's right that can be transferred from the system without injuring other users. As the above discussion demonstrates, real water determinations and legal injury determinations are essentially interchangeable terms.[3]

Real water determinations by the Project Agencies are required, in the first instance, to protect their own water rights from infringement. The Project Agencies are the last diverters in the Sacramento-San Joaquin river system. They have shared responsibility for meeting Sacramento-San Joaquin River Delta (Delta) water quality and environmental requirements, and their water rights are junior to all lawful in-basin water diversions of natural flow under the watershed protection statutes. To the extent that water other than real water is transferred out of the system when the Delta is in balanced conditions — i.e., when Project operations are ensuring that Delta regulatory requirements are being met — it is water that is unlawfully taken from Project supply (see Appendix A).

Real water determinations are also needed to satisfy the legal criteria under Water Code Section 1810(d) that require the owner of conveyance facilities to ensure that the transfer will not cause legal injury to other water users; and to satisfy requirements for water accounting under the COA between DWR and Reclamation when one of the Projects either conducts or facilitates a water transfer — again, to ensure no legal injury. Real water criteria are also used by DWR for the same purpose

[2] Short-term transfers of post-1914 appropriative water rights require approval by the SWRCB under Water Code Section 1725 et seq. The approval criteria are virtually identical to those in Section 1810, so the information gathered here should also be helpful to transferring parties in that approval process.

[3] Real water determinations and legal injury from water transfers are further discussed in the article located on the DWR Water Transfer website, "Approving Water Transfers: Assuring Responsible Transfers." http://www.water.ca.gov/watertransfers/docs/responsible_water_transfers_2012.pdf

in reviewing and approving transfers under specific provisions of its various water rights settlement agreements.

A second set of approval criteria relate to the other two Section 1810(d) legal requirements: that the transfer result in (1) no unreasonable impacts on fish and wildlife and instream uses, and (2) no unreasonable economic or environmental impact on the area in which the transfer water originates.[4]

Although this document seeks to identify in the best and most complete way possible the information needed for transfer approval, to both expedite that approval and to reduce participant uncertainty, each transfer is unique and must be considered on its individual factual merits, using all the information that is available at the time of transfer approval and execution of the conveyance or letter of agreement with the respective Project Agency in accordance with the applicable legal requirements. This document does not pre-determine those needs or those facts and does not foreclose the requirement and consideration of additional information. The general types of transfers that will be considered for proposals requiring the use of Project facilities are listed in Table 1-1.

Table 1-1 Transfers considered for 2014

Transfers considered in 2014	Transfers not considered in 2014
Stored water — Release of stored water that would remain in storage in the absence of the water transfer. Storage reduction caused by a transfer must be refilled at a time when downstream users would not have otherwise captured the water.	**Direct pumping of groundwater** — The Project Agencies will not approve the direct transfer of groundwater from one area to another. Water Code Section 1220 establishes significant barriers to the export of groundwater outside the Sacramento Delta-Central Sierra Basins.
Cropland idling/crop shifting — Reduction in surface water use resulting from reduced ETAW[1] of agricultural crops that would have been planted in the absence of the water transfer (see Section 2).	**Transfers that injure legal users of water or cause unreasonable effects on the environment** — Water transfers that simply reclassify existing stream flows from one category to another, making these flows no longer available to historic downstream users, have the potential to injure other legal users of water and cause harm to the environment.
Groundwater substitution — Reduction in surface water use that is offset with additional groundwater pumping (see Section 3).	

[1] ETAW = evapotranspiration of applied water.

[4] To support the finding required under Water Code Section 1810(d) of no reasonable impact on fish and wildlife, DWR has required that measures patterned upon the Conservation Measures developed by the U.S. Fish and Wildlife Service for the giant garter snake under its most recent consultation with the Reclamation on water transfers be included in transfer proposals seeking to use State Water Project (SWP) conveyance facilities.

1.2 Risks and Constraints

Buyers and sellers should be aware of the uncertainty and risk associated with water transfers. The Project Agencies cannot guarantee that a particular transfer will be successful even with adequate planning, regulatory approval, and monitoring due to the uncertainties related to California's hydrologic conditions, regulatory restrictions on Project Agencies' operations, and the availability of Project Agencies' facilities. As the hydrology gets wetter, there is typically less available capacity to export transfer water through the Delta. Buyers and sellers located in the Delta or the Yolo Bypass should contact the Project Agencies for specific risks that may affect their transfer proposal.

Project Agencies' operations are governed by a number of regulatory restrictions, including State Water Resources Control Board (SWRCB) Decision 1641 (D-1641), the 2008 U.S. Fish and Wildlife Service (USFWS) biological opinion for the coordinated operations of the Central Valley Project (CVP) and State Water Project (SWP) and its effects on the listed Delta smelt, and the 2009 National Marine Fisheries Service (NMFS) biological opinion for the coordinated operations of the CVP and SWP and its effects on listed anadromous fish and marine mammals. Current federal Endangered Species Act (ESA) consultations for export of transfer water through Banks and Jones Pumping Plants covers the period of July through September, and transfers will be limited to this interval. Limitations on CVP and SWP Delta operations in the early winter and spring months often result in the need to maximize Project exports during July through September, which can further limit the available export capacity for water transfers. The water transfer proponents assume the risk that all, or a portion of, the water made available from the water transfer cannot be exported and may be lost.

Generally, CVP power will not be provided for transfers of non-project water utilizing CVP facilities. The parties are required to provide any energy required to convey non-project water through CVP facilities or replace the value of the energy used to store and/or convey the non-project water.

1.3 Proposal Review

Figure 1-1 outlines the process for determining which agencies have review authority over the water transfer proposal. The Project Agencies work cooperatively to review water transfers requiring conveyance through SWP or CVP facilities.

Water transfers involving SWP facilities or SWP water supplies are subject to DWR's consent. Reclamation has approval authority over water transfers involving CVP water supplies. DWR and Reclamation must coordinate their accounting and operations for any transfer that involves use of Banks Pumping Plant or Jones Pumping Plant. Public Law 102-575, the CVPIA, Section 3405(a) outlines the conditions under which CVP water may be transferred. Reclamation has developed interim implementing guidelines for the water transfer provisions of the CVPIA.

These interim guidelines can be found at http://www.usbr.gov/mp/cvpia/3405a/docs/int_guide_imp_water_trans.pdf.

Depending on the nature of the water right, the seller may be required to file a petition for change with the SWRCB. Individual water right holders are responsible for obtaining changes to water rights from the SWRCB as needed. If a transfer requires SWRCB approval, the water transfer proponent should submit a petition for change to the SWRCB as soon as possible. SWRCB approval must be obtained before any water can be transferred.

1.4 Developing a Water Transfer Proposal

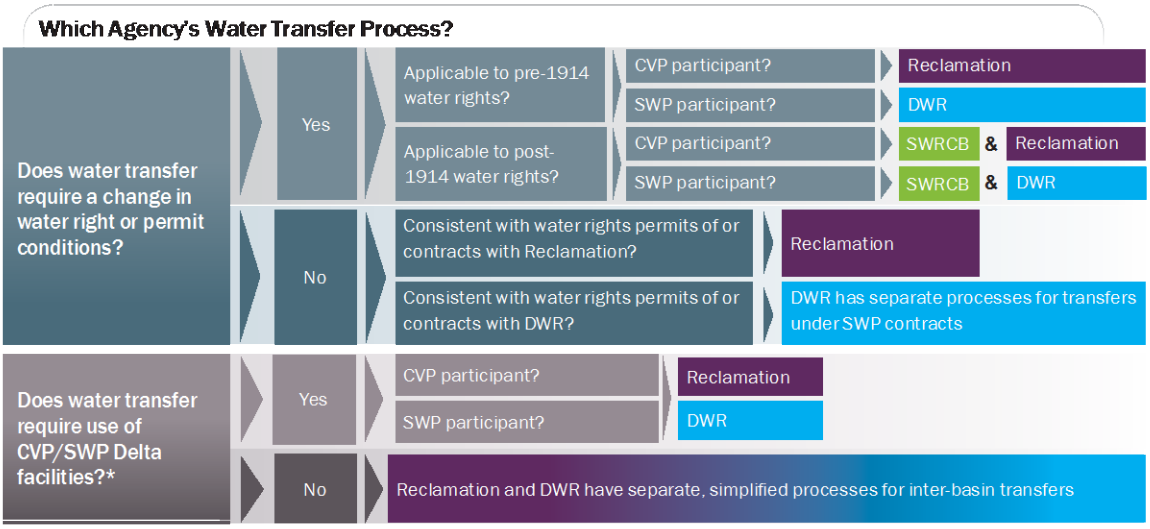
Water transfer proponents are encouraged to work with local water agencies and districts to develop coordinated water transfer proposals capable of providing substantial quantities of water. The following should be considered in developing a water transfer proposal requiring conveyance through SWP or CVP facilities:

- The types of water transfers that the Project Agencies will consider in 2014 are shown in Table 1-1. The water transfer proponents should ensure that the transfer proposal is described in sufficient detail to allow for proper review by the Project Agencies, California Department of Fish and Wildlife (CDFW), USFWS, and NMFS, as appropriate.
- The agencies that may need to be consulted are shown in Figure 1-1.
- The amount of water made available for transfer by the seller is usually determined at the most downstream point of control of the water transfer proponent. Losses beyond this point, including Delta carriage water losses and conveyance losses, affect the total amount of transfer water delivered and are determined by the Project Agencies.
- Proposals, contract negotiations, and CEQA/NEPA documentation (if required) must be completed before the water can be transferred. Water transfers involving CVP water supplies or CVP facilities (or both) require the approval of Reclamation, and water transfers involving SWP water supplies or facilities (or both) require the approval of DWR.
- If SWRCB approval is required, sellers should obtain this approval as soon as possible.

