Chapter 9

Water Efficiency

9.1 INTRODUCTION

In any raw water or drinking water supply system, there are methods to improve the management and operations of existing supplies to conserve water, reduce waste and ensure more efficient operations. Water reuse, recycling, and conservation are important components of the state's overall water supply and are a growing part of the El Dorado County municipal water supply plan. This section presents an overview of the County's involvement with water efficiency programs including conservation measures, water shortage strategies, groundwater banking, water recycling, water transfers and exchanges.

9.2 WATER CONSERVATION AND OPERATIONAL STRATEGIES FOR WATER SUPPLY OPTIMIZATION

Water conservation can be broadly defined as activities that use available raw and treated water resources in increasingly efficient ways in order to serve as many beneficial uses as possible. Water conservation has been and remains an important component of water resources management in the County. Although the area of origin for a significant volume of water used in the Sacramento region, El Dorado County has a limited supply of water. As a result, conservation efforts have been a high priority since the 1976-77 drought. Many areas have been metered since the 1980s and irrigation management services that substantially reduce agricultural water use have been offered by EID since the early 1980s and by the EDCWA, on the western slope of the county, for the last 5 years. This section describes in more detail the various water conservation programs being implemented on the state and local level by water purveyors that serve the El Dorado County.

To accommodate projected growth in California, water purveyors and state agencies are becoming increasingly focused on finding solutions that use water more efficiently. For example, the California Bay-Delta Authority, a joint state and federal powers agency slated with restoring the Sacramento-San Joaquin River ecosystem and ensuring water supply reliability, estimates that better coordinated operations of the State Water Project with the federal Central Valley Project could increase the State's water supply reliability by 2.9 million acre-feet (MAF) through a combination of water conservation, water reclamation, and improvements to conveyance and storage systems[20]. This is substantial given the complexity of planning and permitting involved with building new reservoirs.

Water conservation and efficient use are common goals and objectives shared by regional water purveyors and state agencies. In urban areas, the California Department of Water Resources requires that each water provider prepare an Urban Water Management Plan (UWMP) that describes programs and policies that ensure a reliable water supply for their service area. All urban water suppliers in the State of California are required to prepare an UWMP and complete updates every five years on or before December 31 and every five years thereafter. As defined by California Water Code Section 10631, an urban water supplier is defined as a provider that is either private or publicly-owned that serves at least 3,000 customers or supplies more than 3,000 acre-feet of water annually on a wholesale or retail basis. Urban water management programs typically require the following elements: description of the water supply, water supply reliability, water demand management measures, water shortage contingency plans, water recycling, and water service reliability. The UWMP includes a variety of measures to improve operations and water use efficiency.

There are four primary urban water purveyors in El Dorado County that are required to develop an UWMP: El Dorado Irrigation District (EID), Georgetown Divide Public Utilities District (GDPUD), South Tahoe Public Utilities District (STPUD), and Tahoe City Public Utility District (TCPUD). Grizzly Flat Community Services District (GFCSD) does not meet the definition of an urban water supplier and are not required to prepare an UWMP. The four main suppliers: EID, GDPUD, STPUD and TCPUD, develop and implement a number of programs to conserve water. Each purveyor implements different water conservation programs that meet the needs of their respective service area customers. Details of measures being implemented by water suppliers in El Dorado County are described for each supplier in the following section. The range of actions that could be taken varies with each water supplier, but may include:

- Reducing leakage and losses in raw water canals and conveyance systems
- Conducting water audits and surveys to assess potential illegal diversions and use
- Tailwater controls and spill management
- Water treatment plant backwater recovery
- Leak management on both raw water and finished water distribution system

- Construction water (ensure reuse over using potable water)
- Implementing a meter or meter replacement program
- Implementing public education and water efficiency programs
- Developing tiered water use rates
- Residential plumbing retrofit program (low flow showers and toilets)
- Rebate programs for water efficient washing machines and other home appliances
- Water system audits and leak detection programs

9.2.1 EL DORADO IRRIGATION DISTRICT

A complete description of the EID water supply and distribution system is presented in Chapter 3. The District has prepared and released its 2005 UWMP update, which outlines water conservation measures and programs implemented by the District.

California Urban Water Conservation Council

The California Urban Water Conservation Council (CWUCC) is a consensus-based organization comprised of water suppliers, public advocacy organizations, and other interested groups. Members of the CWUCC commit to developing and implementing a set of 14 Best Management Practices for water conservation. These BMPs include Residential Surveys, Retrofits, Audits, Metering, Landscape, Clothes Washers, Public Information, School Education, Commercial, Industrial, and Institutional, Wholesaler Incentives, Rates, Designating a Conservation Coordinator, Waste Prohibitions, and Ultra-Low-Flush Toilets.

The California Urban Water Conservation Council was created to increase efficient water use statewide through partnerships among urban water agencies, public interest organizations, and private entities. The Council's goal is to integrate urban water conservation Best Management Practices into the planning and management of California's water resources.

A historic Memorandum of Understanding was signed by nearly 100 urban water agencies and environmental groups in December, 1991. Since then the Council has grown to 384 members. Those signing the MOU pledge to develop and implement fourteen comprehensive conservation Best Management Practices (BMPs).

El Dorado Irrigation District is a member of the CWUCC and a signatory to the MOU. As such, the District reports BMPs currently in use to the CUWCC's BMP reporting database. At this time, El Dorado Irrigation District is the only water supplier in the county that is a member of the CUWCC.

Best Management Practices (BMPs)

All existing and new water service within EID is metered and billed by volume-of-use. The district has implemented incentive programs for Commercial, Industrial, and Institutional (CII) customers that currently utilize mixed-use meters to install dedicated meters for irrigation and landscaping. The Large Landscape Irrigation System Rebate Incentive Program offers rebates up to $5,000 to qualified commercial landscape customers and up to $10,000 for schools who install new irrigation system upgrades or retrofits. EID was also awarded a Proposition 50 water use efficiency grant in 2006 for sub-metering mixed-use meters and installing evapotranspiration and smart controllers for commercial landscape customers. Hardware, meter installation labor and plan checking are provided by the District for participates of this program. EID recently received a grant award for $400,000 to install Evapotranspiration (ET) Controllers for participating customers for further conservation in outside irrigation uses. EID has identified outside water use as the highest potential for further conservation.

