

URBAN WATER MANAGEMENT PLAN  
2005



PARADISE IRRIGATION DISTRICT

Submitted by:

Paradise Irrigation District  
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# Paradise Irrigation District 2005 Urban Water Management Plan Contact Sheet

Date plan submitted to the Department of Water Resources: **12/29/05**

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The Water supplier is an: **Irrigation District**

The Water supplier is a: **Retailer**

Utility services provided by the water supplier include: **Water**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

## Public Participation

### Law

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published ... After the hearing, the plan shall be adopted as prepared or as modified after the hearing.

### Public Participation

The Paradise Irrigation District (District) has actively encouraged community participation in its urban water management planning efforts since the first plan was developed in 1986. Public meetings were held for the 1986, 1989, 1996, 2000 and 2005 plans.

For this update to the Urban Water Management Plan, a public hearing was scheduled at the District Office on December 14, 2005. Due to a lack of a quorum, the hearing was rescheduled to December 19, 2005 and rescheduled again to December 20, 2005. The hearing was held on December 20, 2005 at 6:30 pm. The rescheduling of the meeting was in conformance with government code and the Brown Act. The plan was available for public inspection and posted on the District's website for comments. Legal public notices were published in the local newspapers and posted at local facilities. A copy of the Legal Notice for the Public Hearing is attached as Appendix "A".

### Plan Adoption

The Paradise Irrigation District prepared this update of its Urban Water Management Plan during 2005. The updated plan was adopted by District's Board of Directors in December 2005 and submitted to the California Department of Water Resources within 30 days of Board approval. Attached to the cover letter addressed to the Department of Water Resources and as Appendix "B" are copies of the signed Resolution of Plan Adoption. This plan includes all information necessary to meet the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

### Agency Coordination

#### Law

10620 (d) (2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

### Coordination with other Agencies

Paradise Irrigation District is in regular contact with the Town of Paradise, Del Oro Water Company (a neighboring retail water company) and the Butte County Department of Water and Resource Conservation on issues relating to water supply and growth projections. Paradise Irrigation District is nearing the completion of a Water Supply Alternatives Feasibility Study developing the issues related to various alternatives of future water supply. The District has received from Boyle Engineering Corporation the

“Evaluation of Water Supply Alternatives Final Report” (Boyle Report), which will provide the base information for the final feasibility study and is attached as Appendix “G”. The agencies referenced above were consulted numerous times during the development of the study and much of the information in this updated plan is a result of the work completed.

The District continues to promote cooperation and sharing of planning information between Butte County Water Commission, Butte County Department of Water and Resource Conservation, and DOWC to facilitate the implementation of solutions to Paradise ridge water supply reliability problems. The District and Del Oro Water Company are in negotiations for a regional intertie agreement.

Table 1 summarizes the efforts the District has taken to include various agencies and citizens in its planning process.

Entities	Coordination and Public Involvement Actions					
	Helped write the plan	Was contacted for assistance	Was sent a copy of the draft	Commented on the draft	Attended public meetings	Was sent a notice of intention to adopt
Del Oro Water Co.		✓	✓			✓
Butte County W&R Department		✓	✓			✓
Town of Paradise		✓	✓	✓		✓
General Public			✓		✓	✓
Public Library						✓
Other		✓	✓	✓	✓	✓

**Law**

10620 (f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

The Boyle Report evaluates additional water supplies including maximizing the District’s water rights by the raising of Paradise Dam and strengthening of Magalia Dam, alternative groundwater source development and imports from other sources. It appears at this time maximizing the District’s own resources and fully using the District’s water rights is the most economically feasible alternative.

The District has developed a Yield Analysis Model that will assist the District in making conservation decisions based on rainfall in a given year. This will maximize the use of our resources throughout various rainfall patterns. The Yield Analysis Model is an operational model of the District’s demands, supplies, and storage over a 98-year historical period. This model was used to develop the supply and demand data projection in this plan.

## Supplier Service Area

### Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631. (a) Describe the service area of the supplier, including current and projected population, climate, and other demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

### Climate

The elevation of Paradise ranges from 1,080 to 2,320 feet above sea level. Situated outside of the District boundaries are Paradise Lake, the District's main storage reservoir sits at 2,568 and Magalia Reservoir, the District's terminal reservoir, at 2,200 feet above sea level as a result of the 1997 Division of Safety of Dams order restricting the level due to seismic concerns. Prior to that, the Magalia reservoir operated at 2225.8 feet above sea level.

