Appendix 1E

Water Transfers in California: Types, Recent History, and General Regulatory Setting

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1E.1 Introduction

The purpose of this Appendix is to provide a basic understanding of water transfers in California with an emphasis on transfers that move water through the Sacramento-San Joaquin Delta (Delta). This Appendix provides an overview of various types of water transfers, their recent history, and the regulatory setting that governs transfers.

In its 1976 report, the Governor's Commission on Water Rights recognized the importance of water transfers to the future of California's water supply and made recommendations regarding the need for specific changes to the Water Code to facilitate the transfer of water. Many of these changes were accomplished in the following years and are reflected in the discussions below.

Water transfers involve a change in the place of water use, from the water's historic point of diversion and use, to a new location either within or outside the watershed of origin. Water may be transferred from one user to another for a variety of purposes, including agricultural, municipal and industrial uses. It may also be transferred for environmental purposes such as in-stream flow augmentation and wildlife refuges. Water transfers and exchanges can be temporary - either short-term (up to 1 year) or long-term (more than one year but not permanent) or permanent.

Water transfers can be an effective water management tool providing much-needed flexibility in the allocation and use of water in California. Transfers in California are primarily executed to meet dry-year demands rather than to obtain a primary water supply for either agricultural or municipal development. Transfers are particularly useful for meeting critical needs during drought periods. Transfers, however, must be carried out in a responsible manner in order to assure that they do not result in adverse impacts to other water users or third parties.

A key component of a water transfer is a determination of the quantity of water available for transfer. This quantity is calculated by determining the amount of new water the surface water system will realize as a result of the actions taken by the individual or agency proposing the transfer. This is known as a "real water determination". The baseline for purposes of the analysis is the amount that would have been available downstream of the historic point of diversion or return flow in the absence of the transfer. In other words, the amount of water available for transfer cannot exceed the amount of demonstrated reduction in consumptive use or augmentation of the streamflow by the transferor.

An active transfer market has existed in California for a number of years. The most common through-Delta transfers to date have been short-term (up to 1 year) transfers from agricultural users within the Sacramento Valley to agricultural and urban users south of the Delta to meet critical dry year demands. The primary facilities used in exporting through-Delta transfer water are the State Water Project (SWP) Harvey O. Banks Pumping Plant (Banks) and the Central Valley Project (CVP) Jones Pumping Plant (Jones). This appendix will discuss the key role the SWP and CVP

(collectively Projects) play in facilitating through Delta water transfers, as well as the limitations resulting from regulatory restrictions governing Project operations.

Access to pumping plants in the Sacramento/San Joaquin Delta and canal capacities is essential to accomplishing water transfers from the northern portions of the State to the central and southern areas of California. (Transfers south of the Delta and transfers and exchanges among state and federal contractors also occur but are not discussed in this Appendix since they do not result in increased water exported from the Delta. Water transfers are common among agencies in the San Joaquin Valley and are discussed in Appendix 5C.) Water Code Section 1810 et seq. encourages water transfers by requiring any state, regional or local agency to allow bona fide transferors[1] the use of available conveyance capacity provided the prospective transferor can show that the transfer will not injure any legal user of water or unreasonably affect fish, wildlife, or other instream beneficial uses or unreasonably affect the economy or environment of the county from which the water is diverted.

1E.2 Types of Water Transfers

Water transfers can be structured as temporary - either short-term transfers (one year or less) or long-term transfers (two years or more), or as permanent transfers. There are also transfers based on water exchanges, in which water is transferred in one year and returned, either in full (even exchange) or in part (uneven exchange), at a later time. Transfers involve a one-way movement of water, while exchanges involve a commitment to return a negotiated amount of water at a later date, and may include some monetary compensation as well.

The most common types of water transfers are based on reservoir storage releases, substitution of groundwater for surface water diversions, and crop idling. Other methods can be used to make water available for transfer; however, these three methods represent the bulk of water transfers within California to date. Crop shifting and water conservation measures can also be used to develop water for transfer. However, crop shifting and water conservation based transfers are not common.

A basic tenet underlying all water transfers is that they must be based upon the availability of "real water", that is, water that would not be in the watercourse absent the transfer. Each transfer is unique and must be evaluated individually to determine the quantity and timing of real water made available. Unless a transfer is based upon "real water", the water conveyed to the buyer will come at the expense of other water users or the environment. A more in depth discussion on the issue of developing responsible transfers is provided on California Department of Water Resources' (DWR's) website, "Responsible Water Transfers", at http://www.water.ca.gov/watertransfers/.