1.5 Environmental Documentation

In addition to requirements listed in Figure 1-1, for 2014, water transfer proponents must complete any required CEQA documentation and obtain all necessary California Endangered Species Act (CESA) and federal ESA compliance and any other regulatory approval for transfers related to State actions. Temporary transfers (one year duration or less) based on post-1914 appropriative water rights are required to obtain SWRCB approval consistent with the requirements of Water Code Section

1725 et seq. For transfers requiring Reclamation approval, NEPA documentation and ESA compliance for through-Delta transfers is required. Reclamation will need to complete additional environmental analysis and documentation prior to providing contractual approvals for the transferred water to be conveyed in federal facilities to the appropriate turnouts of the identified water users.



Agency Water Transfer Processes

AGENCY	DWR	Reclamation	SWRCB
How to start agency process?	• Contact DWR with transfer proposal and request conveyance through SWP • Agree to cost reimbursement	• Send letter of request for transfer with information on seller, buyer, type, amount, and timing of transfer • Reclamation sends letter back with cost reimbursement requirements • Agencies agree to move forward	File petition for temporary water transfer (1 year or less) or for long-term transfer under the aplicable provisions of the Water Code.
What technical information is required in submittal packages?* *See checklists for data requirements	Information as listed in Water Transfer Technical Information (crop shifting/cropland idling and groundwater substitution)	Information as listed in • CVPIA Criteria Checklist for a complete written Transfer Proposals • Water Transfer Technical Information (crop shifting/cropland idling and groundwater substitution)	Information as required for the type of transfer being sought by the appropriate SWRCB form.
What regulatory compliance is required?	CEQA, ESA, CESA, local and regional requirements, depending on the location of the proposed transfer	NEPA and ESA	Approval of Petition for Change for transfer of post 1914 appropriative water right.
What is acceptance of transfer proposals based on?	• Complete Submittal Package • Determination of real water and Project operation considerations • Water Code Section 1810 - use of a water conveyance facility is to be made without injuring any legal user of water and without unreasonably affecting fish, wildlife, or other instream beneficial uses; the overall economy; or the environment of the transferor area • CEQA	• Complete Submittal Package • Determination of real water and Project operation considerations • CVPIA section 3405(a) – No adverse impacts on CVP contractors, water supply or operations, fish and wildlife obligations, and groundwater conditions in the transferor area • NEPA	Transfer shall not injure any legal user of the water and not unreasonably affect fish, wildlife, or other instream beneficial uses.

Figure 1-1 Water transfer process flowchart

1.6 Cost Reimbursement

Project Agencies will require water transfer proponents to reimburse the costs incurred by the Project Agencies to review and approve the transfer proposal, and administer their respective water transfer "conveyance contract" or "letter of agreement." These costs will vary depending on the size and complexity of the transfer proposed.

1.7 Contacts

Parties with general questions on water transfers may contact:

Tom Filler
Chief, Water Transfer Program
DWR (916) 653-5272
TFiller@water.ca.gov

Brad Hubbard
Program Manager
Reclamation (916) 978-5204
BHubbard@usbr.gov

Parties interested in developing water transfer proposals that require conveyance through SWP facilities may contact:

Nancy Quan
Chief, Program Development and Water Supply Branch
DWR (916) 653-0190
nquan@water.ca.gov

Section 2. Water Transfers Based on Cropland Idling and Crop Shifting

This section provides a discussion of the information needed by DWR and Reclamation for the review of transfer proposals based on cropland idling/crop shifting that require conveyance through SWP or CVP facilities. Cropland idling includes the idling of land that would have been planted during the transfer period in the absence of the transfer. Crop shifting is the shifting from historically planted higher-water-intensive crops to lower-water-using crops. It does not include land fallowed as part of normal farm operations, which does not make water available for transfer. Cropland idling or crop shifting water transfers make water available by reducing the consumptive use of surface water applied for irrigation. Each proposal needs to contain sufficient information to support the claimed reductions in consumptive use of applied surface water upon which the transfer is based. Figure 2-1 shows the overall cropland idling/crop shifting transfer information required, which is summarized in the subsequent sections.

Figure 2-1 Cropland idling/crop shifting transfers process flow chart

Figure 2-2, summarizes the information requested for a cropland idling/crop shifting water transfer proposal. This information will help Project Agencies review the water transfer proposal and develop the appropriate conveyance contract or letter of agreement between the transfer proponents, buyers, and Project Agencies. Sellers are encouraged to work with their water purveyor (e.g., water district) to develop joint water transfer proposals.

Cropland Idling/Crop Shifting Transfers Technical Information – Proposal Checklist

- ☐ Submit past 5 years data of:
  - ☐ Net crop acreages by crop (acres)
  - ☐ Fallowed land (acres)
  - ☐ Dry farmed land (acres)
  - ☐ Total district acreage (acres)
  - ☐ Total farmable acreage (acres)
- ☐ Maps showing:
  - ☐ District or farm operation boundary
  - ☐ Current fields irrigated
  - ☐ Fields routinely irrigated and not irrigated
  - ☐ Fields to be idled as part of water transfer
- ☐ Basis of right to use surface water during the spring and summer in the year of the proposed water transfer

Figure 2-2 Crop idling technical information submittal proposal checklist

2.1 Estimation of Conditions That Would Occur Absent the Transfer

A key element to the evaluation of a cropland idling and crop shifting water transfer is the determination of the conditions that would exist without the transfer. Predicting such conditions accurately is often difficult. The use of historical cropping patterns is currently the best method to estimate conditions that would exist absent the cropland idling/crop shifting transfer. The crop history identifies the type of crops typically grown, the degree of land fallowing that typically takes place, and the crop rotation practices that typically occur.

To estimate conditions that would occur without a transfer, water transfer proponent must provide the following information:

- Accurate crop records for the five years preceding the year of the proposed transfer unless otherwise coordinated with the Project Agencies. Crop acreage should be reported in net field acres of the actual farmed and irrigated acres. If only gross field acres are known (i.e., the county parcel acres), then multiply the gross acres by 0.95 to estimate net acres. Crop acreage needs to be included for each crop (include fallowed lands, non-irrigated crops, and total farmable acres) for the water district or individual farm operation.
- Maps showing district or farm operation boundary, current fields irrigated, fields routinely fallowed or not irrigated, and fields to be idled as part of the proposed water transfer, in a format acceptable to the Project Agencies. The Project Agencies will consider information and maps submitted by a water transfer proponent as well as other available information to independently

determine field acreage. Project Agencies' determined acreages will be used to calculate water made available for transfer.

- The basis of right (water right or contract supply) for use of surface water during the transfer period.

The following sections further describe how this information will be used to determine conditions without the transfer.

2.1.1 Large Water Districts

The term "water district" is used in this document as shorthand to include any water company, district, agency, or other entity that provides water service to a group of landholders and can enter into a binding contract with a buyer. "Large water district" is defined as a legal entity serving multiple landowners. If only a few individual landowners within the water district wish to participate in the transfer, they should coordinate with their water district and refer to section 2.1.2 on methods to calculate expected water savings.

A water district's previous year's crop acreage is typically the best indication of the next year's crop patterns, provided the market for the particular crops grown remains relatively stable, the water supply has not been affected by droughts, and the acreage of the one or two crops with highest water use is typical of past years. The average acreages for these high-water-use crops in each district needs to be reviewed as follows:

- If acreage values for the crops with the highest water use for the immediate prior year are within 5 percent of the five-year average for these crops and there have been no significant market changes for the crop, then the last year's cropping patterns will be used as the base for calculating changes due to the cropland idling and crop shifting transfers.
- If acreage values for the crops with high water use fall outside this range, then another, more typical, year or an average of cropping patterns and acreages will be used, as mutually agreeable between the applicable Project Agency and the party proposing the water transfer.
- Fallowing a percentage of the total crop acreage is a normal agricultural practice. A significant shift in market prices, as has been seen in the rice market in recent years, can temporarily alter the typical fallowing pattern, resulting in a higher percentage of total acreage in production. The use of the prior year's crop acreage as the baseline in this situation may not be appropriate after a series of consecutive years of elevated production. After a series of years, the Project Agencies may elect to use an alternate method to calculate baseline to account for the need to fallow a percentage of the total acreage as part of normal farming practices. Absent a change in market conditions, prior year cropping pattern will be used in 2014 as the baseline if the acreage meets the conditions noted previously in this section. The issue of baseline will be reevaluated in 2014.