Climate varies in the Paradise area. The highest temperature on record is 111 degrees F., the lowest temperature recorded being 12 degrees F. There are 65 days average per year with temperatures 90 degrees or higher, and 30 days average with a low temperature of 32 degrees or colder. Average rainfall is 55 inches, mostly in the winter months, but ranging from November to April. An average of 6 inches of snow falls in the upper Ridge area. Paradise averages 257 days of sunshine per year.

**Table 2  
Climate**

	1.05	1.8	3.24	4.97	6.48	7.37
	10.82	8.93	7.91	3.96	1.73	0.65
	45.61	48.3	51.18	55.81	63.18	71.38

**Table 2 (continued)  
Climate**

	7.82	6.86	5.28	3.56	1.66	0.97	51.06
	0.08	0.27	0.87	3.1	7.29	9.34	54.95
	77.88	76.66	72.2	63.22	51.75	45.85	60.25

### Other Demographic Factors

#### History and Background

The Paradise Irrigation District was established in 1916 to supply water to an area of approximately 11,250 acres with a population of approximately 1,000 people. The District was formed with the express purpose of providing agricultural water to the Paradise area. The District was authorized to operate by the California Water Code, Division 11, Section 20500 to 29978 derived from the 1897 Irrigation District law. The District was organized to bond itself to the extent of \$350,000 to finance the Magalia Reservoir project.

Construction of the Magalia Dam on Little Butte Creek was begun in 1916 and completed in 1917. The Little Butte Creek watershed was chosen because of the relatively large amounts of precipitation and resulting runoff it received, even though it was seasonal. Magalia Dam was located approximately one-half mile north of the community of Magalia and approximately two miles north of the service area. During the early years, Magalia Reservoir water was used almost solely for irrigation, as domestic supplies were obtained from private wells. The primary agricultural crops within the area at that time were pears, apples, walnuts, olives and grapes. The reservoir's capacity was 1,950 acre-feet and water was delivered through an open canal that followed the eastern wall of Little Butte Creek Canyon.

On January 5, 1932, following a period of acute water shortage, the District's customers were asked to vote on whether or not they would permit the installation of water meters. Ballots were mailed out to 650 water consumers and the issue was voted down by a vote of 262 to 172. In May 1933, the District's directors called a meeting to find ways and means of financially sustaining PID. The meeting was attended by 200 customers and the following plan was adopted:

1. That each individual tract or establishment in the District be charged \$6.00 for service.
2. That water used between April and November be paid for at the rate of \$3.00 per acre-foot. This was a special charge for water users only.
3. If two or more families lived on one tract, they would be subject to a \$6.00 service charge for each family or household.

In March of 1934, PID secured a loan of \$260,500 from the Reconstruction Finance Corporation, a federal agency. The outstanding indebtedness of the District at that time was \$521,020. This included \$12,000 worth of irrigation bonds purchased from PID by the State of California in December 1927. These securities bore interest at 6% and maturity dates between 1941 and 1955.

A \$160,000 Works Progress Administration project for laying pipe in the District was approved on January 24, 1942. The Federal Reconstruction Corporation made available \$140,000 in bonds to purchase the pipe and fittings for the project.

The method for transporting water out of Magalia Reservoir was upgraded in 1954 when a steel pipeline was constructed to replace the open canal. This was necessary due to water losses, contamination and debris in the water. One attempt to increase the capacity of the reservoir was the installations of flashboards in the spillway structure. This provided an additional 600 acre-feet of storage, but was later abandoned for safety reasons. The water supply was augmented by purchasing water from PG&E's Hendricks Canal.

Remedial works were completed on Magalia Dam in 1964. The work consisted of stabilizing the existing dam by adding fill material to flatten the downstream slope of the western section below the county road. Approximately 13,000 cubic yards of earth were utilized in the reconstruction. Also 3,200 cubic yards of crushed drain and transition rock were placed on the bottom 3 to 8 feet of the embankment. The Bechtel Corporation served as engineer for the District and District personnel and equipment were used whenever possible.

The Mosquito Junction Dam (later the Paradise Dam and Reservoir) and Reservoir Project was proposed in 1956 to fulfill the growing requirements for water for both irrigation and domestic use. A special election was held in January 1956 to decide on \$1,500,000 worth of general obligation bonds to finance the project. The measure was approved by a majority of only 53% of the total votes cast. The Mosquito Junction Dam and Reservoir was located approximately two miles upstream from Magalia Reservoir and would provide an additional 6,300 acre-feet of storage area. Construction began on April 20, 1956 and in June 1956 the name was changed to Paradise Dam and Reservoir. This project increased the total usable capacity for the District to 8,350 acre-feet. Paradise Dam was raised an additional 24.5 feet in 1976 increasing the available storage to 11,497 acre-feet. This project cost four million dollars and increased the District's total capacity to 14,140 acre-feet (a 69% increase), which has since been reduced to 14,071 (1992 Topography and Hydrography Study, Harlan-Tait). In 1997, this was further reduced to 12,293 acre-feet as a result of a draw down required by the Division of Safety of Dams due to concerns of seismic stability.