A key element in evaluating whether a transfer generates real water is establishing what would occur in the absence of the transfer or, the baseline conditions. Establishing the baseline conditions can be difficult and the method for doing so varies with the type of transfer proposed, but is critical in assuring responsible transfers. More detailed information on how DWR and the U.S. Bureau of Reclamation (Reclamation) evaluate water transfers and assess real water is provided in the Draft

[1] Section 1811 of the Water Code defines "bona fide transferor " to mean " a person or public agency, as defined in Section 20009 of the Government Code with a contract for sale of water that may be conditioned upon the acquisition of conveyance facility capacity to convey the water that is the subject of the contract."

Technical Information for Preparing Water Transfer Proposals prepared by DWR and Reclamation and available at http://www.water.ca.gov/watertransfers/.

1E.2.1 Reservoir Reregulation

Reservoir reregulation involves an increased release of water from a reservoir compared to normal operations. The transfer water is conveyed downstream to a new point of diversion either within or outside the watershed. It is important that storage releases are coordinated with the agency conveying the water to assure that the additional flows can be rediverted at the new downstream diversion point.

The release of additional water from the reservoir for transfer creates a lower "end of season" storage in the reservoir than would have existed absent the transfer. Consequently, more water must be captured the following year to refill the reservoir. If the reservoir operator refills the additional vacated storage at a time when those flows would also have been available to other legal users downstream of the reservoir, the transfer would result in an injury to other downstream legal users in the year(s) following the transfer. To avoid injuring downstream users, sellers must refill the vacated reservoir storage at a time when downstream users would not have otherwise been able to capture the water, either in downstream reservoirs or direct diversion facilities. If refill causes an injury due to its timing, additional water must be released to compensate for the injury. This means that the storage capacity vacated due to the transfer can only be refilled at times when the Delta is in excess conditions or, if there is another reservoir downstream of the transfer reservoir, the storage space can only be refilled after the downstream reservoir fills or reaches its flood control elevations. Reservoir refill criteria are typically included in any reservoir reoperation transfer to assure that no other legal users of water are injured by the transfer.

1E.2.2 Groundwater Substitution

In a groundwater substitution transfer, a water user with a right to divert surface water forgoes this right and pumps groundwater for the period of the transfer, thereby making the forgone surface diversions available to a user downstream. The quantity of surface water available is based on the quantity of groundwater actually pumped less any streamflow depletion losses.

Additional groundwater pumping will, to some extent, have an effect on the surface water supply, referred to as streamflow depletion. The impacts of the transfer on streamflow can continue to occur long after the transfer has been completed. If the additional streamflow depletion occurs at a time when excess flow is available, downstream users are not affected. However, if the depletion occurs at a time when other downstream users could divert that water, the transfer could have an impact on other legal users.

Accounting for the impact of the transfer on streamflow is essential to determining the amount of real water available for transfer and to avoid injury to downstream water users. The amount and timing of the impacts, however, cannot be directly measured but can be estimated through the use of mathematical models. Although the work required to accurately assess the appropriate streamflow depletion factor for a particular transfer can be time-consuming and costly, the assessment of an appropriate streamflow depletion factor is necessary to protect other legal users of water.

An increase in groundwater pumping has the potential to affect not only the streamflow, but other groundwater users and water quality as well. DWR and Reclamation require that the transferor

implement a monitoring program to assess potential groundwater level and water quality impacts. For transfers conveyed through either the SWP or the CVP, the Seller is required to develop and implement a monitoring and mitigation plan to address any concerns raised by the monitoring data or other potentially affected parties.

1E.2.3 Crop Idling

Water can also be made available for transfer through crop idling. In crop idling-based transfers, sellers are paid to idle fields that would have been planted during the transfer season absent the transfer. The amount of water made available for transfer is based on the reduction in consumptive use, which is calculated as the evapotranspiration of applied water (ETAW). ETAW is the portion of applied water that is evaporated from the soil and plant surfaces and actually used by the crop. ETAW does not include the portion of the applied water that is lost as deep percolation to groundwater or conveyance losses without project specific documentation supporting an alternate method. 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 by crop, region and growing season. It is not feasible to determine the actual ETAW for the specific conditions of each individual transfer; therefore, average ETAW values are used to estimate transfer water. Historic cropping patterns are used to establish baseline crop acreage. Baseline acreage is important to establish what would have been planted in the absence of the transfer.