The previous year's data may also be used if additional explanation is provided to the Project Agencies and if the parties proposing the transfer and the Project Agencies agree that this is the best representation of conditions that would exist absent the cropland idling and crop shifting transfer. In this case, five years of crop data may not be needed. If the Project Agencies and the water district cannot reach agreement on an estimate of the conditions that would likely exist absent the cropland idling or crop shifting transfer, then the Project Agencies will not consider the water transfer proposal based on cropland idling or crop shifting.

2.1.2 Individual Farm Operations and Small Water Districts

"Small water district" is defined as a legal entity that serves one or few landowners. For individual farm operations or small water districts, last year's cropping patterns may be an inappropriate measure of likely future conditions absent the cropland idling/crop shifting transfer because of crop rotation patterns.

Small water districts and individual operations must provide the previous five years of crop history for their entire district or operation to identify significant crop rotation cycles. Where crop rotation cycles are evident for the whole of the farm operation or small water district, either (1) a repeating crop pattern or (2) the five-year average should be used. In these cases, the potential participant has to identify specific fields to be enrolled in the transfer and provide the five-year crop history for these fields, at a minimum. Use of a repeating pattern to characterize routine land idling and crop rotation practices requires the proponent to provide an exact repeating pattern of cropland idling practices for the fields to be involved in the transfer. The lands considered routinely idled would correspond to those in the subsequent year of the pattern. The Project Agencies must agree to use of a repeating pattern.

From this crop history, the proponent must calculate the five-year average of crop evapotranspiration of applied water (ETAW) values, as indicated below, for each field. The five-year average ETAW values for each field would be used as the base for determining changes due to the proposed cropland idling/crop shifting transfer in the year of the transfer. Individual farms or small water districts must provide a statement that the land idled for water transfer is not "shifted" to other operations under their control.

2.1.3 Eligibility of Double-Cropped Fields

If the seller has historically practiced double cropping of a winter crop such as wheat and a second crop grown during the transfer period, the seller may cultivate that winter crop and idle the field for transfer in that transfer year. The water transfer proponent will need to provide evidence to the Project Agencies of the double cropping history verifiable by Farm Service Agency (FSA) acreage consistent with section 2.1 above, including a five-year crop history. The history needs to indicate which crop(s) were historically the second crop (thus assigning the appropriate ETAW) in order to determine the water available for transfer. Refer to Table 2-2 for crops suitable for idling.

2.2 Use of Evapotranspiration of Applied Water (ETAW)

2.2.1 What is ETAW?

ETAW is defined as the portion of applied water that is evaporated from the soil and plant surfaces and actually used by the crop. The portion of the crop evapotranspiration met by precipitation during the growing season or stored as soil moisture within the root zone before the growing season does not qualify as transferable water. ETAW does not include applied water lost as deep percolation to groundwater or conveyance losses. Unless the acreage overlies an unusable groundwater basin or discharges to a saline sink, these depletions contribute to the overall water supply and are excluded from the calculation of transferable water.

Actual crop water requirements vary from one year to the next due to changing climatic conditions. It is not currently feasible to calculate ETAW for the specific conditions of each transfer year; therefore, ETAW values used for water transfer calculations are based upon crop water requirements reflecting average rainfall and evaporative demand. The calculation of water made available for transfer is based upon the quantity of surface water conserved for each qualifying idled acre of cropland and the appropriate ETAW associated with changes in the specific crops idled.

2.2.2 Crops Allowed for Cropland Idling or Shifting and ETAW Values

Tables 2-1 and 2-2 show the allowable crop ETAW values for the Sacramento Valley for use in 2014water transfers.

Table 2-1 Estimated ETAW values (in acre-feet/acre) for crops suitable for shifting

Crop	ETAW (in af/acre)
Alfalfa[1]	1.7 (July-Sept.)
Bean	1.5
Corn	1.8
Cotton	2.3
Melon	1.1
Milo	1.6
Onion	1.1
Pumpkin	1.1
Rice	3.3
Sudan grass	3.0
Sugar beets	2.5
Sunflower	1.4
Tomato	1.8
Vine seed/cucurbits	1.1
Wild rice	2.0

[1] Only alfalfa grown in the Sacramento Valley floor north of the American River will be allowed for transfers. Fields must be disced on, or prior to, to the start of the transfer period. Alfalfa acreage in the foothills or mountain areas is not eligible for transfer.

Table 2-2 Estimated ETAW values (in acre-feet/acre) for crops suitable for idling

Crop	ETAW (in af/acre)
Alfalfa[1]	1.7 (July-Sept.)
Bean	1.5
Corn	1.8
Cotton	2.3
Melon	1.1
Milo	1.6
Onion	1.1
Pumpkin	1.1
Rice	3.3
Safflower	0.7
Sudan grass	3.0
Sugar beets	2.5
Sunflower	1.4
Tomato	1.8
Vine seed/cucurbits	1.1
Wild rice	2.0

[1] Only alfalfa grown in the Sacramento Valley floor north of the American River will be allowed for transfer. Fields must be disced on, or prior to, the start of the transfer period. Alfalfa acreage in the foothills or mountain areas is not eligible for transfers.

2.2.3 Rice Idling

Rice idling has accounted for the majority of cropland idling transfers in recent years. Through 2013, the quantity of transfer water made available has been calculated based on the pattern of ETAW. In the absence of technical information supporting an alternate method, the quantity of transfer water will continue to be calculated based on ETAW for any rice idling transfers in 2014. Acreage eligible for inclusion in a rice idling program is limited to that acreage that would have been planted to rice in the absence of the proposed transfer.

Rice fields and irrigation/drainage ditches can provide temporary or permanent forage and habitat for terrestrial wildlife and waterfowl species, including the giant garter snake. Section 2.9.1 lists conservation measures for rice idling to protect the giant garter snake.

2.2.4 Rice Straw Decomposition

The Project Agencies are not currently considering transfer proposals based on potential water savings from rice straw decomposition, including the use of groundwater substitution for rice straw decomposition water or using mechanized or other removal methods.

2.2.5 Limitations on Crops and Lands

Some crops are not eligible for idling or shifting transfers because it is too difficult to determine the real water savings because of a lack of authoritative ETAW values, substantial variability in cultural practices, and other crop-specific reasons. Table 2-3 lists the crops that are not acceptable to Project Agencies for idling or shifting transfers. The Project Agencies will not consider water transfers that propose idling or shifting of these crops.

Table 2-3 Crops not suitable for shifting or idling

Crop
Pasture
Mixed grasses
Miscellaneous grasses including Bermuda grass
Alfalfa (in the Delta region)
Orchard
Vineyard

Some specific practices and proposals will not be considered for water transfers due to the difficulty in determining the amount of water made available or the uncertainty in what would have happened absent the transfer. These include:

- Removal of permanent crops.
- Fields historically irrigated by groundwater.
- Cropland idling on lands where groundwater is within 5 feet of the land surface or where the crop root zone may extend into the groundwater table. In these areas, cropland idling transfers may be considered if additional monitoring is conducted to determine the water savings and ensure the projected water savings are achieved. Any monitoring program must be approved by the Project Agencies.
- A shift in cropping pattern resulting in an increase in cropped acreage in other portions of the water agency or transferring party's holdings that would result in no net reduction in consumptive use within the water agency.

2.2.6 Vegetation Control on Idled Land

In order to get full credit for the expected water savings, idled land cannot be irrigated during the transfer season. The calculation of consumptive use savings for crop idling assumes that the idled field will be kept dry and free of vegetation that is actively evapotranspiring. Seepage from adjacent irrigation and drainage canals or areas with high groundwater can result in consumption of applied water by vegetation growth on idled fields and bare soil evaporation, thus reducing effective water savings from cropland idling.

Remnant vegetation (weeds or native vegetation, cover crops, and winter crops) in fields that are idled as part of a water transfer has the potential to consume a portion of the estimated transfer water if that vegetation has access to seepage from adjacent canals or flooded fields, or shallow groundwater, and is actively growing during the transfer period. Consumptive use by remnant vegetation from the above sources will be considered excessive vegetation and will affect the amount of transferrable water and must be avoided or accounted for. Below are recommendations for managing remnant vegetation in fields idled for a water transfer:

- Idled land cannot be irrigated during the transfer season.

- The grower must be able to control excessive seepage on the fields to be idled. Fields subject to excessive seepage or high groundwater will be acceptable only if the grower implements supplemental measurement and monitoring efforts to quantify the water made available for transfer.
- Remnant vegetation (weeds, cover crop, and over-winter crop) should not be actively transpiring and should have begun to senesce (have begun to or have already lost color) by the beginning of the transfer period. The onset of senescence may be delayed by late season rains. Precipitation will be considered in evaluating whether remnant vegetation would affect the quantity of transfer water.
- Two weeks prior to the start of the transfer period, Project Agencies will conduct inspections of participating fields to determine whether abatement of remnant vegetation is necessary.
- Remnant vegetation may be considered excessive vegetation if it is determined to be supported by seepage from irrigation supplies or shallow groundwater that has the potential to affect the amount of transfer water made available. If remnant vegetation is deemed to constitute excessive vegetation and abatement is determined to be necessary, Project Agencies will provide water transfer proponents with notice and sufficient time to implement abatement measures.
- Excessive vegetation not abated may result in a reduction in the verified quantity of water made available for transfer. The reduction in quantifiable water made available for the transfer will be cumulative ET from the beginning of the transfer period to the date that the excessive vegetation was abated or the date that the remnant vegetation has senesced and is no longer consuming water.