The District implements water use surveys and site visits to CII customers to identify opportunities for increased water use efficiency. Incentives offered by the District to CII customers include waterless urinals and pre-rinse spray valves for commercial dishwashers. Funding for these and other CII account conservation program incentives was increased 39 percent from $18,000 in 2004 to $25,000 in 2005. Other BMPs in use by the District includes rebates for high-efficiency washing machines, for which 106 rebates of $100 were issued in 2004. Now in its fourth year, the rebate program for high-efficiency washers continues to offer a $75 rebate to EID and City of Placerville customers. The District also offers a $75 rebate to consumers that install Ultra Low Flow (ULF) toilets in homes that have toilets that use 3.5 or more gallons per use. These are generally homes that were built before 1992, when the State of California adopted new plumbing standards for showerheads, toilets, and faucet aerators. Public information about water conservation and rebate programs is distributed to the District's customers in their bi-monthly bill. The content of billing inserts varies, but includes special events, newsletters, monthly water use comparisons, and public service announcements. The District also implements school programs that promote water conservation awareness for grades K through 12. In addition to conservation incentives, EID is actively partnering with water agencies in the Sacramento area via the Regional Water Authority to educate and promote water conservation. Implementation of conservation measures saved 3,500 acre-feet of water in 2005, which represents 9.3 percent of 2005 *diversions* of 37,656 ac-ft, and is estimated to save 6,600 acre-feet of water annually by 2025, which represents 7.9 percent of estimated 2025 *demand* of 83,082 ac-ft (see Table 5-7 in Chapter 5). Estimated water savings resulting from EID's Conservation Program are quantified in **Table 9-1**. Changes in customer water use practices such as installing water saving devices result in a cumulative savings year to year. Water conservation and the resulting effect on water demand are reflected in the demand scenarios represented in Figure 5-9 in Chapter 5.

In addition to it residential customer conservation efforts, EID implements its Irrigation Management Services (IMS) Program, El Dorado County growers participate in the District's. The program monitors soil conditions and provides irrigation recommendations to growers with five or more acres in production. The District currently monitors the soil moisture conditions at approximately 300 field sites that are read weekly during the irrigation season. Each grower receives an individualized computer printout the following day. The printout indicates soil moisture status, predicts the next scheduling, and recommends the amount of water to apply to each field. The program also provides weather data from the California Irrigation Management Information Service (CIMIS) station located in the District near the community of Camino. The water savings realized by growers who participate in the IMS program equal more than 2000 acre-feet every year[19]. Irrigation efficiency has risen from less than 50 percent to nearly 80 percent on farms in the program.

Table 9-1
EID Existing Conservation Program
Estimated Water Savings in Acre-Feet

Category/Year	2000	2005	2010	2015	2020	2025	2030
Residential Water Survey Program	90	100	250	300	350	350	350
Residential Incentives Program	61	200	325	500	875	875	875
Plumbing Retrofit Program	3	13	15	12	11	10	10
Leak Detection & Repair Program	75	375	750	1,125	1,500	1,875	2,250
Landscape Water Survey Program	5	145	200	300	450	450	450
Commercial, Industrial & Institutional Program	1	300	300	300	300	300	300
SUBTOTALS	**235**	**1,133**	**1,840**	**2,537**	**3,486**	**3,860**	**4,235**
IMS – Irrigation Management Service	2,000	2,400	2,400	2,400	2,400	2,400	2,400
GRAND TOTALS (rounded)	**2,200**	**3,500**	**4,200**	**4,900**	**5,900**	**6,300**	**6,600**

Recycled Water

Use of treated wastewater to meet non-potable needs is an integral component of water supply management and conservation for EID. The District has developed an award-winning recycled water infrastructure that utilizes tertiary treated wastewater from the Deer Creek and El Dorado Hills Wastewater Treatment Plants (WWTP) for public landscaping and other irrigation demands. Both WWTPs produce Title 22 full body contact recycled water, which is suitable for irrigation and other non-restricted uses, including landscaping for individual residences. The District is permitted, under its Master Reclamation Permit to operate two reclamation plants and a distribution system. The District uses recycled water for commercial and residential landscape irrigation, and construction dust-control application. The Serrano master-planned community uses recycled water for its two golf courses and residential and public landscaping. The Creekside Greens and Euer Ranch developments also use recycled water for residential, park and street median landscape irrigation. Future developments such as West Valley and Carson Creek are also planned for similar use of recycled water. The current recycled water supply is limited by wastewater inflow to the WWTPs and limited storage at the EDH WWTP. In order to meet the current recycled water demand, the District supplements its recycled water supply with potable water from Bass Lake and direct supplementation at recycled water tanks. The District delivered a total of 2,957 acre-feet of recycled water in 2005. An additional 575 acre-feet of potable water was used to supplement the recycled water system. As

WWTP inflows increase with growth and new storage is constructed, this supplementation will no longer be necessary[21].

EID continues to promote the use of recycled water by educating the public about the safety and cost-effectiveness of using recycled water. Additionally, all new developments where reclaimed water distribution is feasible are now required to provide recycled water infrastructure. The District has developed reclamation supply and demand management policies and annual water supply and demand reporting to s promote continued recycled water development. The District is also in the process of investigating and analyzing seasonal storage sites as recommended in the EID Recycled Water Master Plan[21].