A water filtration plant was added to the District's water system in 1986 due to the increased turbidity within the reservoirs during the winter months. The filtration plant had the capacity to filter six million gallons of water per day which met flow requirement during the winter but in the summer unfiltered water was added to the system to meet peak summer flow. The community would not approve a full filtration plant due to the costs involved.

An evaluation of alternatives for expanding the capacity of the existing treatment plant was presented by Brown & Caldwell, September, 1990. The need for the study was driven by changes in drinking water regulations which required the treatment of all surface water supplies.

An election was held in June 1992 and the community voted to borrow five million dollars from the Department of Water Resources and to sell Certificates of Participation in the amount of eight million to finance the enlargement project. The measure was approved by a majority of 65% of the voters.

In January, 1995 the new treatment plant was completed and placed in service. The new filtration plant has the capacity to treat 22.8 million gallons of water per day.

Population

The population served by PID resides within the Town of Paradise, which was incorporated in November, 1979. The 2005 population for the District is 27,468. The Town occupies a large southerly trending ridge with an average slope of approximately 4%. Elevations within Paradise range from 1,080 feet in the southwest corner to 2,320 feet in the northeast. Approximately 88% of the Town area lies on slopes of less than 30%.

The population of Paradise has changed dramatically from the time the District was first established in 1916. Major growth occurred in the 1970's. The three basic types of housing units are single-family units, multiple family units (which range in size from duplexes to larger apartment complexes containing several units), and mobile homes located in mobile home parks and on individual lots. The predominant type of dwelling unit in Paradise continues to be the conventional single-family residence. Construction of new multiple-family dwellings in Paradise is constrained by the lack of a sewer system. Paradise does not have a centralized sewer system and sewage must be adequately disposed of on each individual parcel. This is the controlling factor affecting growth in the Town of Paradise and the District.

Table 2 shows the population total for the District through 2030. The Boyle Report's population projections were extended to provide the projections. Adjustments were made for the difference between boundaries of the District and the Town of Paradise. Boyle worked with the Town of Paradise's Director of Planning to develop updated projections for the District's service area. Population estimates from 2000-2010 assume a 1.0% annual growth rate and 0.8% annual growth rate from 2010-2030.

	2005	2010	2015	2020	2025	2030
Service Area Population	27,468	28,869	30,042	31,263	32,534	33,857

### **Base Water Years**

The District's Yield Analysis Model was developed as a tool to provide planning information and a decision making tool to determine when it is appropriate to initiate water rationing. This Model provides the information needed to calculate the various scenarios in this plan.

The Single-Dry Water Year of record is the 1923-24 water year in which it is estimated that 1,763 acre-feet of runoff was produced.

The Multi-Dry Water Years of record is from 1930 – 1934 (four water years) in which it is estimated that an average of 5,349 acre-feet of runoff was produced.

The Average Water Year of record is the 1935-36 water year in which it is estimated that 15,960 acre-feet of runoff was produced.

## Water Sources (Supply)

### Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments [to 20 years or as far as data is available.]

### Water Supply Sources

#### Surface Water

Paradise Irrigation District's primary water supply system is reliant upon water captured and stored from Little Butte Creek. Little Butte Creek is a minor stream in the Sacramento Valley drainage that rises in the northwestern foothills of the Sierra Nevada and lies wholly within Butte County. Elevations range from 2,150 feet at the base of Magalia Dam to 3,850 feet at the uppermost elevation in the watershed. Flow in the catchment area is seasonal and responds to and follows the pattern of precipitation. Data for the runoff in the catchment area is from 1907 to 2004. The average annual runoff for the past 97 years has been approximately 15,750 acre-feet. The water year 1935-36 (estimated runoff 15,960 acre-feet) was used to represent the average year. The lowest estimated runoff was in the 1923-24 water year at 1,763 acre-feet. Average runoff far exceeds the District's average needs of 8,000 to 9,000 acre-feet of water demand each year, although the District is vulnerable to potential water shortages during extended dry periods. The District's firm yield is 7,300 acre-feet plus 350 acre-feet from a well (groundwater). Firm yield is defined as the amount of water that could be annually utilized from the Little Butte Creek system during a critical drought period. Paradise Irrigation District stores water from Little Butte Creek in two reservoirs located on the drainage. Magalia Reservoir originally had a storage capacity of 2,574 AF, but in 1997 the reservoir was drawn down to comply with safety requirements of Division of Safety of Dams (DSOD). After drawdown, Magalia Reservoir has a storage capacity of 796 AF. Paradise Reservoir has a storage capacity of 11,497 AF. The total storage capacity of both reservoirs is 12,293 AF.