Idling agricultural acreage can result in impacts to parties not directly involved in the transfer, such as agricultural workers and seed or equipment suppliers. In order to minimize such potential "third party impacts" resulting from crop idling transfers, crop idling is typically limited to no more than twenty percent of the irrigated acreage within the agency transferring water or the within the county from which the water is transferred.

Water made available by crop idling is made available on the seasonal ETAW pattern. Unless storage is available, export capacity must coincide with the pattern of availability to allow export of the transfer water. The existing window for transfer capacity at the SWP and CVP export facilities in the Delta is currently limited to July through September (discussed below in Regulatory Framework). Depending on the crop, transfer water from crop idling is typically made available May through September. Unless storage capacity upstream of the export location is available, any water made available from crop idling outside the transfer window cannot be exported by either the SWP or CVP Delta pumps. Crop idling water made available from May through June ETAW can represent a significant portion of the transfer water, and the loss of this portion can make crop idling transfers that lack access to storage infeasible. A change in the seasonal restriction on export of transfer water could affect the feasibility of crop idling transfers in areas within the Delta watershed.

1E.2.4 Crop Shifting

Water Transfers based on crop shifting involve a change in crops planted by a grower, substituting a lower water using-crop (one with a lower ETAW) for a more water intensive crop. A cropping history is required to establish baseline cropping patterns. The water available for transfer as a result of crop shifting is the difference between the ETAW of the historic crop type and the alternate lower water intensive crop. Crop shifting transfers are only practical in regions where the

agricultural land is suited to multiple crop types, allowing a shift to an alternate crop. The restrictions on export of transfer water noted above under crop idling apply to crop shifting as well.

1E.2.5 Water Conservation

Implementation of water conservation measures can result in numerous benefits for an agricultural or municipal user, such as reduction in the discharge of poor quality agricultural drainage, or improved availability of limited supplies within the user's service area. However, only those conservation measures that result in a reduction in the consumptive use of water or prevent water from discharging to an unusable water supply make water available for transfer. Conservation measures such as lining or replacing an unlined ditch may generate water for transfer to the extent that riparian vegetation is reduced or surface or groundwater discharges to an unusable basin are eliminated. Documentation of the conditions, including water diversion and use, before and after the conservation measures were implemented is necessary to demonstrate the amount of transferrable water. Transfers based on implementation of water conservation measures have been limited because most conservation programs do not meet the above tests.

1E.3 Regulatory Framework

As discussed above, water transfers can involve both surface and groundwater rights. A basic understanding of both types of water rights is important to understand the legal and regulatory constraints that affect water transfers and their implementation.

One of the primary tests that each prospective transferor must meet is to show that there will be no injury to any other legal user of water from the transfer. This "no injury rule" applies to any proposed change in the historic exercise of a water right regardless of the priority date of the right. The no injury rule is codified in various sections of the Water Code, including Sections 1702, 1706 and 1810.

The no injury rule protects senior water users (those with the oldest water rights) from junior diverters while protecting junior water right holders from the expansion of senior water rights. Junior water right holders would be harmed if seniors could increase the amount of water they divert under their senior priority by expanding their service area or transferring water that was historically available to other downstream users. Likewise, juniors could be hurt if seniors could change their point of diversion, place of use or purpose of use in a manner that reduces the quantity or quality of water relied upon by juniors for their diversion. A more comprehensive discussion of the no injury rule and assuring responsible transfers is provided in "Responsible Water Transfers" posted on DWR's Water Transfers website at http://www.water.ca.gov/watertransfers/.

1E.3.1 Surface Water

California recognizes a dual system of water rights comprised of both riparian and appropriative rights. Riparian rights attach to the land abutting a watercourse and are limited to the direct diversion of available natural flow. Riparian rights are generally not transferrable, with the exception of petitions to transfer water for instream flow filed with the State Water Resources Control Board (SWRCB) under Water Code Section 1707. Appropriative rights allow a water user to divert and use water in areas not abutting the stream, including areas outside the watershed. Appropriative rights can also be obtained to store water. The priority of appropriative rights is

based on the date when the user first initiated efforts to put the water to beneficial use. This principle is sometimes referred to as "first in time, first in right". More specific information on water rights, water transfers and the SWRCB process is available on the SWRCB Division of Water Rights website at http://www.waterboards.ca.gov/waterrights/water_issues/programs/water_transfers/.