Water Shortage Strategies

Historically, EID has implemented a four-stage water shortage plan by monitoring storage in Jenkinson Lake. This reservoir is the largest storage unit in the District, serving approximately half of the District's water demand. A matrix of lake storage levels was developed for various stages by month, and guides the implementation of water conservation actions. In 2006, EID adopted new Board Policies and Administrative Regulations (AR). Water supply management policy and regulations now outline five water supply conditions and the actions that may be needed to manage shortage conditions due to drought or other outages. The new EID drought plan is schedule for adoption in 2007 and will replace the action items contained in the current four-stage plan.

Capital Improvements

EID implemented several capital improvement projects within its service area in 2006 and continues to develop solutions to improve water management and supply reliability. According to their staff, EID is considering three future improvements: (1) reduce ditch losses, (2) develop a tiered "conservation" rate structure and (3) develop potential conjunctive use agreements with City of Roseville or City of Folsom to rely on groundwater during dry conditions (Powell pers. comm.). EID estimates that 1,300 AF can be saved by lining the three miles of their Main Ditch between Forebay Reservoir and the water treatment plant. Water losses are common in unlined ditches due to natural seepage, evaporation, and illegal water diversions. The savings of up to 1,300 AF per year is a high priority for the District to reduce overall system losses. The actual cost of canal lining is not discussed here but would represent a significant cost to the EID. A Capital Improvement project has been scheduled to begin in 2008 to line or pipe the Main Ditch to reduce losses and improve water quality.

In April of 2006, EID began construction on a 2.3 mile, 42-inch diameter water main to increase water transmission capacity in El Dorado Hills, along Silva Valley Parkway between Green Valley Road and Harvard Way. Construction has been completed[42].

In July of 2006, EID announced that the District was awarded an $112,845 Conservation Innovation Grant (CIG) from the U.S. Department of Agriculture's Natural Resources Conservation Service to fund the (IMS) Program. The funds will be used to test and replace the program's IMS neutron probe with permanent moisture sensors that do not have to be moved. The new sensors will be site-specific and permanent, increasing the accuracy of soil-moisture data and improving irrigation demand predictions.

On June 14, 2006 the Board authorized a service level and reliability capital improvement project in the amount of $850,000 to automate the meter reading system in several parts of the District's service area through the conversion of manual-read meters to radio-read meters[41].

9.2.2 GEORGETOWN DIVIDE PUBLIC UTILITY DISTRICT

A complete description of the GDPUD (the District) water supply and distribution system is presented in Chapter 3 of this report. The District's 2005-2010 UWMP outlines water conservation programs and efforts being implemented by the District.

Best Management Practices

Nearly all of the District's domestic water connections are metered and billed volumetrically. The unit cost to the consumer increases with the amount of water used. As a result, water consumption in the district averages 174 gallons per day (gpd) per person, which is lower than the state average of 196 gpd. Water used by irrigation and agricultural accounts is also metered. Agricultural customers use untreated water, which is metered and billed on the basis of a specific flow rate[23].

The District is also focused on reducing water leaks resulting from high system pressures and maintaining 49 pressure-reducing stations throughout its service area to reduce high static pressures in the system and at individual water connections. Pressure management is particularly useful in topographically variant areas such as El Dorado County, where high system pressures can result in water that is wasted through leaking fixtures. The District reviews bi-monthly meter readings to identify customers whose usage has increased in a manner that suggests a possible leak. The customer is notified, and the possibility of a leak is investigated. Other programs include customer education on how to detect leaks at home, and financial incentives are offered to customers to help reduce and repair leaks in the home.

The District plans to target 10 percent of the 2,700 pre-1992 homes each year with its Residential Plumbing Retrofit program. This program entails the distribution of a retrofit plumbing kit, including 2.5 gpm or less showerhead, 2.2 gpm or less faucet aerators, toilet displacement devices, and toilet tank leak detector. High-water use customers in the district will be targeted, however these kits are distributed on a first-come first-served basis.

The District has implemented a community education program promoting conscientious use of water resources. District staff members speak at local schools, service clubs, and other community events about the importance of water conservation. The District also publishes public awareness materials such as the *Homeowners Guide to Onsite Sewage Disposal Systems*, which includes conservation tips and a water conservation booklet entitled *California Water Facts*. The *El Dorado County Xeriscape Handbook* describes how the use of drought-tolerant plants can conserve water. The District has planted drought-tolerant plants at its office. This demonstration garden includes examples of appropriate water-saving landscape irrigation technology, such as drip irrigation.

At present the district has opted not to offer certain rebates or other incentives such as incentives for CII customers or High Efficiency washer and Ultra-Low-Flush Toilet rebates. The District has considered implementing these programs; however, the water savings from these sectors represent a small percentage in the overall system-wide water demand. For instance, Commercial customers account for roughly 14 percent of all water use in the District service area, with the majority in small retail business.

The District is considering establishing an ultra-low-flush toilet rebate incentive in the 2010 UWMP, however budget constraints prohibit the implementation of such a program at this time.

Similarly, rebates for high-efficiency washing machines (machines that use 40 percent or less water per load) are not offered by the District. Household water consumption (174 gallons per person, per day) is already far below the statewide average of 196 gallons per person, per day. If 6 percent of the

Districts residential customers participated in such a program, and based on an average savings of 100 gallons/week, the District determined that the potential water savings from such a program would amount to only 3.1 af/yr, about 0.2 percent of its total 2004 water sales. Due to staffing and financial constraints, the District has opted to focus on broader, system-wide water conservation measures such as ditch lining and pipeline installation.

Recycled Water

There is currently no recycled water use in the District service area. The GDPUD service area has no sewer systems; therefore the opportunity for recycled water development is limited. The District manages the onsite wastewater disposal system serving the Auburn Lake Trails Subdivision in Cool. This 1,100 lot subdivision utilizes site-specific waste disposal methods that depend on the type of soil present on each lot. A small Community Disposal System (CDS) serves 131 of these lots that otherwise do not support site-specific disposal. The CDS collects partially treated septic effluent from each individual septic tank and distributes it to a leachfield. The CDS currently receives an average wastewater flow of 29,000 gallons/day. At build out, the CDS will handle approximately 32,000 gallons/day.