2.3 Estimating Water Available for Transfer

2.3.1 Large Water Districts

Large water districts need to evaluate the crop acreage that would have existed absent the transfer using the methods presented in section 2.1.1, including the acreage for each crop, idled lands, and all other district lands. Base-year ETAW values can be calculated using the baseline crop acreages and ETAW values in Tables 2-1 and 2-2. The district should then determine the acreages of each crop, fallowed lands, and other lands expected in the coming year with the water transfer. Using these acreages, the ETAW for the coming year is calculated by the same method used for the base year. The base-year and expected current-year crop acreages for the district should be checked to make sure they match. The difference between the base-year and current-year ETAW is used to estimate the water made available by the cropland idling/crop shifting transfer. Final eligible crop acreage will be determined by the Project Agencies.

2.3.2 Individual Farm Operations or Small Water Districts

As stated in Section 2.1.2, individual farm operations and small water districts may exhibit significant crop rotation sequences and may wish to simply enroll specific land parcels into a cropland idling/crop shifting program. For these cases, section 2.1.2 describes the method to establish a baseline cropping pattern that will allow calculation of the baseline ETAW for each parcel. The ETAW for the parcel for the current year with the water transfer is then established. The difference between the base-year and current-year ETAW is used to estimate the water made available by the cropland idling/crop shifting transfer. Final eligible crop acreage will be determined by the Project Agencies.

2.4 Potential Cropland Idling/Crop Shifting Transfers in the Delta/Yolo Bypass Region

The Project Agencies are working to increase options for transferable water via cropland idling/crop shifting, if options result in real water savings that can be made available at times and locations such that it can be exported by the Project Agencies. The Project Agencies will evaluate proposals for transfers originating in the Yolo Bypass/Tule Canal or Delta areas on a case-by-case basis. Many uncertainties exist with transfers originating from the Yolo Bypass/Tule Canal or Delta, including how much water can be made available and whether the transfer water can be exported by the projects. The SWRCB must concur in writing that the transfer water can be accounted for separately as meeting the flow-related compliance objectives in D-1641. The Project Agencies must also be assured that hydraulic connectivity with the Delta exists at all times during the transfer period. If written concurrence is obtained from the SWRCB, measurement, monitoring, and reporting requirements, acceptable to the Project Agencies and paid for by the transfer proponents, will be required for all Delta region transfers to determine and verify transferable water. Sellers must contact the Project Agencies for minimum measurement and monitoring requirements. The Project Agencies will work with each seller on a case-by-case basis for any transfers from the Delta region.

2.5 Limitations on Water Made Available for Transfer

See section 1.2 (Risks and Constraints).

2.6 Adjustments for Water Shortage Years

The baseline to determine water available for transfer is typically based on prior-year or five-year average cropping patterns within the water district or individual seller's service area. If hydrologic conditions are sufficiently dry, sellers' water supply allocations may be reduced, making it difficult to establish what the cropping pattern would have been in the absence of the transfer. The following approach will be used

to determine baseline acreages; however, the Project Agencies will analyze the baseline for all transfers based on their unique circumstances.

Is the Seller Facing a Reduced Surface Water Supply During 2014?

1. No: If no, and the seller transferred water in 2013, the baseline for the 2014 transfer is the 2013 baseline unless there are circumstances, such as substantial changes in market conditions that would suggest a change in cropping patterns. If the seller did not transfer water in 2013, an appropriate baseline must be determined. Methods to determine the baselines are described in the previous sections.

2. Yes: If yes, will the reduced supply require reduced consumptive use?

If no, the water transfer proponent will submit data to the Project Agencies to illustrate how the seller will accomplish meeting full consumptive use with reduced surface water supply; include historical diversion data, additional recycling, or other conservation measures. Additional groundwater pumping is an increase to the groundwater baseline for transfer purposes.

If yes, then the baseline for the seller will be based on a calculated ratio of the "district efficiency" or ETAW/diversions.

Under no circumstances will a seller be allowed to transfer more water through cropland idling/crop shifting than the difference between their 2014 surface water allocation and its 2014 actual diversions.

2.7 Reporting

Accurate reporting of the activities undertaken as part of a cropland idling/crop shifting transfer is an essential provision of any water transfer proposal. Reporting is the responsibility of the water transfer proponent and needs to be acceptable to the Project Agencies.

2.7.1 Acreage Calculation Methodology

Current-year Farm Service Agency (FSA) acreage will be used unless water transfer proponents do not provide FSA acreage for the year of the water transfer. In the 2010 water transfers, sellers provided FSA acreage for years ranging from 2002 to 2010, with acreage discrepancies occurring between the older and more recent FSA acreage. These discrepancies resulted in incorrect acreages of fields included in the 2010 water transfer program. In order to be consistent, water transfer proponents are required to provide FSA acreage for the year of the actual water transfer within two weeks of request by Project Agency staff. If FSA acreage for the year of the water transfer is not provided, the Project Agency will provide delineation of the seller's property. Water transfer proponents must reimburse Project Agencies for their costs incurred in delineation of field boundaries, in addition to other reimbursable costs.

2.7.2 Monitoring and Verification

Verification of the actions taken to make water available in a cropland idling/crop shifting transfer will be conducted by the water transfer proponents with the oversight of the Project Agencies. In addition to crop mapping, the following information or actions will need to be provided or completed by the water transfer proponents.

Elements in a cropland idling/shifting monitoring program are listed below.

- Past-year(s) and current-year cropping data.
- Map showing lands participating in the water transfer.
- Verification that there is a reduction in soil moisture and no water leakage onto idled lands.
- Field checking for excessive vegetation on idled fields. Water transfer proponent shall notify the applicable Project Agency staff if areas of excessive vegetation are observed, to request an assessment of the field. Final determinations and need for grower notification and/or abatement shall be made by the Project Agency.
- If, during the transfer period, excessive vegetation is identified, abatement efforts are to be undertaken within two weeks.
- Confirmation of correct crop shift as specified in the proposal.
- Previous and current-year diversions for district programs.
- In areas subject to high groundwater or excessive seepage, instrumentation adequate to determine soil evaporation and weed transpiration necessary to calculate reductions in conserved water savings and acceptable to the Project Agencies.
- For fields with remnant vegetation and that are actively evapotranspiring (i.e., excessive vegetation; see Section 2.2.6) during the typical irrigation season due to such causes as canal seepage or access to groundwater, excessive vegetation abatement measures will be required to prevent loss of transfer water. An alternative to conducting excessive vegetation abatement measures would be the use of instrumentation adequate to determine the cover crop's transpiration and calculate reductions in conserved water savings as noted above.
- For areas or crops where calculation of transferable water may require in-field instrumentation, field data that can be used to verify how much water was actually made available by the transfer action(s) and to modify future proposals if warranted.

The water transfer proponent will provide access to the fields that are part of the cropland idling/shifting transfer so that the Project Agency can perform field checks and determine soil moisture depletion if necessary. The Project Agencies will coordinate verification activities. Water transfer proponents must reimburse Project

Agencies for their costs incurred in monitoring and verification, in addition to other reimbursable costs.

2.8 Third-Party Effects

Cropland idling/crop shifting transfers have the potential to affect the local economy. Parties that depend on farming-related activities can experience decreases in business if land idling becomes extensive. Limiting cropland idling to 20 percent of the total irrigable land in a county should limit economic effects. To minimize the socioeconomic effects on local areas and to minimize effects on special status species, Project Agencies will not approve water transfers via cropland idling if more than 20 percent of recent harvested crop acreage in the county for each eligible crop, including rice, would be idled.

Water transfer proponents and others participating in cropland idling/crop shifting transfers need to be sensitive to the possible economic impacts of their actions on their business partners and their neighbors and of potential cumulative effects from water transfers in neighboring districts. Geographically distributing the acres that are idled can avoid or minimize possible economic effects.

Water Code Section 1745.05 (b) provides that if the amount of water made available by land fallowing (idling) exceeds 20 percent of the water that would have been applied absent the proposed water transfer, a public hearing by the water supply agency is required. In the past, cropland idling programs have stayed well below the 20 percent water delivery threshold for a hearing. Water supply agencies interested in participating in cropland idling/crop shifting transfers need to be aware of this Water Code section and conduct a public hearing if they propose a transfer in which cropland idling would exceed the 20 percent threshold.

2.9 Environmental Considerations

2.9.1 DWR Considerations for Rice Land Idling Transfers

Rice fields and irrigation/drainage ditches can provide temporary or permanent forage and habitat for terrestrial wildlife and waterfowl species, including the giant garter snake, which is considered a threatened species under both the ESA and CESA". Idling land dedicated to rice production for the purpose of water transfers has the potential to negatively impact the giant garter snake by removing important habitat. Accordingly, the issuance of a conveyance agreement by DWR will therefore be conditioned on the development of a transfer proposal that does not unreasonably impact the wildlife or environment of the area from which the transfer originated, among other criteria (see Section 1.1). In order for DWR to make a determination that the proposed transfer does not unreasonably impact these resources, the water transfer proponent from rice land idling must incorporate conservation measures that minimize the impacts on the giant garter snake. It is DWR’s judgment that the conservation measures outlined in the USFWS biological opinion for Reclamation’s

2010-2011 Water Transfer Program[5] represent the most current and best scientific information on protective measures for the giant garter snake. Accordingly, DWR will require transfer proponents to incorporate in their transfer proposals those conservation measures from the biological opinion relevant to crop idling (listed below).