1E.3.1.1 Pre-1914 Appropriative Rights

Prior to 1914, there was no permitting authority responsible for issuing water rights. Water users established a water right by simply putting water to beneficial use. In some cases, notice was posted at the proposed point of diversion or with the county. Water rights initiated before 1914 are referred to as pre-1914 appropriative rights. The priority date for pre-1914 water rights is based on the date the notice was posted or the date water was first put to beneficial use. In times of water shortage, users with the most senior priority date may divert up to the full quantity of their right before more junior appropriators can begin diverting. Pre-1914 water rights are not within the jurisdiction of the SWRCB, the current water rights permitting agency. However, the extent of the pre-1914 appropriative right is limited to the quantities historically put to beneficial use within the historic place of use. Pre-1914 appropriators are also prevented from wasting or unreasonably using water consistent with Article 10, Section 2, of the California Constitution.

Pre-1914 rights holders can change the purpose of use, place of use or points of diversion without notifying the SWRCB; however, the "no injury rule" applies to pre-1914 water rights (Water Code Section 1706). The change cannot result in an increase in the amount of water used under the water right, including changes in timing of the diversions if the changes will result in a reduction in the amount of water that would be available at that time to other legal users.

Pre-1914 water rights holders must also comply with the requirements of the California Environmental Quality Act (CEQA) prior to implementing a water transfer. The lead agency, typically the selling agency, normally prepares an Initial Study, and then either a Negative Declaration or an Environmental Impact Report (EIR) disclosing the potential environmental effects of the water transfer. Unlike post-1914 transfers, there is no statutory exemption from these requirements under the Water Code,. If the transfer involves any federal action, including use of federal facilities or Federal approval of the transfer, compliance with the National Environmental Policy Act (NEPA) is required as well. Assuring compliance with Water Code Section 1706, CEQA and/or NEPA is generally the responsibility of the water right holder or the federal approving agency.

If the transfer involves a dedication of water for instream purposes, the water right holder should seek to protect this water right by filing for a water right change under Section 1707 of the Water Code. This section allows water users, including pre-1914 water right holders, to make changes to their water rights for "preserving or enhancing wetlands habitat, fish and wildlife resources or recreation in or on the water". The benefit in seeking such a change is the protection of this water from forfeiture and the protection of the additional flow from the historic point of diversion to the most downstream point of the transfer for instream enhancement purposes.

The SWRCB may approve an instream flow petition, provided that the specific findings set forth in the appropriative processing provisions of the Water Code can be made and the SWRCB finds that the change "will not increase the amount the party is entitled to use, will not unreasonably affect any legal user of water, and otherwise meets the requirements" of the Water Code.

1E.3.1.2 Post-1914 Appropriative Rights

The Water Commission Act of 1913, which went into effect on December 19, 1914, established an administrative process for the permitting of water rights. Those wanting to obtain a water right after 1914 are required to file an application and obtain a permit from the SWRCB prior to diverting water. The permit establishes a quantity of water that may be directly diverted or stored, as well as the authorized place, purpose and season of use. The priority of the water right is based on the date the application was filed. A post-1914 water rights holder proposing to transfer water must file a petition for change with the SWRCB, and receive approval prior to implementing the transfer. As with pre-1914 water rights, these changes are not allowed if they would injure "any legal user of water" (see Water Code Section 1702).

Appropriative water rights can be lost through non-use. Specific changes to the Water Code were enacted to protect water rights from forfeiture as a result of transferring water either short-term or long term. Water Code Sections 1010, 1011, 1011.5, 1244, 1440, 1731, and 1737, 1745.07 were specifically added to provide protection to water right holders who transfer water.

1E.3.1.2.1 Short Term Transfers – Water Code Section 1725 et seq.

Water Code Sections 1725-1729 provide an expedited process for post-1914 transfers of up to one year in duration. Water Code Section 1729 exempts short term transfers from the requirements of CEQA. The seller must demonstrate that the transfer water would have been consumptively used or stored in the absence of the transfer. The Board must find that the transfer would not injure any legal user of water or unreasonably impact fish, wildlife or other instream beneficial uses. The water user must file a petition for change with the SWRCB. The Board issues a notice of the petition and there is a 30 day public review period during which time potentially affected parties can file a protest of the proposed change. Following a review of the petition and the resolution of any valid protests, the Board may issue an order approving the change, provided the Board can make the required findings. No transfer water can move until an order approving the transfer is issued.

1E.3.1.2.2 Long Term Transfers – Water Code Section 1735 et seq.