The District and the Auburn Lake Trails Owners Association has evaluated the potential for utilizing reclaimed water to irrigate the nearby 9-hole golf course. The golf course currently uses 100,000 gallons of treated water per day during the summer months. The district and property owner's association determined that the wastewater system could not accommodate the demand of the golf-course and that additional treatment of the wastewater would be necessary. These factors make the use of recycled water cost-prohibitive at this time. The District will continue to explore funding for future alternatives to reclaim its wastewater.

Water Shortage Strategies

The District has in the past, and will continue to respond to water supply shortages as they develop. For droughts or other long-term shortage, the District will implement water conservation measures that result in use restrictions in proportion to the severity of the shortage. The District has developed a four-stage rationing program for shortages up to 50 percent. Stage 1 entails voluntary measures and public education. Stage 2, 3, and 4 involve agricultural rationing in addition to voluntary and mandatory conservation of domestic water in Stages 3 and 4, respectively. Domestic water has historically taken priority over agricultural water, and will continue to do so. As such, no new agricultural accounts will be taken during Stages 3 or 4. No new domestic accounts will be accepted during Stage 3 unless the parcel has been assessed for improvement through a legal process, but at Stage 4, no new accounts will be accepted.

The District continues to enforce water waste prohibitions during normal water supply situations. These ordinances prohibit gutter flooding, non-recirculating fountains, non-recirculation systems in carwash and commercial laundry establishments.

Capital Improvements

The District pursues grant or loan funding whenever possible to maximize its ability to maintain, rehabilitate or upgrade the conveyance system. The District estimates that operational losses in the ditch conveyance system account for up to 3,000 acre-feet of water per year. To address this loss, investment in leak reduction and pipe replacement are an important component of the District's maintenance program. As a result of routine funding for rehabilitation of the raw water conveyance system, over 30 percent of the untreated water conveyance system is now in pipe or concrete-lined ditch. Sections of the ditch system have been replaced with new pipeline or lined with gunite, significantly reducing loss from seepage. New development is fitted with pipe extensions to reduce raw water losses. Additional improvements are estimated to reduce losses by approximately 1000 acre-feet per year. The savings in water demand associated with these improvements is shown in **Figure 5-11**.

9.2.3 South Tahoe Public Utilities District

A complete description of the South Tahoe Public Utilities District (STPUD: the District) water system is included in Chapter 3 of this report. The STPUD has over 17,000 sewer connections and over 14,000 residential water connections.

Best Management Practices

Irrigation and landscaping remain the primary factor for STPUD water demand. However, water saving features such as low flow toilets, high energy washing machines, and other water-saving devices help in lowering overall water demand and foster a culture of conservation among its customers [24]. The District offers rebate incentives to customers who install water-conserving household fixtures and appliances in their home. This pilot program will qualify for additional funding if enough customers participate in the rebate incentive program.

Recycled Water

The District operates a recycled water export system that transports an average of 5 million gpd of reclaimed water a distance of 27 miles to the district-owned and operated Harvey Place Reservoir. The reservoir is designed to contain all District wastewater effluent as well as maximum flood flow. The effluent is stored in the reservoir for eventual agricultural land application. The system includes diversions and ditches to supply certain landowners throughout Diamond Valley, Wade Valley, and Fredericksburg with reclaimed wastewater from the treatment plant during dry summer months. The STPUD system recycles 100 percent of both water and biosolids[24].

Water Shortage Strategies

The District implements water conservation strategies designed to be implemented as water shortage conditions require. At all times, water waste is prohibited. Under normal conditions, the following strategies are implemented: (1) Hoses used for washing vehicles or watering plants are required to be equipped with a stop nozzle; (2) water shall not be permitted to flow over impervious surfaces such as sidewalks, driveways, or adjacent property; (3) Irrigation of undeveloped land is prohibited; and (4) Water users shall repair plumbing and irrigation system leaks.

The District also imposes designated irrigation days on the basis of address numbers. Water users with even-numbered addresses shall irrigate on Monday, Wednesday, and Friday; odd numbered addresses shall irrigate on Tuesday, Thursday, and Sunday. No irrigation is allowed on Saturday, and no irrigation is allowed to exceed a period of one hour per application[25]. Exceptions apply for newly planted grass or landscaping plants. Water conservation strategies developed by the District generally become more restrictive as water shortage conditions increase beyond what the District considers “normal conditions”. For example, Stage 2, or “Significant Water Shortage”, calls for the prohibition of water used to fill uncovered, outdoor swimming pools, lawn irrigation more than twice a week, or any irrigation of new construction landscaping. Stage 3 represents a “Water Emergency”. Under Stage 3 conditions, Stages 1 and 2 restrictions apply, and further prohibitions include water used for air conditioning where an alternate source of fresh air is available. The use of water other than commercial and domestic use is prohibited, unless specifically authorized by the District under its

Exemptions clause. Exemptions have been developed by the District to be granted when the restriction of water would cause undue hardship on the District, the user or the public, or when the health and safety of the user or public would be compromised.

Capital Improvements

The District operates an Underground Repair Departments for Water The purpose of this department is to provide line repair and replacement to minimize leaks.

Since 1993, District engineers have identified over 85, 000 lineal feet of undersized waterlines that should be replaced with 6-8 inch PVC pipe in order to provide adequate pressure for fire suppression. In 2006, approximately $6 million in water lines was under construction, to replace 18,000 lineal feet of waterlines. Since 1993 the District has spent over $17 million to replace some of the undersized water lines, and is seeking $1 million in federal funding for accelerated replacement of these water lines. Congressman John Doolittle demonstrated his commitment to the Tahoe Basin in including the District's request in the FY 2007 Departments of the Interior, Environment, and Related Agencies Appropriations Bill (H.R. 5386) for waterline replacement to enhance fire-fighting capability.

In addition to water line replacements projects, the District has also spent over $7M for new supply wells, $1.5 million for booster pump stations, and $5.3 million for water tanks since 1993.