#### Delivery System

Water enters the gravity distribution system (90% of District's customers) from the water treatment plant via a 42" supply pipeline. PID maintains a total of approximately 169 miles of pipeline for transportation and distribution. The District's distribution system is divided into seven pressure zones. Five storage facilities are located throughout the District. Four of these are steel storage tanks and one is a hypalon lined and covered reservoir. The reservoirs and storage tanks have a total storage capacity of 9.5 million gallons of water, which are utilized to regulate the supply and as an emergency supply. It is necessary to pump water to approximately 10% of the District's customers that live in one elevated zone.

#### Wholesale Supply

The District does not receive water from a wholesale supplier, nor does it provide wholesale water to any other agency.

**Recycled Water**

The area served by the District is entirely served by individual septic systems and the collection, treatment and disposal of wastewater is the responsibility of the Town of Paradise, not Paradise Irrigation District. For further information, please refer to the recycled water section of this plan.

**Table 4 Explanations**

Supplier surface diversions are defined as the total runoff anticipated in a normal water year as calculated by the District's Yield Analysis Model. Reservoir Storage is defined as the storage in the reservoirs anticipated on January 1<sup>st</sup> of each year as calculated using the District's Yield Analysis Model. There has been no action taken by the Board selecting any planned water supply projects, therefore no planned water supply projects are included in Table 4.

Water Supply Description	2008	2010	2015	2020	2025	2030
Supplier Surface Diversions	30	30	30	30	30	30
Reservoir Storage	15,960	15,960	15,960	15,960	15,960	15,960
Other	8,259	8,136	7,962	7,817	7,479	7,132
<b>Total</b>	<b>24,349</b>	<b>24,126</b>	<b>23,952</b>	<b>23,907</b>	<b>23,469</b>	<b>23,122</b>

**Future Supply Projects**

The Boyle Report (Appendix "G") identifies opportunities for additional water supply for the District. The final feasibility of the options has not been completed at this time. These potential projects are not included in Table 4 because there has been no formal approval from the District's Board of Directors of which project to pursue and a timeline for construction. The three most likely future supply projects have been included in Table 5 that shows the additional water supply the project would provide in a Normal-Year, Single-Dry Year, and a Multiple Dry Year.

Project Name	Normal Year	Single Dry Year	Multiple Dry Year	Normal Year	Single Dry Year	Multiple Dry Year
Restore Mag Res Storage	1,700	1,690	1,700	904	362	
Paradise Dam Max Raise	6,650	6,600	6,600	4,227	2,278	
3 ft bladder dam, Paradise	750	680	800	770	387	

**Ground Water**

The District drilled a well in 1996. The output from the well is estimated to be 350 acre-feet per year, but is operated annually at only 30 acre-feet per year to keep the well operational. The primary purpose of the well is to augment the District's water supply during times of drought or emergency. Ground water supply in the District's area is not expected to provide a significant source of water.

Ground water in Butte County is governed by the County's Groundwater Management Plan. The plan is focused on the valley area's of the County and the area underlying the District is not well detailed in the plan. The Butte County Groundwater Management Plan is attached as Appendix "F". The basin is not adjudicated and the restrictions to pumping ground water are detailed in the Groundwater Management Plan.

The Department of Water Resources has not identified or projected the basin under the District to be in overdraft.

Table 6  
Amount of Groundwater pumped - AFY

	2005	2010	2015	2020	2025
<b>Tuscan Formation</b>	<b>76.27</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>% of Total Water Supply</b>	<b>3.28%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>

Table 7  
Amount of Groundwater projected to be pumped - AFY

	2005	2010	2015	2020	2025
<b>Tuscan Formation</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>	<b>30</b>
<b>% of Total Water Supply</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.1%</b>	<b>0.1%</b>

## Reliability Planning

### Law

#### Water Code section 10631

*(c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:*

- (1) An average water year.*
- (2) A single dry water year.*
- (3) Multiple dry water years.*

*For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.*

### Reliability

In order to assess the reliability of the District's water supply, the District developed a Yield Analysis Model. The Yield Analysis Model is an operational model of the District's demands, supplies, and storage over a 97-year historical period. The Yield Analysis Model was reviewed by Boyle in the Boyle Report and further explanation of the model can be found there. Table 8 displays the base water years that were calculated from the model. It has been determined that the 2000 plan showed an inaccurate basis for the single-dry year due to a calculation error.