There is no expedited SWRCB process for long-term transfers. Analysis of a long-term transfer proposal is required to determine if approval of the transfer will result in impacts to other legal users or the environment over the entire term of the transfer. Transfer proponents must comply with CEQA; and if federal action or facilities are involved, compliance with NEPA is also required. A more rigorous analysis than what might be required for a temporary change may be necessary to assess potential accumulation of impacts associated with the transfer over the life of the transfer.

Long-term transfers also must comply with the SWRCB's standard noticing and protest processes. If valid protests to the proposed change cannot be resolved through negotiation between the parties, then a hearing must be held prior to the approval or denial of the requested transfer. The same findings related to no substantial injury to legal users of water and no unreasonable effects on fish and wildlife or other instream beneficial uses are necessary before the SWRCB can approve a long-term transfer.

1E.3.2 Groundwater

There is no administrative process for permitting extraction of groundwater in California except in the few basins that have been adjudicated. The majority of the adjudicated groundwater basins are located in southern California. Groundwater use in California is analogous to riparian rights. Overlying users have the ability to install a well and use the naturally occurring groundwater for beneficial use on their overlying land. The overlying users share equally in the resource. Users overlying a basin may import water to a basin and retain a right to the imported water, less any losses and, other users within the basin cannot claim a right to imported water.

Groundwater pumping in excess of natural recharge is a significant problem in a number of areas in the state. If the condition persists over a long period of time, areas of overdraft can develop and may affect groundwater pumpers within the basin. Managing groundwater extraction in an overdrafted basin can present significant challenges, and solutions to the issue of overdraft are as varied as the regions within the state.

Extractions of groundwater for transfer must comply with any applicable groundwater management plans, other local plans, and any groundwater 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., is required depending on the source of any groundwater substitution transfers. Compliance is usually the responsibility of the entity proposing the groundwater substitution transfer, and would be confirmed by the project that would be asked to export the water from the Delta.

The approval process associated with a proposed groundwater transfer varies by county. Table 1E-1 provides brief descriptions of the water transfer requirements for those counties in the region north of the Delta that currently have such requirements, in geographic order from north to south.

More information on local groundwater management and evaluation of groundwater substitution transfers is provided in the Draft Technical Information for Preparing Water Transfer Proposals prepared by DWR and Reclamation and available at http://www.water.ca.gov/watertransfers/.

Precipitation and streamflow are the source of recharge for groundwater basins. A change in the amount of groundwater pumping affects both the groundwater and surface water resources. The timing and magnitude of the impacts to the surface water supply varies from place to place depending on a number of factors, including geology, hydrology, regional groundwater use, and depth and construction of the wells among others. Groundwater pumping will result in some level of streamflow depletion, the effect of which may extend well beyond the area from which transfer is made, depending on the specifics of the transfer. It is important that the impacts to streamflow from increased groundwater pumping are accounted for in the transfer to prevent injury to other legal users of water. Streamflow depletion cannot be directly measured and must be estimated using a technical analysis including groundwater modeling considering the specific conditions of the transfer and hydrogeology.

Table 1E-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
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
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

Transfers involving groundwater may involve groundwater substitution (in lieu pumping described earlier), transfer of groundwater from a banking program or direct transfer of groundwater. Each type of groundwater based transfer presents a unique set of issues and concerns.

1E.3.2.1 Groundwater Substitution

The most common type of groundwater based transfer is groundwater substitution. Groundwater substitution transfers are an option for water users that have access to both surface water and groundwater supplies. In a groundwater substitution transfer, a water user that typically uses surface water switches to groundwater pumping for all or a portion of its demand and allows the surface supply to be delivered to the buyer's service area. The groundwater is used within the existing place of use, and therefore there is no export of groundwater from the basin. Transfer of the surface water must comply with the applicable water rights requirements depending on whether it is diverted under claim of a pre or post-1914 water right.

The amount of water available for transfer is determined by metering the quantity of water pumped and applying a streamflow depletion factor based on an analysis of the specific wells and geology of the groundwater basin.

As noted above, more information on local groundwater management and evaluation of groundwater substitution transfers is provided in the Draft Technical Information for Preparing Water Transfer Proposals prepared by DWR and Reclamation and available at http://www.water.ca.gov/watertransfers/.