9.2.4 TAHOE CITY PUBLIC UTILITIES DISTRICT

The Rubicon service area of Tahoe City Public Utilities District lies within El Dorado County. The Rubicon system of the District had 566 service connections in 2005. Details of water conservation measures, including BMPs, recycled water use, and water shortage contingencies were obtained from the 2005 TCPUD UWMP issued in March of 2006.

Best Management Practices

The District implements Demand Management Measures (DMM) that are comparable to BMPs. TCPUD does not utilize water meters, so the impact of DMMs are difficult to quantify. The District has, however, implemented a meter pilot program to provide information for eventual development of a district-wide residential metering program, The pilot program includes 100 residential and 120 commercial meters that provide a cross section of the district's customer base to aid in consumption projection as well as rate structure[40]. The District provides audits for commercial, industrial, and institutional accounts upon request.

The District provides conservation recommendations to its customers upon request. Public education and information is provided to customers through its newsletter, by mail, and through community meetings and clubs. School education programs have been discontinued due to financial constraints, but is periodically considered for renewal as funds become available[40].

The District requires the installation of 1.6 gallon flush toilets, 3.5 gallon/min Showers, and 4 gallon/min faucets in all new and remodel residential construction, pursuant to TCPUD's Water Conservation Ordinance 185, Section 6.22. The District also operates a leak detection and repair program. On average, approximately 30-60 gallon/min of leaks are detected and repaired annually[40].

Recycled Water

All wastewater is currently exported out of the Lake Tahoe Basin to the Tahoe-Truckee Sanitation Agency (TTSA) wastewater treatment plant in Truckee, California via the gravity flow North Shore Export Pipeline. The purpose of exporting all wastewater from the Lake Tahoe Basin is to prevent the discharge of nutrients to Lake Tahoe, thereby preventing the loss of lake water clarity. Given the special considerations and efforts taken to protect Lake Tahoe's clarity, it is unlikely that reclaimed wastewater will be considered for use in the Lake Tahoe Basin [40].

Water Shortage Strategies

According to the UWMP, the Rubicon system has a 1.48 MGD spring well capacity, while maximum projected demand in 2010 is 0.81 MGD. Therefore, the Rubicon system capacity should be adequate to satisfy both the projected average and maximum day demands. Based on operating history, water supply in the Rubicon is not expected to be significantly impacted during an average water year, a single dry water year, nor during multiple dry water years[40].

Capital Improvements

The TCPUD will carry on their annual program to perform leak detection in areas of concern. Most of these areas contain older thin-wall steel pipe. Prioritization and capital budgeting will continue to support the long-term replacement of this infrastructure. The long-term replacement schedule, as well as the implementation of electronic metering throughout the TCPUD service area, will enhance and contribute to conservation efforts[40].

9.2.5 Grizzly Flats Community Services District

The GFCSD has approximately 600 residential customers and therefore is not required to prepare an UWMP. Its sole source of water are two local creeks tributary to the Cosumnes River that are diverted directly into a 32 acre-foot raw water pretreatment reservoir. The reservoir provides very little seasonal storage and no carryover storage, putting the residents at risk of running out of water when stream flows are low in the late summer and fall. As a result, the District has implemented water use prohibitions and water conservation measures. These measures are included in the District's Water Ordinance 88-1 adopted in 1988 and updated in 2004.

Best Management Practices

Water conservation measures implemented by the District include encouraging customers to retrofit residences with water-saving plumbing devices, and to utilize drip irrigation systems for landscaping. Irrigation is restricted to a 2-hour period between 6 am and 12 pm. Drip irrigation systems are exempt from the 2-hour limit. Vehicle washing shall be done using a hose with a shut-off nozzle. Non- compliance with these measures is subject to a written warning. Subsequent violations are subject to increasing fines, up to and including water shut-off.

Water Shortage Strategies

The District has three stages of Water Shortage Emergency Response. Stage 1 is Water Emergency Alert, Stage 2 is Water Emergency, and Stage 3 is Critical Water Emergency. The District can issue a Water Emergency Alert (Stage 1) when the supply of water is determined to be low or a facility malfunctions requiring greater than normal conservation practices. The customers will receive a 24-hour notice by telephone or mail and the notice will disclose the reasons for the emergency, the expected duration, and the method of further notification.

In Stage 1, Water Shortage Emergency a 10 to 20 percent reduction in residential water use is required. Potable water will not be used for land application for dust abatement, road construction, or earthwork. Similarly, potable water shall not be used for washing driveways, parking lots, decking, or other paved surfaces. A water patrol will be utilized to ensure compliance with these measures.

In Stage 2, Water Emergency Alert includes all of the Stage 1 restrictions with the addition of the following restrictions: Customers are expected to reduce water use by 20 to 30 percent. Also, potable water shall not be used for: planting new gardens, lawn or landscaping; filling swimming pools, ponds, fountains. Landscape irrigation is restricted to a one-hour period between the hours of 7 pm and 8 am. Water use for new construction (i.e. concrete work) is restricted to a one-hour period within 24 hours.

In Stage 3, Critical Water Emergency includes all of the Stage 1 and Stage 2 requirements with the addition of the following restrictions: Customers are expected to reduce water consumption by 30 to 50 percent. Water Meter applications and service connections will be suspended. No outside watering will be permitted, including irrigation by drip system.

9.2.6 El Dorado County Water Agency

The Water Agency's IMS program for the West Slope of the El Dorado County has in place since 2000. Using consulting services, the program serves 141 sites in El Dorado County outside of EID. The Water Agency plans to establish 2 or 3 CIMIS weather stations in Georgetown and the South County in 2008 to provide more localized ET data. Most of the IMS customers are on un-metered wells. Therefore, there are no IMS program related water savings estimates available at this time.