	Little Butte Cr
	1935-36
	1923-24
	1930-34

The model was used in calculating all water supply estimates in the report. The model will also be used as a management tool in the event of a water shortage.

The water supply reliability calculations shown in table 9 include the District's surface water sources and the District's well. The supply available is calculated using the expected reservoir storage on January 1<sup>st</sup> added to the production of the well and the runoff calculated in the Normal Water Year and the Single-Dry Water Year. For the Multiple Dry Water Years, reductions in demand were calculated based on anticipated restrictions the District would implement in this type of situation. The storage levels that would trigger reductions are shown elsewhere in this plan.

Table 9  
Supply Reliability - AF Year

Average Annual Demand	Year 1	Year 2	Year 3	Year 4
24,249	9,946	11,357	14,867	10,070
% of Normal	43.1%	49.2%	64.5%	43.7%

**Consistency of Supply**

There are no Legal, Environmental, or Water Quality factors that result in inconsistency of supply for our water in the Little Butte Creek Watershed for the period studied in this plan.

The climactic changes from our seasonal rainfall result in an inconsistent supply of water. The District plans to use the Yield Analysis Model to determine the likelihood of shortage of supplies on an annual basis and apply demand management measures to the extent possible to minimize the impacts to our customers.

The District has been and will continue to replace aging pipelines to reduce our unaccounted water. In December 2003, the District received a grant from the Department of Water Resources for the replacement of pipelines that provided an additional \$1.3 million over a three-year period to accelerate the replacements. The District has approved a rate increase from its customers to maintain the additional funding needed to replace pipe at this accelerated pace.

The District is also studying the feasibility of increasing its existing storage reservoirs to help bridge the gap between low rainfall producing years.

## Water Quality Impacts on Reliability

### Law

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

The District enjoys a pristine watershed that provides for a high quality raw water supply. There are no water quality changes anticipated in the next 20 years that would affect the reliability of the water supply.

The District is in the process of updating our 2001 Watershed Sanitary Survey and Vulnerability Analysis and has not seen any significant changes in the watershed that would affect water quality.

Butte County has established a watershed protection zone for the following purposes:

1. To Protect the County's surface and ground water resources.
2. To reduce future governmental costs by preserving public water supplies.
3. To recognize the essentially public nature of the land and water resources of a watershed, and that their continued vitality is directly related to the social and economic welfare of the County and its communities.
4. To protect the public health, safety and welfare by requiring such additional restrictions upon the use of the land as are necessary to retain the natural balance and integrity of a watershed.
5. To recognize the uniqueness of each watershed by basing the selection of the most effective measures for their protection upon an evaluation of the soils, climactic conditions, topography, vegetation, drainage pattern, and any other specific conditions unique to the watershed.
6. To allow the County or its citizenry to identify watersheds where a natural or man-made imbalance in these environmental system occurs and provide a means for repairing or restoring the natural functions of these watersheds.

## **Transfer or Exchange Opportunities**

### **Law**

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

### **Water Transfers**

The District is in negotiations with Del Oro Water Company that could result in the potential for transfer of water from Lake Oroville through Del Oro's Lime Saddle District into the District's distribution system. There are no quantities provided in this plan or amounts because the negotiations have just began and the Del Oro Water Company is just beginning their environmental review for a pipeline that would make the transfer possible.

The District does have an agreement in place with Del Oro Water Company that would provide a small amount of water available to the District in an emergency from their Paradise Pines District. The Paradise Pines District is solely served by groundwater that is somewhat limited.

## Water Use Provisions

### Law

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the following uses:

(A) Single-family residential; (B) Multifamily; (C) Commercial; (D) Industrial; (E) Institutional and governmental; (F) Landscape; (G) Sales to other agencies; (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof; and (I) Agricultural.

(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.

### Past, Current and Projected Water Use

The Boyle Report provided for projections in population growth and demand growth after consultation with Town of Paradise staff. Through investigations into more recently built subdivisions in the District, it was determined that newer homes demanded a higher gallons per capita per day (gpcd) amount. Using 2003 as a baseline, the demands before the baseline year were calculated at 231 gpcd. For gpcd demand for population in excess of the baseline, 289 gpcd was used.

Population growth estimates were assumed to grow at a 1% annual growth rate from 2000-2010 and 0.8% annual growth rate from 2010-2030.

All past and future water connections are and will be metered.