1E.3.2.2 Groundwater Banking Transfer

Groundwater banking involves the conjunctive use of surface and groundwater resources in which surface water supplies in excess of current demands are delivered to groundwater recharge facilities. Groundwater may be recovered directly through groundwater recovery pumping or through in lieu recovery. In lieu recovery can be accomplished where the agency operating the groundwater banking program also has access to surface water supplies which can be delivered in exchange for the previously stored groundwater. In an in lieu exchange, the ownership of the previously stored groundwater changes from the bank depositor to the groundwater banking authority. The amount of water available for recovery may be reduced by the amount of natural losses and in some cases an additional assessment is imposed on the banking operation.

From a water rights perspective, the surface water stored in a groundwater banking program is treated like water stored in a surface reservoir. It retains the water rights limitations specified under the water right, including its place of use. When water is extracted from groundwater storage, it must be used within the authorized place of use specified in the surface water permits. Just as directly diverted or stored surface water may be transferred, surface water stored in a groundwater banking facility may be transferred. Transfers to an area outside the authorized place of use of the water right must comply with the requirements discussed above, depending on whether the stored water was diverted under claim of pre or post-1914 water rights.

1E.3.2.3 Direct Export of Groundwater

As noted earlier, for the most part, appropriation of groundwater is not regulated by the State. Some groundwater basins have been adjudicated and any transfer or change in groundwater use from an adjudicated basin must be in conformance with the adjudication or be approved by the court.

Water users proposing to export groundwater from Delta-Central Sierra Basins must comply with the provisions of Water Code 1220 where the groundwater pumping was initiated after January 1, 1985 (see Water Code Section 1215). Water Code Section 1220 prohibits the export of groundwater from the Delta-watershed unless: (1) the pumping is in compliance with an adopted groundwater management plan, and (2) the plan is approved by a vote in the county or portions of counties that overlie the groundwater basin.

Concern over the potential effects of the export of direct groundwater pumping and the requirements enacted for local approval of groundwater extraction transfers have effectively limited the implementation of direct groundwater transfers, particularly from the Delta watershed.

1E.4 Conveyance through Project Facilities

1E.4.1 Water Code Section 1810 Requirements

Export of transfer water from the Delta is primarily accomplished using SWP or CVP facilities, including the North Bay Aqueduct (NBA), Banks, and Jones. The majority of the available export capacity for transfers is at Banks. DWR and Reclamation provide capacity for transfers when the export can be done without impacting Project operations, including all regulatory requirements and, in the case of SWP facilities, after making the specific written findings required under Water Code Section 1810(d).

Water Code Section 1810 et seq. provides that a public entity may not deny a bona fide transferor of water access to available conveyance capacity if the conveyance of transfer water will not adversely affect the beneficial uses or quality of water in the facility and the conveyance can be provided without injuring any other legal user of water, without unreasonably affecting fish, wildlife, or other instream beneficial uses and without unreasonably affecting the overall economy or the environment of the county from which the water is being transferred. The agency's approval must be supported by written findings.

Complying with Water Code Section 1810 requires that DWR evaluate each individual request for conveyance. That review includes an analysis of the specific transfer proposal and a real water determination. The real water determination is required to support a finding that the transfer will not injure any other legal user of water including the Projects. The methods used by DWR and Reclamation to calculate the real water made available for transfer are detailed in the "Draft Technical Information for Preparing Water Transfer Proposals" prepared by DWR and Reclamation and available at http://www.water.ca.gov/watertransfers/.

Information sufficient for DWR to make the findings required under Water Code Section 1810 must be provided with the request for conveyance. The methods detailed in the Draft Technical Document noted above are designed to limit the transfer to only the amount of real water developed by the transfer proposal. Compliance with those methods assists DWR in making the required findings. In the case of a transfer of pre-1914 water, the environmental document prepared by the lead agency can be used to support the required environmental findings if the document is sufficiently detailed to address potential areas of concern. In the case of post-1914 based transfers, the information contained in the SWRCB order approving the transfer can be used to support some of the required findings. An analysis of potential economic impacts to the area from which the water is being transferred required by Section 1810(d) is not necessarily addressed in the environmental

document and is not one of the findings required of the SWRCB. The request for conveyance should include sufficient information for DWR to determine that there will be no unreasonable impacts to the economy of the transfer area.

1E.4.2 Operational Considerations

In determining the availability of excess capacity within the SWP or CVP, Project operators analyze annual hydrology, project operations, contractor requests, and regulatory and operational restrictions among other things to determine whether transfers can be conveyed without affecting the Projects.