Conclusion

The water purveyors in El Dorado County continue to focus on increasing water use efficiency. By utilizing water conservation strategies such as volumetric metering, inclining block tiered rate structures, water reclamation, recycling, irrigation management services and public participation and education, suppliers have stretched their water supplies to provide the greatest benefit to the most number of uses. Although the strategies described here represent successful increases in water efficiency, there is always room for improvement. For example, lining and piping ditches, installation of evapotranspiration and smart controllers for commercial and residential users and expanding the number of participates in the irrigation management programs will stretch supplies further. Overall, the purveyors in the County have been and continue to implement a broad variety of water conservation strategies that have been effective at conserving and recycling available water supplies.

9.3 GROUNDWATER BANKING

Groundwater banking is a water management tool designed to increase water supply reliability. By using dewatered aquifer space to store water during wet years (years when there is abundant rainfall and surplus water available), it can be pumped and used during dry years (years with little rainfall and no surplus water).

Groundwater banking is accomplished two ways: through in-lieu and direct recharge. In-lieu recharge is storing water by utilizing surface water “in-lieu” of pumping groundwater, thereby storing an equal amount in the groundwater basin. Direct recharge is storing water by allowing it to percolate directly to storage in the groundwater basin.

EID is currently investigating the benefits of groundwater banking to their overall water supply mix.

9.4 WATER RECYCLING

Water recycling is becoming more prominent in Northern California as existing water supplies are being strained by population growth in counties like Placer and El Dorado, two of the fastest growing regions in Northern California. The City of Lincoln located in western Placer county is implementing the first phase of a reclamation program to serve water to new residential communities and a large industrial user that historically used surface water (City of Lincoln 2005). In El Dorado County, EID is the primary leader in implementing wastewater reclamation and reuse on the western slope. In the Tahoe Basin, STPUD, NTPUD and TCPUD export wastewater out of the basin for beneficial reuse on the eastern slope of the Sierras in order to protect Lake Tahoe water quality.

Water recycling is the reuse of treated wastewater for beneficial purposes such as agricultural and landscape irrigation, industrial processes, toilet flushing, and ground water basin replenishment (referred to as ground water recharge). Water is also sometimes recycled and reused onsite. An example of this is an industrial facility recycling water used for cooling processes. The most common type of recycled water is water that has been reclaimed from municipal wastewater or sewage. The term water recycling is generally used synonymously with water reclamation and water reuse.

Recycled water is most commonly used for non-potable (not for drinking) purposes, such as agriculture, landscape, public parks, and golf course irrigation. Other non-potable applications include using recycled water as cooling water for power plants and oil refineries, industrial process water for such facilities as paper mills and carpet dyers, toilet flushing, dust control, construction activities, concrete mixing, and artificial lakes. In 2003, approximately 500,000 acre-feet of water was recycled in the state (DWR 2003). This amount of water represents about 56 percent of the total storage capacity in Folsom Lake (900,000 TAF), which is of a significant scale, and therefore an important component of the state's water supply program. Estimates have been made that California has the potential to recycle up to 1.5 million acre-feet by 2030.

Although most water recycling projects have been developed to meet non-potable water demands, a number of projects, primarily in Southern California, are using recycled water indirectly for potable purposes. These projects include recharging ground water aquifers and augmenting surface water reservoirs with recycled water. In ground water recharge projects, recycled water can be spread or injected into ground water aquifers to augment ground water supplies, and to prevent salt water intrusion in coastal areas. For example, since 1976, the Water Factory 21 Direct Injection Project, located in Orange County, California, has been injecting highly treated recycled water into the aquifer to prevent salt water intrusion while augmenting the potable ground water supply (EPA website). There are also environmental benefits from wastewater reclamation and reuse. They include decreased diversions from sensitive water bodies and decreases in discharges to surface waters, which reduce and prevent pollution in receiving waters.

Wastewater reclamation, reuse and recycling are a small but important component of the county's water supply. Wastewater beneficially reused for a variety of purposes reduces the new water demand in the County. Wastewater reuse on the western slope of the county, primarily within the EID services area, is expected to increase overtime as more treatment and distribution systems are constructed to deliver reclaimed wastewater back into the communities where it originates. By contrast, reclaimed water in the Tahoe Basin is exported out of the watershed and reused primarily on ranches and farms on the eastern slope of the Sierras. Reclaimed wastewater in the Tahoe Basin therefore, represents no net gain in the county's water supply.

Some of the environmental benefits of wastewater reclamation and reuse include decreased diversions from sensitive water bodies, decreases in discharges to surface waters, and reduction and prevention of pollution to receiving waters.

Treated wastewater, while meeting current EPA and SWQCB standards, may still contain constituents that are not removed during the treatment process, including trace amounts of medicines, pharmaceuticals and other beneficial products used in our society. Many of these compounds can cause disruption of normal endocrine function and are termed Endocrine Disruption Chemicals (EDCs). Substantial research is currently being conducted by state, federal, and university researchers on the effects of these products in the environment. Preliminary results indicated that there can be ecological impacts, including genital and gender characteristic abnormalities, gonadal tissue irregularities intersex, and skewed sex ratios from continual exposure to various chemicals. As more research is conducted on the effects of these chemicals in the environment, new EPA regulations could be forthcoming.

The EID and STPUD are the primary agencies in El Dorado County involved in wastewater reclamation and reuse. Wastewater generated in the GDPUD and Grizzly Flats service areas is disposed of through onsite septic tanks.

9.4.1 WATER RECYCLING REGULATIONS

Legal requirements applicable to recycled water are found in State statutes and regulations. The State Water Resources Control Board (SWRCB) and the Department of Health Services (DHS) are the two agencies vested by the state to regulate water recycling. Permits are issued to each water recycling project by one of the nine Regional Water Quality Control Boards (RWQCB) that are a part of the SWRCB. These permits include water quality protection as well as public health protection by incorporating criteria established by DHS. The criteria used by DHS are found in Title 22 of the California Code of Regulations. Although DHS has no enforcement authority over Title 22 criteria, the RWQCB's are empowered to enforce the regulations in their permits. In addition, Title 17 contains regulations to prevent cross connections between recycled water systems and potable water systems. Local health departments and DHS have enforcement authority over these cross connection prevention regulations (DWR 2003).