The District does not provide water to other agencies from its water supply. The District does have an agreement with Del Oro Water Company to treat and deliver raw water that is provided by Del Oro into the District's Paradise Lake. Appropriate losses are accounted for in the receipt and delivery of water.

The additional losses from unaccounted water are included in Table 10 and the total use is shown in Table 11.

PARADISE IRRIGATION DISTRICT 2005 URBAN WATER MANAGEMENT PLAN

TABLE 10 - Past, Current and Projected Water Deliveries

Water Use Section	2000		2005		2010	
	metered		metered		metered	
	# of acc.	Deliveries AFY	# of accounts	Deliveries AFY	# of accounts	Deliveries AFY
Water Supply	9,411	4,698	9,171	5,074	9,840	5,444
Water Loss			649	1,120	690	1,191
Water Loss	778	1,294	534	496	568	528
Water Loss						
Water Loss	14	44	54	156	57	165
Water Loss						
Water Loss	31	325	25	298	23	270
Water Loss	5		5	3	5	3
<b>Total</b>	<b>10,239</b>	<b>6,361</b>	<b>10,439</b>	<b>7,147</b>	<b>11,183</b>	<b>7,801</b>

TABLE 10 (continued) - Past, Current and Projected Water Deliveries

Water Use Section	2015		2020		2025		2030	
	metered		metered		metered		metered	
	# of accounts	Deliveries AFY						
Water Supply	10,404	5,756	10,991	6,081	11,602	6,419	12,231	6,767
Water Loss	725	1,251	761	1,313	798	1,377	837	1,444
Water Loss	596	554	627	582	657	610	689	640
Water Loss								
Water Loss	60	174	63	182	66	191	70	201
Water Loss								
Water Loss	20	243	18	216	16	189	14	162
Water Loss	5	3	5	3	5	3	5	3
<b>Total</b>	<b>11,810</b>	<b>7,881</b>	<b>12,455</b>	<b>8,377</b>	<b>13,144</b>	<b>8,789</b>	<b>13,546</b>	<b>9,217</b>

Table 11  
Additional Water Uses and Losses - AF Year

	2000	2005	2010	2015	2020	2025	2030
<b>Unaccounted-for system losses</b>	1286	1261	1037	887	679	713	747
<b>Total</b>	<b>1,286</b>	<b>1,261</b>	<b>1,037</b>	<b>887</b>	<b>679</b>	<b>713</b>	<b>747</b>

Table 12  
Total Water Use - AF Year

	2000	2005	2010	2015	2020	2025	2030
<b>Total</b>	<b>7,801</b>	<b>10,439</b>	<b>11,183</b>	<b>13,144</b>	<b>13,546</b>	<b>13,546</b>	<b>13,546</b>

## Supply and Demand Comparison Provisions

### Law

10635 (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.

### Supply and Demand Comparison

The following tables provide for the assessment of the reliability for customers in normal, dry and multiple dry years. Storage levels and runoff that provides for the supply totals were calculated using the District's Yield Analysis Model. Demand-Runoff-Storage Scenario Analyses are included as Appendix "C".

#### NORMAL WATER YEAR 2010-2030

Table 13  
Projected Normal Water Supply - AF Year

	2010	2015	2020	2025	2030
Supply	23,122	22,882	22,637	22,390	22,122
% of year 2010	100%	98%	98%	97%	95%

Table 14  
Projected Normal Water Demand - AF Year

	2010	2015	2020	2025	2030
Demand	23,122	23,122	23,122	23,122	23,122
% of year 2010	100%	100%	100%	100%	100%

Table 15  
Projected Supply and Demand Comparison - AF Year

	2010	2015	2020	2025	2030
Supply	23,122	22,882	22,637	22,390	22,122
Demand	23,122	23,122	23,122	23,122	23,122
Supply - Demand	0	-2,240	-4,485	-7,732	-10,999
% of year 2010	0%	-9%	-19%	-34%	-49%
Percentage of Water Available	100%	97%	98%	97%	95%

**SINGLE DRY WATER YEAR 2010-2030**

The following tables are estimates for a single dry year impact. The demands were reduced for the anticipated 30% reduction that would be required if the District were to face a single dry year similar to the driest on record.