Project operations are governed by the requirements contained in Water Right Decision 1641 (D1641). A copy of D 1641 may be viewed at http://waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649.shtml. D1641 contains flow and water quality objectives. D1641 also contains specific provisions relating to the use of Project facilities for conveyance of transfer water including water level and water quality response plans.

Other regulatory requirements (in addition to those described above) affect Project operations and the ability of DWR and Reclamation to convey transfer water. On December 15, 2008, the U.S. Fish & Wildlife Service (FWS) issued a biological opinion (BO) on the Long-Term Operational Criteria and Plan (OCAP) for coordination of the CVP and SWP (http://www.fws.gov/sfbaydelta/cvp-swp/cvp-swp.cfm). The OCAP project description includes conveyance of water transfers of up to 360,000 A in most years (the wettest 80 percent of years) and up to 600,000 AF in Critical and some Dry years (approximately the driest 20 percent years). Under the FWS BO, transfer water may be conveyed through project facilities only in the months of July through September without further consultation with the agency.

On June 4, 2009, the National Marine Fisheries Service (NMFS) released its final BO on the long-term operations of the CVP and SWP for the protection of anadromous fisheries, green sturgeon and marine mammal species (http://swr.nmfs.noaa.gov/ocap.htm). The NMFS BO deals with transfers in the same manner as the USFWS BO on delta smelt, namely, allowing transfers during the July through September summer transfer window and requiring additional consultation should transfers be proposed for export during other times of the year.

The maximum daily pumping rate at Banks is controlled by a combination of D-1641, the adaptive management process outlined in the BOs, and permits issued by the U.S. Army Corps of Engineers (COE) that regulate the rate of diversion of water into Clifton Court Forebay (CCF) for pumping at Banks. This diversion rate is normally restricted to 6,680 cubic feet per second (cfs) as a three-day average inflow to CCF and 6,993 cfs as a one-day average inflow to CCF. Additionally, under the COE permit, the SWP can export an additional 500 cfs between July 1 and September 30, which can be used for the purpose of replacing Project export pumping foregone for the benefit of Delta fish species, making the summer limit effectively 7,180 cfs. The 500 cfs has been used to move a portion of the water provided under the Lower Yuba River Accord (Yuba Accord, discussed below) in most years.

Another operational consideration important for transfers moving through the Delta is carriage water. Carriage water is the additional flow necessary to move transfer water across the Delta for export so as not to exceed the objectives contained in D1641. DWR and Reclamation estimate carriage water based on annual hydrology, Project operations and regulatory restrictions among other operational considerations. Carriage water losses are applied to the quantity of transfer water

made available above the Delta. This reduces the quantity of water that is actually exported from the Delta. The amount of carriage water required to export transfer water can vary significantly from year to year and can exceed 20% in dryer years. In 2012, carriage water losses for cross Delta transfers were 30%.

In addition to carriage water losses, transfers through Project facilities may also be assessed aqueduct conveyances losses depending on the delivery point.

1E.5 Historic Transfer Programs

This section provides a brief overview of recent water transfer programs in California. Appendix 5C provides additional details on both federal and state water purchase programs, including the programs outlined below.

1E.5.1 DWR Water Purchase Programs

The first large scale water transfer program in California was the 1991 Emergency Drought Water Bank (1991 DWB). The 1991 DWB was established in response to projected critical water supply shortages following 4 years of drought conditions. The 1991 DWB team purchased water from willing sellers in the Delta, Sacramento Valley and Feather River basin areas. Water was made available through crop idling, groundwater substitution and reservoir storage release. The 1991 DWB team executed over 300 contracts with water agencies and individuals to purchase water for critical statewide needs. Water from the 1991 DWB was allocated to 12 municipal and agricultural water users. Drought water banks were implemented again in 1992 and 1994, acquiring water primarily from groundwater substitution.

DWR implemented Dry Year Purchase Programs in 2001 and 2002 in response to dry conditions and reduced SWP and CVP allocations. In 2001 DWR purchased water from willing sellers in Northern California from a combination of crop idling, groundwater substitution and reservoir storage release, for delivery to eight water agencies throughout the State to help offset water shortages. In 2002, DWR acquired water made available through groundwater substitution from Yuba County Water Agency (YCWA) and provided it to four SWP contractors.

DWR implemented a drought water bank in 2009 after a series of three dry years, acquiring about 76,600 acre-feet of transfer water from a combination of crop idling, groundwater substitution and reservoir storage release. An additional 200,000 acre-feet of cross-Delta transfers were executed independently by water agencies and exported through Project facilities. Since 2009, DWR has facilitated water transfer by conveying transfer water through SWP facilities; however, it has not acted as a purchaser or broker.