El Dorado Irrigation District

The following information on the EID Reclamation program was obtained from their 2002 Recycled Water Master Plan, 2006 Water Resources and Reliability Report, information fact sheets, and their internet website (www.eid.org).

The primary water source for EID is the South Fork American River and Folsom Lake, which are both high quality water sources. EID operates two large wastewater treatment plants that produce recycled water. The Deer Creek Wastewater Treatment Plant (DCWWTP) and El Dorado Hills Wastewater Treatment Plant (EDHWWTP) have a combined capacity of 6.6 million gallons per day. EID also operates 3 small satellite wastewater treatment plants that do not produce recycled water. Treated effluent from the DCWWTP is discharged to Deer Creek and a portion of the flow is recycled for irrigation and dust control. At least one million gallons per day must be discharged to Deer Creek year round in accordance with their permit. Treated effluent from the EDHWWTP is discharged to Carson Creek in the winter and a portion of the flow is used in the plant or stored for later summer use. In the summer, the entire flow to the plant is recycled for urban irrigation at Serrano and other residential developments, and two golf courses.

EID's reclamation program began in 1979 with reuse from the EDHWWTP at a local golf course and a few industrial customers. In 1990, EID began tertiary treatment and reclamation at the DCWWTP for golf course and median irrigation and over the next 10 years constructed transmissions and distribution systems to serve regional growth. EID began serving reclaimed water to dual plumbed homes in 2000. Today uses of reclaimed water in the EID service area include golf courses, street medians, dual plumbed homes, commercial sites, industrial use, decorative impoundments and construction activities. Currently, they are working on a seasonal storage feasibility study. In 2005, EID produced approximately 3000 acre-feet of reclaimed water serving 3,000 residents, 120 commercial customers, two golf courses, plant and construction uses. An additional 575 acre-feet of potable water was supplied to the recycled water system to meet the demand from these uses.

EID has obtained a Master Reclamation Permit (MRP) from the Central Valley RWQCB for the reclamation program. The following six items are required to obtain a Master Reclamation permit from the RWQCB:

- Waste discharge requirements,
- Compliance with statewide reclamation criteria,
- Establishment and enforcement of rules for reclaimed water usage,
- Submittal of quarterly reports,

- Performance of periodic inspections, and
- Any other requirements as requested by RWQCB.

In summary, EID produces high quality recycled water that meets state and federal requirements. Reuse of treated wastewater from EID is helping meet the total water demands in their service area and the overall Countywide water demand. EID estimates that for every home served by reclaimed water, one additional home can be served with potable water (EID 2006 Fact Sheet). As El Dorado County and the El Dorado Hills region continues to grow in the next 25 years, the EID reclamation program will grow and become a greater percentage of the water supply picture from a regional perspective. Currently, the EID reclamation program represents less than one-percent of the total current countywide water demands.

9.4.2 GRAY WATER REUSE

El Dorado County recognizes and encourages gray water reuse within state and county guidelines. The current sewage disposal ordinance and resolution allows for graywater systems in accordance with the most current California Gray Water Standards. However, the standards require the installation of a storage and disposal system that are be cost-prohibitive for most homeowners. The Water Agency Board of Directors and El Dorado County Board of Supervisors have expressed interest in making gray water reuse more feasible within El Dorado County, either by changes to local ordinance or state law.

9.5 WATER TRANSFERS AND EXCHANGES

9.5.1 TRANSFERS

Water transfers can be an effective tool for managing water supplies for both agriculture and municipal users. This section describes water transfers programs that are currently being implemented by State and federal agencies in California as well as describes existing transfers that have occurred in the past and current water transfer opportunities for El Dorado County water purveyors to ensure adequate regional water supply. This section does not comprehensively describe the extensive water modeling or calculations that often accompany a water transfer application, nor does it explain transfers of water rights. It is intended as an overview of the most common types of water transfers.

A water transfer is a change in water allocation among users. These changes range from a simple reduction in one contract to allow an increase by another, to a complex transfer between reservoirs and users hundreds of miles apart. Many rules and regulations apply to water transfers, but one general rule governs water transfers: “Water may be transferred if it is your water and no one else’s, provided that the transfer will not harm anyone else’s water rights or unreasonably affect instream beneficial uses”. The effect on instream uses and other water rights holders are an important factor in decisions about water transfers (SWRCB, 1999).

State law supports water transfers and directs state agencies to facilitate voluntary transfers in a manner that protects existing water uses. The Department of Water Resources (DWR) works with local water agencies to implement state and federal water projects, including the State Water Project (SWP) and the Central Valley Project (CVP), to ensure that local water interests have the opportunity to manage their resources in ways that meet local water objectives. Local water agencies may sell or purchase water from other local agencies through the transfer process. Transfers involve a petition for a water rights permit change between the participating agencies, often for a period of one year, but sometimes longer. The seller must first establish that it has a surplus of water once its local water needs have been met. Once the petition is approved, DWR facilitates the transaction, allowing the buying agency to purchase an approved amount of water from the selling agency. The water is then delivered via established SWP and CVP conveyance facilities.

Before the water transfer is approved, the parties must establish that the transfer will not cause serious economic or environmental impacts. Water transfers in the Delta in 2001-2002 were successful in part because of cooperative monitoring between participating agencies (CALFED, 2002). The agencies use data monitoring programs and modeling to help identify potential impacts before they become serious, allowing for better transfer planning and timing. Water transfers have been used by state and federal agencies for consumptive (human) use, and for environmental protection.

9.5.2 WATER EXCHANGES

A water exchange is a water-for-water transfer. It is different from a water transfer because water is being traded, rather than sold. One example of a water exchange is augmenting surface water with groundwater during period of low flow in streams that support anadromous fish spawning. This sort of exchange is currently being studied for implementation in Deer Creek, within Butte and Tehama

Counties. The Deer Creek Flow Enhancement Program is an agreement between the Deer Creek Irrigation District and the Department of Fish and Game.