Adoption of these measures will be required of all rice-land-idling-based water transfer proponents to minimize impacts on the giant garter snake from rice idling. Adoption of these measures, however, does not constitute compliance with the federal ESA and CESA. It is the responsibility of water transfer proponents to secure compliance with all local, state, and federal laws and regulations.

Conservation Measures

- The block size of idled parcels will be limited to 320 acres in size. The 320-acre blocks will not be located on opposite sides of a canal or other waterway and will not be immediately adjacent[6] to another fallowed parcel (a checkerboard pattern is the preferred layout).
- No more than 20 percent of rice fields may be idled cumulatively (from all sources of fallowing) in each county.
- Parcels participating in cropland idling will not include lands in the Natomas Basin.
- Water transfer proponents will continue to voluntarily perform giant garter snake best management practices, including educating all district personnel to recognize and avoid contact with giant garter snakes, clean only one side of a conveyance channel per year, and raise flail mower blades to at least 6 inches above the canal operation and maintenance road surfaces.
- A depth of at least two feet of water will be maintained in the major irrigation and drainage canals to provide movement corridors.
- A field proposed for a cropland idling transfer cannot be fallowed more than two irrigation seasons in a row.
- Water transfer proponents must provide the Project Agencies access to land being idled to verify the implementation of Conservation Measures and other monitoring and verification activities as noted in Section 2.7.2.

[5] U.S. Fish and Wildlife Service, March 2, 2010. Memorandum: From Susan Moore, USFWS Sacramento, to Richard Woodley, U.S. Bureau of Reclamation, Sacramento — Endangered Species Consultation on the Bureau of Reclamation's Proposed Central Valley Project Water Transfer Program for 2010-2011.

[6] For the purpose of complying with conservation measures, parcel adjacency is not negated by any natural or artificial feature that a giant garter snake could traverse. Features that do not constitute barriers include but are not limited to roads, railroad tracks, levees, berms, and any open air waterways other than large rivers (e.g., Sacramento River).

2.9.2 Reclamation's ESA Considerations for Rice Land Idling Transfers

Reclamation must consider the effects of idling rice acreage for the purpose of a water transfer on ESA-listed species, as terrestrial wildlife and waterfowl species may use irrigated croplands or water infrastructure for temporary or permanent forage and habitat. Specific practices that may need to be implemented to transfer water in 2014 would be similar to those found in the USFWS biological opinion issued to Reclamation for the 2010 and 2011 water transfers, and those summarized above.

Section 3. Water Transfers Based on Groundwater Substitution

This section provides technical information to prospective water transfer proponents who wish to transfer water through groundwater substitution. Groundwater substitution transfers make surface water available for transfer by reducing surface water diversions and replacing that water with groundwater pumping.

The rationale behind a groundwater substitution transfer is that surface water demands are reduced because a like amount of groundwater is used to meet the demands. The resulting increase in available surface water supplies can be transferred to other users. The net amount of additional surface water supply, or transferable water, created through groundwater substitution transfers must account for: (1) the amount of increased pumping that occurs in support of the transfer during the time that export facilities can convey the water, (2) the extent to which transfer-related groundwater pumping decreases streamflow (resulting from surface water-groundwater interaction), and (3) the timing of those decreases in available surface water supply.

A groundwater substitution transfer proposal generally consists of the following components:

- Documentation of surface water rights and the method used to quantify the amount of surface water available for the transfer.
- The location and characteristics of the wells proposed for use in pumping groundwater.
- The proposed volume and schedule of transfer-related groundwater pumping.
- A monitoring plan designed to assess the effects of the transfer.
- A mitigation plan designed to alleviate possible third-party impacts.

An overview of the requirements for a groundwater substitution proposal is included in Figure 3-1, the details of which are discussed later in this section.

Submit the following information to the Project Agencies for review and approval at least three months prior to the proposed transfer.

- ☐ Surface water source that will be replaced by groundwater pumping
- ☐ Location and construction details of wells that will be pumped
  - ☐ Well Identification: Well owner name and identification number, water district, and district's well identification number
  - ☐ Well Location: Latitude and longitude, Township, Range and Section, map (similar detail to 7.5 minute USGS quad sheet) with well location and all surface water within two miles of District boundary
  - ☐ Well Construction: well depth, depth of annular surface seal, gravel pack interval(s), casing size, casing perforation interval, and well's construction method
  - ☐ Geologic Log
  - ☐ Estimated Well Capacity
  - ☐ Photographic evidence of the calibrated instantaneous reading and totalizing flow meters installed on each participating well
  - ☐ Certification by a Professional Engineer or Professional Geologist of proper flow meter installation and calibration
  - ☐ If applicable, for Project Agencies consideration, technical analysis that supports a streamflow depletion factor (SDF) other than 12% and/or information sufficient to demonstrate that a well likely does not have a significant hydraulic connection to the surface water system tributary to the Delta according to the well aceptance criteria (Appendix B). For this specific information, it is recommended transfer proponents provide additional time for Project Agency review.
  - ☐ Additional Information (If available): PG&E well pump efficiency test, independent well drawdown tests, water quality data, and/or site-specific studies with aquifer properties surrounding the well or extent of the well's hydrologic connection with any surface waters
  - ☐ Pump Power: Verification of an electric source for well, or if well is diesel or natural gas powered, verification of compliance with Air Board Regulations
- ☐ Schedule and volume of water to be pumped
  - ☐ Proposed Operations: Description of the well's projected operation and the projected beneficial use of pumped water
- ☐ Baseline from which the additional pumping will be measured
- ☐ Historic Operations: Operation records indicating the volume of water pumped from each well during July through September 2013 Identify and document area(s) normally irrigated by wells

Monitoring Program - submit the monitoring plan to the Project Agencies along with the transfer proposal. The seller shall begin monitoring groundwater levels in March prior to the proposed transfer.

- ☐ A monitoring well network that adequately covers the surface area and aquifer intervals within the affected pumping area
- ☐ Meter readings of instantaneous flow (gpm) and total discharge volume at each of the groundwater substitution wells (collected as specified)
- ☐ Groundwater level measurements (collected as specified)
- ☐ Groundwater quality monitoring (when groundwater pumping is initiated, monthly during the transfer period, and at the termination of pumping)
- ☐ Method to detect land subsidence or that subsidence is unlikely to occur
- ☐ Plans to coordinate data collection and cooperate with regional monitoring efforts
- ☐ Data evaluation and reporting

Mitigation Plan - submit a mitigation plan to the Project Agencies at the time the transfer proposal is submitted

- ☐ A procedure for the seller to receive reports of purported environmental or third party effects and to report that information to the Project Agencies and, as required, to local agencies
- ☐ A procedure for investigating any reported effect
- ☐ Development of mitigation options, in cooperation with the affected third parties, for legitimate effects
- ☐ Assurances that adequate financial resources are available to cover reasonably anticipated mitigation needs

Figure 3-1 Groundwater substitution transfer technical information — proposal checklist

3.1 Compliance with Local Groundwater Management Plans and Ordinances

Compliance with local requirements (including ordinances relating to well drilling, well spacing, and groundwater extraction) and local groundwater management plans, as well as compliance with Water Code Section 1745 et seq., will be the responsibility of the entity proposing the groundwater substitution transfer.

The approval process associated with a proposed groundwater substitution transfer varies by county and may take a significant amount of time. Table 3-1 provides brief descriptions of the water transfer requirements for individual counties, in geographic order from north to south. Potential sellers are advised to contact the counties early to discuss the requirements for water transfer approval.