Table 16  
Projected single dry year Water Supply - AF Year

	2010	2011	2012	2013	2014
Supply	9,304	9,131	9,017	8,690	8,310
% of projected normal	35.6%	35.1%	34.8%	33.0%	31.6%

Table 17  
Projected single dry year Water Demand - AF Year

	2010	2011	2012	2013	2014
Demand	6,565	6,740	6,883	7,221	5,979
% of projected normal	76.0%	76.0%	76.0%	76.0%	69.0%

Table 18  
Projected single dry year Supply and Demand Comparison - AF Year

	2010	2011	2012	2013	2014
Supply	9,304	9,131	9,017	8,690	8,310
Demand	6,565	6,740	6,883	7,221	5,979
Surplus	2,739	2,391	2,134	1,469	2,331
Surplus as % of Demand	41.7%	35.5%	31.0%	20.3%	39.0%

**MULTIPLE DRY WATER YEARS 2006-2010**

The following tables are estimates for a multiple dry year impact in years 2006-2010. This is a worst-case scenario with the single driest year on record followed by the four driest consecutive years on record. The demands were reduced in each year according to the reduction that would be required if the District were to face a multiple dry year scenario following the driest year on record.

Table 19  
Projected supply during multiple dry year period ending in 2010 - AF Year

	2006	2007	2008	2009	2010
Supply	9,346	6,411	11,900	8,146	13,543
% of proposed demand	55.7%	28.3%	60.0%	54.7%	58.0%

Table 20  
Projected demand multiple dry year period ending in 2010 - AFY

	2006	2007	2008	2009	2010
Demand	6,425	4,590	5,639	4,640	6,392
% of proposed demand	74.4%	51.0%	62.0%	48.5%	64.2%

Table 21  
Projected Supply and Demand Comparison during multiple dry year period ending in 2010- AF Year

	2006	2007	2008	2009	2010
Supply	9,346	6,411	11,900	8,146	13,543
Demand	6,425	4,590	5,639	4,640	6,392
Excess	2,921	1,821	6,261	3,506	7,151
% of proposed demand	31.5%	28.3%	97.5%	45.0%	58.0%
% of proposed supply	48.5%	28.7%	111.0%	70.0%	111.9%

**MULTIPLE DRY WATER YEARS 2011-2015**

The following tables are estimates for a multiple dry year impact in years 2011-2015. This is a worst-case scenario with the single driest year on record followed by the four driest consecutive years on record. The demands were reduced in each year according to the reduction that would be required if the District were to face a multiple dry year scenario following the driest year on record.

Table 22  
Projected supply during multiple dry year period ending in 2015 - AF Year

	2011	2012	2013	2014	2015
Supply	9,293	6,192	11,574	7,683	12,976
% of proposed normal	38.3%	23.9%	45.8%	32.7%	50.1%

Table 23  
Projected demand multiple dry year period ending in 2015 - AFY

	2011	2012	2013	2014	2015
Demand	6,600	4,714	5,791	4,764	5,853
% of proposed normal	76.3%	53.2%	65.6%	53.1%	58.7%

Table 24  
Projected Supply and Demand Comparison during multiple dry year period ending in 2015- AF Year

	2011	2012	2013	2014	2015
Supply	9,293	6,192	11,574	7,683	12,976
Demand	6,600	4,714	5,791	4,764	5,853
Surplus	2,693	1,478	5,783	2,919	7,123
Surplus as % of Demand	40.9%	31.4%	91.0%	61.0%	121.7%

**MULTIPLE DRY WATER YEARS 2016-2020**

The following tables are estimates for a multiple dry year impact in years 2016-2020. This is a worst-case scenario with the single driest year on record followed by the four driest consecutive years on record. The demands were reduced in each year according to the reduction that would be required if the District were to face a multiple dry year scenario following the driest year on record.

Table 25  
Projected supply during multiple dry year period ending in 2020 - AF Year

	2016	2017	2018	2019	2020
Supply	9,101	5,847	11,139	8,638	14,055
% of proposed demand	37.7%	24.4%	45.9%	33.5%	55.6%

Table 26  
Projected demand multiple dry year period ending in 2020 - AFY

	2016	2017	2018	2019	2020
Demand	6,769	4,829	4,490	4,509	6,701
% of proposed demand	78.4%	54.5%	48.8%	47.5%	67.3%

Table 27  
Projected Supply and Demand Comparison during multiple dry year period ending in 2020- AF Year

	2016	2017	2018	2019	2020
Supply	9,101	5,847	11,139	8,638	14,055
Demand	6,769	4,829	4,490	4,509	6,701
Surplus	2,332	1,018	6,649	4,129	7,354
Surplus as % of demand	34.5%	21.1%	148.3%	91.5%	109.7%

**MULTIPLE DRY WATER YEARS 2021-2025**

The following tables are estimates for a multiple dry year impact in years 2021-2025. This is a worst-case scenario with the single driest year on record followed by the four driest consecutive years on record. The demands were reduced in each year according to the reduction that would be required if the District were to face a multiple dry year scenario following the driest year on record.