9.5.3 CALFED ENVIRONMENTAL WATER ACCOUNT (EWA)

The EWA was established by CALFED to reduce environmental impacts, specifically to declining populations of fish in the Delta and other endangered species, caused by water transfers, diversions and other activities that affect the estuary The EWA buys water from willing sellers or diverts surplus water when safe for fish and wildlife, then banks, stores, transfers and releases it as needed to protect fish and compensate water users. For example, EWA managers might coordinate with water project operators to curtail pumping at specific times to avoid harming fish, and then provide water to cities and farms to compensate for the reduced pumping[27].

9.5.4 DEPARTMENT OF WATER RESOURCES (DWR)

The DWR facilitates transfers between mutually interested parties, allowing the buying agency to purchase an approved amount of water from the selling agency. The water is then delivered via established SWP and CVP conveyance facilities. Water transfers of interest to DWR include stored water transfers, groundwater substitution, and crop idling/shifting and dry year water purchase program..

9.5.5 STORED WATER TRANSFERS

Stored water transfers include the release of stored water that would remain in storage or stored in the absence of a transfer. For example, in 2001 Placer County Water Agency (PCWA) transferred 2,000 acre-feet (af) of stored water from French Meadows Reservoir and Hell Hole Reservoir via the American River into Folsom Reservoir for use by El Dorado Irrigation District (EID). To preserve the quantity of cold water storage in Folsom Reservoir, EID pumped water at an elevation above the typical cold water storage level (340’ above Mean Sea Level). Both parties worked with the Bureau of Reclamation and SWRB to consider potential impacts to other legal users of the water and to fish, wildlife, and other in stream uses (SWRCB, 2001).

9.5.6 GROUNDWATER SUBSTITUTION TRANSFERS

Groundwater transfers are used as a substitution for surface water. The objective is to meet surface water demand by offering groundwater as a substitution. The unused water is then transferred to other users. A program for this type of transfer entails the development of a pumping program in terms of volume and scheduling of pumping. Additionally, monitoring and mitigation plans are required to avoid possible injuries to ground or surface water users. The wells are reviewed and tested by DWR and the USBR before the transfer takes place[28].

9.5.7 Crop Idling/Shifting

Transfers involving crop shifting or idling need accurate crop records (at least five years previous to the transfer) or other documentation to establish a typical crop history including any fallowing schedule. The previous year's crop acreage of a water district is presumed to be the best indication of the next year's crop patterns provided that the acreage of the highest water-using crops is typical of past years and provided that the water supply has not been affected by droughts [29]. The applicant's crop history is the basis for the calculation of the five-year average crop/fallowing evaporation of applied water (ETAW) values for each field. The five-year average ETAW values for each field ETAW is then used to determine changes due to the proposed crop shifting and crop idling program in the year of the transfer. Some potential problems with transfers involving crop idling or shifting include adverse effects to wildlife that may use the irrigated cropland for foraging or permanent habitat.

9.5.8 Dry Year Water Purchase Program

DWR operates a Dry Year Water Purchase Program for use by local water purveyors in dry years. The program is initiated if hydrologic and meteorological factors, as well as purveyor demand predict that the year may be dry. The program has been successful in fulfilling the needs of local agencies. For instance, the program was utilized in 2001 and 2002, securing 138,800 acre-feet of water from willing sellers in Northern California, and provided it to eight water agencies throughout the State to help offset their water shortage conditions. In 2002, DWR secured 22,000 acre-feet of water from willing sellers in Northern California and provided it to four water agencies throughout the State[28].

9.6 EL DORADO COUNTY WATER TRANSFERS

9.6.1 El Dorado- SMUD UARP Agreement

In December of 2005, SMUD entered into an agreement with the EDCWA EID and GDPUD, to deliver 30,000 AF of water annually via the American River from reservoirs in the Upper American River Project (UARP), including Loon Lake, Union Valley, and Ice House Reservoirs. Under this agreement, EID receives 20,000 af/yr and GDPUD receives 10,000 af/yr from the UARP system. El Dorado pays SMUD for forgone power generation, as in the original UARP agreement. In turn, SMUD pays El Dorado for the impacts related to the UARP, including road maintenance, watershed management, and other miscellaneous activities[30].

9.6.2 POTENTIAL ISSUES WITH WATER TRANSFERS

The Department of Water Resources has the following policy issues related to water transfers:

- If water transfers are going to play a meaningful role in helping relieve some of California's water supply issues, these policy issues should be addressed. For instance, it is possible that the increasing interest in water transfer markets could generate higher base levels of water consumption. The monetary incentive for a seller to make water available could drive that seller to use as much water as possible, artificially raising the base level of consumption upon which the transfers are based[30].

- Virtually everyone has a stake in every transfer proposal in areas tributary to the Sacramento-San Joaquin Delta, including CVP and SWP contractors, local communities, and various environmental interests. It is important that mechanisms are developed to insure that all interests are protected. Additionally, the interdependency of surface and groundwater must fully be recognized when determining the effect on all water interests. For instance, suppose an owner proposes to capture surface water just before it percolates into the ground and transfer it via surface streams. Hydrogeologists disagree on exactly how long it takes for percolating water to emerge in downstream surface streams[30]. It would be difficult to quantify the effects of such a transfer if the proposed diversion were to impact downstream flows gradually over a number of years. This sort of transfer situation should be studied and monitored, a process that could take decades.

9.7 THE FUTURE OF WATER TRANSFERS

Water transfers are emerging as an important component of California's long-term water supply solution. However, long-term remedies for the state's water supply issues demand a more comprehensive approach. In the absence of new water development projects, water transfers will play an increasingly important role in meeting future water demand in California. Water transfers, water conservation efforts to reduce consumptive demand or irrecoverable losses, and water reclamation programs, all need to be pursued if California is to meet the water supply challenges of a growing population and its environmental and agricultural needs.