Table 3-1 Description of county ordinances related to groundwater transfers

County	Description	Sources for more information
Shasta	Ordinance pertaining to the Redding Groundwater Basin portion of Shasta County requires a permit for extraction and export of groundwater, either directly or indirectly, for use outside the county. Application for a transfer permit should be submitted to the chief engineer of the Shasta County Water Agency.	Shasta County Water Agency (530) 225-5181 http://www.co.shasta.ca.us/index/pw_index/engineering/water_agency.aspx
Tehama	Ordinance requires a permit to extract groundwater for off-parcel use, prohibits mining of groundwater, and restricts the radius of influence associated with the operation of a well participating in transfer operations to the parcel on which the well is located, among other requirements.	Tehama County Health Agency, Environmental Health Division (530) 527-8020 http://www.tehamacountypublicworks.ca.gov/Flood/
Butte	Ordinance requires permits for groundwater extraction for use outside the county, and requires a permit for groundwater substitution pumping. Butte County also has a well spacing ordinance. The Butte County Water Commission advises the Board of Supervisors with technical information from the Butte County Water Advisory Committee and Technical Advisory Committee.	Butte County Department of Water and Resource Conservation (530) 538-4343 http://www.buttecounty.net/Water and Resource Conservation.aspx
Glenn	Ordinance uses basin management objectives of groundwater levels, groundwater quality, and land subsidence to help define safe yield and overdraft of the basin. The ordinance is enforced by the Glenn County Board of Supervisors.	Glenn County Department of Agriculture (530) 934-6501 http://www.glenncountywater.org/about_us.aspx

County	Description	Sources for more information
Colusa	Ordinance requires a permit for extraction and export of groundwater, either directly or indirectly, for use outside the county. Application for a transfer permit is filed with Colusa County Groundwater Commission, through the director of the Planning and Building Department.	County Director of Planning and Building (530) 458-0480 http://www.codepublishing.com/CA/colusacounty/ http://colusagroundwater.ucdavis.edu/index.htm
Sutter	Sutter County has no ordinance governing the extraction and export of groundwater. According to its general plan, Sutter County has a long-term interest in discouraging water transfer/export sales if they result in long-term supply losses.	Chief of Water Resources (530) 822-3299 http://www.co.sutter.ca.us/doc/government/depts/cs/ps/gp/gp_home
Yolo	Ordinance (Title 10, Chapter 7, Groundwater) requires a permit for extraction and export of groundwater, including the extraction of groundwater to replace a surface water supply. Application for a permit should be filed with the Director of Community Development.	Director of Planning and Public Works (530) 666-8775 http://www.yolocounty.org/Modules/ShowDocument.aspx?documentid=1899
Sacramento	Ordinance (Title 3 section 3.40.090, Ground and Surface Water Export) requires a permit for groundwater or surface water to be transported in any manner outside the county. Application for a permit must be filed with the director of the Sacramento County Department of Water Resources.	Sacramento County Department of Water Resources (916) 874-6851 http://www.countycounsel.saccounty.net/Documents/sac_017441.pdf
Solano	At this time, Solano County has no ordinance governing the extraction and export of groundwater.	Solano County Water Agency (707) 451-6090

3.2 Evaluation of Groundwater Substitution Transfer Proposals

Before beginning transfer operations, the water transfer proponent will need to develop a groundwater substitution transfer proposal and provide it to the Project Agencies for evaluation.

The Project Agencies will review groundwater substitution transfer proposals to determine whether they meet the following objectives.

- Transfer will result in providing the agreed-upon amount of transfer water.

- Transfer will not unreasonably affect fish, wildlife, other instream beneficial uses, or the environment and will have no significant unmitigated environmental effects.
- Transfer will not injure other legal users of water.
- Proposal shows that a monitoring and mitigation plan is in place prior to the transfer.

The Project Agencies need sufficient information to determine whether the transfer will meet the desired objectives. The following sections describe the information to be submitted with the proposal.

3.3 Groundwater Substitution Wells

The Project Agencies will conduct a review to determine whether the proposed well(s) are suitable for use in a water transfer operation and meet the above objectives.

Water transfer proponents must provide sufficient information, described below, to assist the Project Agencies conducting the well review. Wells may be considered ineligible for transfer pumping if a review of location and construction or other data demonstrates that either of the below is true:

- A well is completed in an unconfined aquifer that is likely to be hydrologically connected to a streambed or other surface water feature.
- Sufficient information is not available to estimate a well's potential effects.

3.3.1 Information Requirements for Groundwater Substitution Wells

The Project Agencies need the information listed below to evaluate a groundwater substitution transfer proposal. Refer to Appendix B for a listing of the current well acceptance criteria. In 2014, water transfer proponents can resubmit data for wells used for transfers in 2009 through 2013, for Project Agency consideration, if there have been no changes to the wells. However, certification of proper flow meter installation and calibration must be submitted for each well every two years. Water transfer proponents should consult with Project Agencies prior to submitting their proposal. The following information should be included in the water transfer proposal.

1. Well identification: The well owner's name, the well owner's identification number, the water district or agency where the well is located, and the water district or agency's well identification number (if different from the well owner's identification number).
2. Well location:
    a. Latitude and longitude and the township, range and section. The location can be determined with a hand-held global positioning system (GPS) unit

or instrument with greater measuring accuracy. GPS coordinates should be given using the current DWR standard coordinate system and datum: latitude/longitude in decimal degrees, using North American Datum 1983 (NAD83).

b. A map, with at least as much hydrologic and physical detail as that of a 7.5-minute U.S. Geological Survey quadrangle sheet, showing the location of all production and monitoring wells that will be involved in the transfer and the location of all surface water features within two miles of the district service area boundary.

3. Historic operations: Operation records indicating the volume of water pumped from each participating transfer well during 2013. Records of power consumption along with a well pump efficiency test conducted within the last two years may be submitted in place of flow measurements from a totalizing flow meter.

4. Proposed operations:

   a. Description of the wells' projected operations (e.g., is groundwater to be applied to surrounding land, or is groundwater to be pumped into district canals) and the projected beneficial use of pumped water.

   b. Verification that a totalizing flow meter has been installed and calibrated.

5. Well construction: Provide total well depth, depth of annular surface seal, gravel pack intervals, casing size, casing perforation intervals (or open hole interval), and well's construction method (cable tool, rotary gravel pack well, etc.).

6. Geologic log: Details of geologic materials described on the well log.

7. Estimated well capacity: Estimate well capacity and describe method of determination.

8. Additional information: If available, provide results of a Pacific Gas and Electric (PG&E) (or equivalent) well pump efficiency test, independent well drawdown tests, water quality data, and site-specific studies that document aquifer properties surrounding the well or the extent of the well's hydrologic connection with any surface waters.

9. Pump power: Wells powered by an electric source are eligible for use in transfers. Wells powered by diesel or natural gas engines are eligible for use in the transfer if applicable air quality and other environmental laws and regulations are complied with and appropriate mitigation is provided.

The amount of information submitted for each well will depend on its location relative to surface water features and other areas that may be sensitive to groundwater pumping effects. The Project Agencies will require site access for field verification of the above information and collection of additional data during the program.

3.4 Determining the Amount of Transferable Water

Transferable water equals the incremental increase in Sacramento River flow to the Delta created by transfer operations during balanced Delta conditions. Balanced Delta conditions occur when the Project Agencies agree that releases from upstream reservoirs plus unregulated flow approximately equal the water supply needed to meet Sacramento Valley in-basin uses plus exports. Sacramento River flow increases as sellers use groundwater pumped from wells to replace surface water provided by river diversions. The resulting increase in streamflow is reduced by varying degrees as transfer-related groundwater pumping affects streamflow.

Information provided in the water transfer proposal will be used in conjunction with monitoring report data to calculate the amount of water the transfer operations make available. The amount of transferable water credited to a groundwater substitution water transfer operation in 2014 will be determined as follows.

1. Establish the baseline groundwater pumping for the transfer operation.
2. Determine the difference between the proposed groundwater substitution pumping in 2014 and the baseline.
3. Determine the reduction in streamflow during balanced Delta conditions resulting from pumping groundwater to make surface water available for transfer.
4. Calculate the difference between 2 and 3, above.
5. The following formula summarizes the above four steps: (2014 Groundwater Substitution Pumping) – (Baseline Groundwater Pumping) – (Estimated Streamflow Reduction) = (Surface Water Made Available for Transfer).

The following sections describe these steps.

3.4.1 Determining the Baseline Groundwater Pumping

The baseline is the amount of groundwater pumping that would have occurred during the transfer period without the transfer. For water transfers in 2014, the Project Agencies will use the 2013 records of groundwater pumping submitted by the water transfer proponents to establish the baseline. Water transfer proponents are requested to submit the following information for non-transfer pumping years.

- Identify all wells that discharge to the contiguous surface water delivery system within which a well is proposed for use in the transfer program.
- The amount of groundwater pumped monthly during 2013 for each well that discharges to the contiguous surface water delivery system.

The Project Agencies will calculate baseline groundwater pumping based on the total volume pumped in non-transfer years from all proposed participating transfer wells (typically July through September) that discharge to a contiguous surface water delivery system. Newly participating sellers may be allowed to use records of

electrical power consumption along with well pump efficiency test data (from a test conducted within the past two years) to estimate baseline groundwater pumping.

To participate in future groundwater substitution transfers, transfer and non-transfer wells that discharge to a contiguous surface water delivery system should be metered and recorded on a monthly basis during both transfer and non-transfer years so that the baseline can be properly established.

If sellers experienced cutbacks to their normal surface water allocation in 2012, the amount of baseline groundwater pumping will be determined on a case-by-case basis after consultation with the seller.

3.4.2 Measuring Groundwater Pumped

Sellers should provide pumping records from all wells that discharge to a contiguous surface water delivery system used in groundwater substitution transfers. An instantaneous reading and totalizing flow meter shall be installed on each well participating in groundwater substitution water transfers. The flow meter shall be installed such that:

- Each flow meter is in good working order and properly sized, positioned, and oriented on the discharge piping to ensure accurately measured flows.
- Discharge piping is configured to ensure that full pipe flow conditions are met where the meter is installed.
- The manufacturer's standards for sizing, positioning, orientating, and calibrating of the meter are followed.