1E.5.2 Federal Water Acquisition Programs

The Central Valley Project Improvement Act of 1992 (CVPIA) amended previous authorizations of the CVP to include fish and wildlife protection, restoration, and enhancement as project purposes having equal priority with agriculture, municipal and industrial, and power purposes. A major feature of CVPIA is that it requires acquisition of water for protecting, restoring, and enhancing fish and wildlife populations. To meet water acquisition needs under CVPIA, the U.S. Department of the Interior (Interior) has developed a Water Acquisition Program (WAP), a joint effort by Reclamation

and the FWS. The major purposes of the WAP are acquisition of water to meet optimal refuge demands and support instream flows. Additional information on Reclamation's water transfer programs is contained in the CVP Water Transfer Program Fact Sheet which can be accessed at http://www.usbr.gov/mp/PA/water/ and the CVPIA Water Acquisition Program Background Information Sheet, November 2003 USDOI which can be accessed at http://www.usbr.gov/mp/cvpia/3406b3_wap/info/index.html.

1E.5.3 Environmental Water Account

The Environmental Water Account (EWA) was established in 2000. The purpose of the EWA program was to provide protection to at-risk native fish species of the Bay-Delta estuary by supporting environmentally beneficial changes in SWP and CVP operations. EWA funds were used to acquire alternative sources of water, called the "EWA assets," which the EWA agencies used to replace the Project water that was not exported from the Delta because of the voluntary fish actions. The EWA program ended in December 2007.

1E.5.4 Yuba River Accord Transfers

In 1989, the State Water Resources Control Board received a complaint regarding fishery protection and water right issues on the lower Yuba River. The SWRCB held hearings on the issues raised in this complaint, and in 1999, issued a draft decision. At the request of YCWA and DFG, subsequent hearings were postponed in order to provide the parties an opportunity to reach a proposed settlement regarding instream flows and further studies. The parties failed to reach agreement on a settlement and the SWRCB held additional hearings in the spring of 2000. A draft decision was issued in the fall of 2000 and was adopted as Decision 1644 on March 1, 2001.

Subsequent litigation led to withdrawal of Decision 1644 and issuance of Revised Decision 1644 (RD-1644) in July, 2003. These decisions established revised instream flow requirements for the lower Yuba River and required actions to provide suitable water temperatures and habitat for Chinook salmon and steelhead and to reduce fish losses at water diversion facilities.

After the issuance of Revised Decision 1644, the parties involved in the SWRCB proceedings expressed a desire to further negotiate the instream flow, flow fluctuation, and water temperature issues on the lower Yuba River. The parties engaged in a collaborative, interest-based negotiation with numerous stakeholders, reaching a series of agreements now known as the Lower Yuba River Accord (Accord). These negotiations resulted in the agreements outlined below and the SWRCB approval of the flow schedules and water transfer aspects of the Accord on March 18, 2008 with Water Right Order 2008-0014. Several technical revisions to the Order were adopted as part of Water Right Order 2008-0025 on May 20, 2008.

Surface water releases are made available for transfer under the Accord based on the difference between a baseline release rate (the interim flow schedules defined in RD-1644 and in Water Right Order 2008-0014) and the Fisheries Agreement flow schedules. The baseline releases (interim flow schedule in RD-1644) are based on the Yuba River Index as defined in RD-1644. The flow schedules in the Fisheries Agreement are determined based on the North Yuba River Index independent from the Yuba River Index. (There are also some conditions when the YCWD-DFG agreement or the current FERC license control the baseline flows.) As a result, there can be a wide range of possible transfer amounts under the various hydrologic conditions that can occur in the Yuba River watershed in any year.

Groundwater substitution water is made available by individual landowners within seven of the eight YCWA member units that are signatory to the Accord (Cordua Irrigation District has not signed the Accord as of this writing). YCWA reduces its surface diversions to those member units from the Yuba River and regulates storage in Bullards Bar Reservoir to accrue and release the groundwater substitution water on a schedule to allow the releases to be exported in the Delta.

Detailed information on the Accord can be obtained from YCWA's website including the Final Environmental Impact Report/Environmental Impact Statement http://www.hdrprojects.com/engineering/ProposedLowerYubaRiverAccord/ and "The Lower Yuba River Accord, From Controversy to Consensus" published by the Water Education Foundation at http://www.ycwa.com/documents/622.

1E.6 References

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