Sellers must have a qualified professional engineer or professional geologist certify that each well's flow meter installation and calibration conforms to the manufacturer's specifications prior to use. Sellers shall provide a photograph of each participating well showing the flow meter installation and associated plumbing. Project Agencies may conduct independent field checks of flow meter installations to verify the information provided.

An exception to the above accounting method for groundwater substitution transfers applies to districts that can provide water from their own reservoir(s) and replace it with groundwater pumping. If a reservoir controls flow to a stream where gages or weirs are sufficiently accurate, and streamflow is sufficiently low that the Project Agencies can use stream gage or weir data to determine how much water is being provided for transfer, the stream gage or weir data may be used in place of totalizing flow meters on individual wells. In these cases, additional analysis of reservoir operations may be required to determine whether transfer operations must consider reservoir refill criteria (see Section 4). Data requirements for transfer proponents that can operate a groundwater basin in conjunction with their own reservoir will be determined on a case-by-case basis.

The development of a water transfer proposal must take into account that a district's total diversion of surface water during the year shall not exceed the maximum amount provided under its water service or settlement contract with the United States, or its water service contract with DWR, or their appropriative water rights, less the total quantity of groundwater provided by wells within a district pumping under a groundwater substitution transfer agreement.

3.4.3 Estimating the Effects of Transfer Operations on Streamflow

Groundwater pumping for transfer operations will yield water at the expense of current and future streamflow. Flow reduction in a river, stream, canal, or drain could injure other legal users of water if it occurs when the Delta is in balanced conditions (see section 1.1) or there is limited streamflow in the channel from which the water is being transferred. However, if transfer-related streamflow losses occur when the Delta is in excess conditions and there is sufficient flow in the stream channel from which the water is being transferred, the streamflow depletions should not impact the water supply available to other legal users.

Although real time streamflow depletion due to groundwater substitution pumping for water transfers cannot be directly measured, impacts on streamflow due to groundwater pumping can be modeled. Project Agencies have applied the results from prior modeling efforts to evaluate potential groundwater transfers in the Sacramento Valley to establish an estimated average streamflow depletion factor (SDF) for transfers requiring the use of Project Facilities. To account for the anticipated streamflow depletion, Project Agencies will apply an SDF to the amount of water pumped pursuant to each transfer proposal in the Project Agency's respective conveyance contract or letter of agreement.

Project Agencies will evaluate transfer proposals along with any available monitoring data. Project Agencies will apply a 12 percent SDF for each project meeting the criteria contained in this chapter unless available monitoring data analyzed by Project Agencies supports the need for the development of a transfer proposal site-specific SDF. Transfer proponents may submit site-specific technical analysis supporting a proposed SDF for review and potential approval by Project Agencies, in the event Project Agencies determine that a site-specific SDF is required for the proposed transfer proposal. It is recommended that water transfer proponents provide Project Agencies with adequate time to review proposed data supporting an alternate SDF.

Project Agencies are developing tools to more accurately evaluate the impacts of groundwater substitution transfers on streamflow. These tools may be implemented in the near future and may include a site-specific analysis that could be applied to each transfer proposal.

3.5 Monitoring Program

Groundwater substitution transfers have the potential to cause injury to local groundwater users due to the additional groundwater pumping needed to allow the substitution transfer to take place. Injury to other surface water users could also occur if the additional groundwater extraction results in a significant reduction in streamflow when those users need it.

Water transfer proponents transferring water via groundwater substitution transfers must establish a monitoring program capable of identifying any adverse transfer-related effects before they become significant. The Project Agencies will evaluate the monitoring program for its ability to meet the objectives listed below. The regional extent and frequency of monitoring necessary to meet objectives will depend on site-specific factors. For instance, areas that are susceptible to land subsidence may require land surface elevation surveys, while areas with groundwater quality concerns may require a more comprehensive suite of water quality testing.

In order to provide adequate review time, water transfer proponents should provide a monitoring plan to the Project Agencies along with the transfer proposal. In order to properly establish baseline groundwater levels, the groundwater level monitoring program should begin in March 2014.

3.5.1 Monitoring Plan Objectives

The monitoring plan needs to describe how the water transfer proponent will collect, evaluate, and report the monitoring data in order to meet the following objectives.

- Accurately account for the quantity of groundwater pumped to replace surface water diversions.
- Determine the extent of surface water-groundwater interaction in the areas where groundwater is pumped for the transfer.
- Determine the direct effects of transfer pumping on the groundwater basin, observable until March of the year following the transfer.
- Assess the magnitude and potential significance of any effects on other legal users of water, instream beneficial uses, the environment, and the economy.
- Comply with federal and State laws and local ordinances.
- Coordinate the transfer monitoring program with other established groundwater monitoring programs in the area.

Water transfers may not cause significant adverse effects on nearby federally reserved Indian Trust Assets. Proposed transfers near Indian Trust Assets may require additional monitoring commitments, such as increased groundwater level measurements or additional groundwater quality sampling.

3.5.2 Monitoring Program Elements

To meet the objectives, a monitoring program will contain (at a minimum) the following elements.

Monitoring Well Network

The monitoring well network shall include a sufficient number of monitoring wells to accurately characterize groundwater levels in the area before, during, and after transfer-related groundwater pumping. Water transfer proponents will submit detailed information for monitoring wells, which includes:

- The location and construction of both proposed transfer wells and monitoring wells, and third party wells.
- Identification of known contaminated areas that could be affected by transfer pumping.

Groundwater Pumping Measurements

All wells pumping to replace surface water designated for transfer shall be configured with an instantaneous and totalizing flow meter (capable of measuring well discharge rate and volume) as described in section 3.4.2 of this document. 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. The seller will report the readings and calculate and report the quantity of water pumped between successive readings. In addition, the seller will record electric meter readings (or diesel or natural gas engine hours, as applicable) and report them to the Project Agencies as requested.

To participate in future groundwater substitution transfers, participating wells should be metered, and pumping rates and volumes should be recorded during both transfer and non-transfer years so that the baseline groundwater pumping can be accurately established.

Groundwater Levels

Sellers will collect groundwater level measurements in both participating transfer wells and monitoring wells. Groundwater level monitoring will include measurements before, during, and after transfer-related pumping. The water transfer proponent will measure groundwater levels as follows:

- <u>Prior to transfer:</u> Groundwater levels will be measured monthly from March 2014 until the start of transfer.
- <u>Start of transfer:</u> Groundwater levels will be measured on the same day that the transfer begins, prior to the pump being turned on.
- <u>During transfer:</u> Groundwater levels will be measured weekly throughout the transfer period.

- Post-transfer: Groundwater levels will be measured weekly for one month after the end of transfer pumping, after which groundwater levels will be measured monthly until March 2014.

Sellers will submit a proposed monitoring schedule to the Project Agencies.

Groundwater Quality

Groundwater pumped by municipal water transfer proponents must meet water quality requirements of the California Department of Public Health under the California Code of Regulations, Title 22. Project Agencies may request that water transfer proponents provide a three-year summary of all specific conductance and total dissolved solids (TDS) results for water samples from each proposed transfer well for review prior to acceptance.

Water transfer proponents with an agricultural groundwater source shall measure the field parameter specific conductance in samples from each participating transfer well. Samples shall be collected as follows.

- When pumping is first initiated and no later than the day the pump starts.
- Monthly during the transfer period.
- On the day that transfer pumping is terminated.

Specific conductance measurements should be collected at the same time that groundwater level measurements are collected. The water transfer proponent shall record water quality meter calibration information, water quality measurements, and other site-specific information relevant to water quality on the field log provided by DWR.

Some wells may require a more comprehensive suite of water quality testing. These include wells in areas with known groundwater quality problems, municipal wells producing water exceeding specific conductance of 900 microSiemens/centimeter (µS/cm), (California Secondary Maximum Contaminant Level [Recommended][7]) or agricultural wells producing water exceeding specific conductance of 700 µS/cm (Water Quality for Agricultural [8]). Where applicable, water transfer proponents should provide a brief discussion of local groundwater quality issues to Project Agencies. Project Agencies and the seller will determine the appropriate level of groundwater quality monitoring prior to the start of transfer pumping in these areas.

[7] CA Dept. of Public Health website: http://www.cdph.ca.gov/certlic/drinkingwater/pages/chemicalcontaminants.aspx

[8] 1985. Water Quality for Agriculture: http://www.fao.org/docrep/003/T0234E/T0234E00.htm .

Land Subsidence

The extent of required monitoring will depend on the susceptibility of the area to land subsidence. Areas with documented land subsidence will require more extensive monitoring than areas with no documented land subsidence. The Project Agencies will work with the water transfer proponent to develop a mutually agreed upon subsidence monitoring program. Monitoring could include periodic determination of land surface elevation in strategic locations throughout the transfer area and installing and monitoring extensometers.

Coordination Plan

The monitoring program will include a plan to coordinate the collection and organization of monitoring data and will identify the water transfer proponent's point of contact (POC). The POC will be responsible for communication with the well operators and other decision makers The POC will be responsible for the monitoring and reporting of transfer-related data. The POC should be available to meet with the Project Agencies before the start of the transfer. Together, these parties may visit the participating transfer wells and monitoring wells at least one month prior to the start of pumping to measure pre-transfer groundwater levels, inspect flow meter installations, and record pre-transfer meter readings. Water transfer proponents should coordinate their monitoring efforts with other local groundwater monitoring programs.

Evaluation and Reporting

The proposed monitoring program will describe the method of reporting monitoring data. At a minimum, water transfer proponents will provide data summary tables to the Project Agencies, both during and after transfer-related groundwater pumping. Post-transfer reporting will continue until groundwater levels recover to seasonal highs in March 2014. Water transfer proponents will provide a final summary report to the Project Agencies evaluating the effects of the water transfer program. The final report will identify program-related impacts on groundwater and surface water (both during and after pumping), and the extent and significance, if any, of impacts on local groundwater users. It should 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 2014.

3.6 Mitigation Program

A mitigation plan is needed to ensure that groundwater pumping to support water transfers is conducted in a manner that does not injure other legal users of water or unreasonably affect the environment and economy of the county from which water is being transferred. Groundwater substitution transfer proponents need to mitigate any local impacts caused by their transfer operations. A mitigation plan must be included in the water transfer proposal.

3.6.1 Objectives

The water transfer proponent must implement an effective mitigation program to evaluate and correct problems that could arise due to transfer-related groundwater pumping. Potentially significant impacts identified in a water transfer proposals must be avoided or mitigated for a proposed water transfer to continue, including:

- Contribution to long-term conditions of overdraft.
- Dewatering or substantially reducing water levels in non-participating wells.
- Land subsidence.
- Degradation of groundwater quality that impairs beneficial uses or violates water quality standards.
- Affecting the hydrologic regime of wetlands or streams to the extent that ecological health is impaired.

The water transfer proponent will design and implement a mitigation plan and will be responsible for mitigating any significant third-party and environmental impacts that occur. Mitigation actions could include:

- Curtailment of pumping until natural recharge corrects the issue.
- Lowering of pump bowls in third-party wells affected by transfer pumping.
- Reimbursement for significant increases in pumping costs due to the additional groundwater pumping to support the transfer.
- Other actions as appropriate.

3.6.2 Mitigation Plan Elements

To ensure that mitigation programs will be tailored to local conditions, the mitigation plan must include the following elements.

1. A procedure for the water transfer proponent to receive reports of purported environmental or third-party effects.
2. A procedure and schedule for investigating any reported effect.
3. A procedure for developing mitigation options for legitimate effects and schedule for implementing those options in cooperation with the affected third parties, including a strategy for conflict resolution.
4. Assurances that adequate financial resources are available to cover reasonably anticipated mitigation needs.

Water transfer proponents will submit a mitigation plan to the Project Agencies at least two months prior to the start of the groundwater substitution transfer.

If an effect is reported, the description of the effect and the water transfer proponents' proposed response will be submitted to the Project Agencies and, as required, to local agencies within five business days.

Mitigation measures will be funded by the transfer proponents, unless an agreement is made otherwise. Water transfer proponents will provide assurance that adequate financial resources are available to accomplish any required mitigation.

Section 4. Reservoir Storage Release

Water is made available for transfer by reservoir release when the project operators release water in excess of what would be released annually under normal operations. The water must also be released at a time when it can be captured and/or diverted downstream. Each storage facility is unique, and, therefore, each reservoir storage release (or reservoir reoperation) proposal must be evaluated on a case-by-case basis. Sufficient information must be provided to establish normal operating conditions and normal end-of-season storage as well as typical release patterns. Definitively establishing the without-transfer proposal conditions for a reservoir reoperation is difficult because normal conditions can vary substantially, depending on things such as annual hydrology, agency demand, and instream requirements. Sufficient information must be provided to ensure the water transfer proposal is providing additional storage withdrawal. Data spanning a variety of hydrologic conditions is necessary to develop without transfer proposal or "normal" operating conditions.

At a minimum, the following information is needed to evaluate the without-transfer operating conditions:

- A minimum of five years' reservoir operating data, including end-of-month storage.
- End-of-season reservoir storage.
- Historic and forecast inflows with monthly updates.
- Historic and forecast water demands with monthly updates.
- Historic reservoir releases.
- Instream requirements.
- Flood control diagram.
- End-of-season target carryover storage, if any.

In addition to the information necessary to establish the without-transfer conditions, information will be required during the transfer period to verify delivery of the transfer water. Such information would include independent gage information downstream of the reservoir as well as reservoir release and storage data.

4.1 Refill Criteria

Refill of the reservoir storage space vacated by the water transfer can affect downstream water users if it is done at a time when downstream legal users could have utilized reservoir releases. Refill criteria are required for all reservoir release water transfers to ensure that the transfer does not injure other legal users of water. The refill period can span a number of years if the hydrology in subsequent years is insufficient to allow refill. In general, the refill of vacated space from a water transfer will be restricted to periods when the refill quantity is in excess of the needs of any

legal user of water downstream of the point of diversion. For example, if a transfer of reservoir storage originates above another reservoir, refill will not be considered to occur until the downstream reservoir goes into flood control operations. Alternately, if a transfer source directly affects the inflows to the Delta, refill will not be considered to occur until the Delta is declared to be in excess conditions as defined in the COA between Reclamation and DWR. Each transfer proposal is unique; thus, refill criteria must be developed for each proposal and must be tailored to these unique circumstances. The refill criteria are typically developed in coordination with the SWP and CVP operations staff.

Appendix A. Potential Water Transfer Effects on the Projects

Apart from the interest of the Project Agencies in promoting responsible water transfers, they have another important interest in transfers: one that underlies much of what this technical document is about. Transfers through the Delta or affecting Delta water supply in the summer and fall have the inherent potential to adversely affect the SWP and the CVP physically and from a water accounting perspective. If water that is transferred by others is not new water to the system, it will necessarily come instead out of Project supply. As described more generally below, that is impermissible "legal injury."

The Projects together have the shared responsibility for meeting Delta water quality requirements and are junior to all lawful in-basin water diversions of natural flow under the watershed protection statutes. Because the Projects only export natural flow after all in-basin uses have been met, and must operate to meet Delta flow-related standards, transfers that do not provide new water to the system (or insufficient new water) will require the SWP and CVP to release water from storage or curtail diversions in order to maintain regulatory compliance. This is why the Projects must be assured that the water made available for transfer is new water that would not be in the system but for the transfer activity.

When the Projects contract to convey transferred water through their facilities, or otherwise weigh in on proposed transfers, they must be sure that the water supply to which their Project contractors are legally entitled is not unlawfully diminished by the transfer. If it is diminished, it is effectively an involuntary and uncompensated transfer of someone else's water and constitutes legal injury.

Appendix B. Well Acceptance Criteria

Table B-1 Well acceptance criteria

Well location	Criteria for acceptance **Note: In addition to the well acceptance criteria documented below, wells may be considered ineligible for transfer pumping based on the requirements documented in Section 3.3.**
Between one and two miles from a **major** [1] surface water tributary to the Delta or a delineated wetland	Well(s) may be accepted if: • Sufficient information is submitted to demonstrate that the well likely does not have a significant hydraulic connection to the surface water system tributary to the Delta, or • The well's uppermost perforations start deeper than 50 feet below ground surface (bgs), or • The well does not pose a risk of adversely affecting groundwater quality.
Within one mile of a **major** surface water tributary to the Delta or a delineated wetland	Well(s) may be accepted if: • The uppermost perforation starts below 150 feet bgs; or • The uppermost perforations start between 100 and 150 feet bgs and the well has a surface annular seal to at least 20 feet bgs, a total of at least 50 percent fine-grained materials in the interval above 100 feet bgs, and at least one fine-grained layer that exceeds 40 feet in thickness in the interval above 100 feet bgs; or • Sufficient information is submitted to demonstrate that the well likely does not have a significant hydraulic connection to the surface water system tributary to the Delta.
Between one-half and one mile away from a **minor** [2] surface water tributary to the Delta or a delineated wetland	Well(s) may be accepted if: • Sufficient information is submitted to demonstrate that the well likely does not have a significant hydraulic connection to the surface water system tributary to the Delta, or • The well's uppermost perforations start deeper than 50 feet bgs, or • The well does not pose a risk of adversely affecting groundwater quality.
Within one-half mile of a **minor** surface water tributary to the Delta or a delineated wetland	Well(s) may be accepted if: • The top of the uppermost perforations start below 150 feet bgs; or • The uppermost perforations start between 100 and 150 feet bgs and the wells has a surface annular seal to at least 20 feet bgs, a total of at least 50 percent fine-grained materials in the interval above 100 feet bgs, and at least one fine-grained layer that exceeds 40 feet in thickness in the interval above 100 feet bgs; or • Sufficient information is submitted to demonstrate that the well likely does not have a significant hydraulic connection to the surface water system tributary to the Delta; or • Sufficient information is submitted to demonstrate that the surface water feature does not flow during times when the Delta is in balanced conditions.

[1] **Major** surface water features tributary to the Delta affected by groundwater pumping are: Sacramento River, Feather River, Big Chico Creek, Cottonwood Creek, Stony Creek, Yuba River (including the Yuba Gold Fields), American River, and Cosumnes River.

[2] **Minor** surface water features tributary to the Delta potentially affected by groundwater pumping are: Colusa Basin Drain, Tule/Toe Canal, and Natomas Cross Canal.