Table 28  
Projected supply during multiple dry year period ending in 2025 - AF Year

	2021	2022	2023	2024	2025
Supply	8,954	5,530	10,692	8,043	13,292
% of proposed normal	57.1%	23.1%	44.5%	34.3%	57.5%

Table 29  
Projected demand multiple dry year period ending in 2025 - AFY

	2021	2022	2023	2024	2025
Demand	6,950	4,986	4,661	4,705	6,271
% of proposed normal	59.5%	36.2%	31.5%	49.5%	52.9%

Table 30  
Projected Supply and Demand Comparison during multiple dry year period ending in 2025- AF Year

	2021	2022	2023	2024	2025
Supply	8,954	5,530	10,692	8,043	13,292
Demand	6,950	4,986	4,661	4,705	6,271
Surplus	2,004	544	6,031	3,338	7,021
Deficit	0	0	0	0	0
Surplus/Demand	22.4%	9.9%	56.2%	41.5%	53.1%
Deficit/Supply	0%	0%	0%	0%	0%

## Water Demand Management Measures (DMM's)

### Law

10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:.....

The District is committed to implementing water conservation programs. The main focus of the District at this time is replacement of aging steel mainlines. The District has just implemented a new rate structure that will support funding of mainline replacements at an accelerated pace. The District is completing a three-year grant project that funded \$1.3 million additional replacement of mainlines. The new rate structure will continue the replacements at this accelerated pace. The District is experiencing an 18.5% unaccounted water loss and pipeline replacement will focus on reducing this number. Replacement of pipe provides for water savings and also reduces the cost of leak repairs District wide.

The District is not a signatory to the Memorandum of Understanding regarding Urban Water Conservation in California (MOU) and is therefore not a member of the California Urban Water Conservation Council (CUWCC).

For the purpose of responding to the Urban Water Management Planning Act, the District will address the Demand Management Measures.

## **Interior and Exterior Water Audits for Single Family and Multi-Family Customers**

**IMPLEMENTATION DESCRIPTION:** Since 2004, the District has provided water audits at the request of customers. The public has the opportunity on our website to schedule a water audit. This is available to all types of users in the District.

In each winter, The District issues letters to customers that show a high winter consumption use. The letter offers a water audit to these customers and provides information on water conservation. In 2004, 144 letters were distributed and 129 were sent out in 2005. Over the last three years, we have conducted an average of five audits per year.

Our Utility Billing Technician and a Meter Service Technician conduct the audits. The customers are provided with a bucket for measuring use, a low flow showerhead, a hose nozzle, toilet tank dye strips, a toilet tank bag, a water rate sheet and a conservation fact sheet. An interior check for leaks is conducted with a review of the customers irrigation system.

### **IMPLEMENTATION SCHEDULE and CONSERVATION SAVINGS:**

The District will continue to offer this program in the future. It is too difficult to quantify the savings, but the positive public relations the audits supply are worth the expense to the District.

**METHODS TO EVALUATE EFFECTIVENESS:** For a District of our size, the intangible benefits of a positive experience of customers makes the program effective.

**BUDGET:** The District will continue to fund the time needed for surveys and the conservation aids for customers.

## **Plumbing Retrofit**

**IMPLEMENTATION DESCRIPTION:** The District provides information on our website with conservation information and a link to the h2ouse.org website. The District has also developed a front lobby display developed by District staff showing "10 Simple Steps to Save Water". Information is provided to the customers as well as free showerheads, Tank Banks for toilets and toilet tank dye packages.

**IMPLEMENTATION SCHEDULE:** The District will continue to provide this information and update it as necessary.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will continue to offer this program in the future. It is too difficult to quantify the savings, but the positive public relations the audits supply are worth the expense to the District.

**BUDGET:** The District will continue to fund the time needed for website development and the conservation aids for customers.

## Distribution System Water Audits, Leak Detection and Repair

**IMPLEMENTATION DESCRIPTION:** The District tracks and updates on a monthly basis the unaccounted water in the District, looking back over a twelve-month period. The percentage of lost water has slowly increased over the past five years, but the quantity of lost water is slowly decreasing. Usage patterns due to the weather have showed a decrease in annual consumption resulting in a higher than anticipated percentage of lost water. Table "31" shows the historical unaccounted water and the anticipated percentage through 2010.

Year	2001	2002	2003	2004	2005
Percentage	16.6%	16.0%	16.3%	17.3%	18.0%

Year	2006	2007	2008	2009	2010
Percentage	14.4%	13.8%	13.2%	12.6%	12.0%

In 2001, at an expense of \$13,640, the District used an outside consultant to survey 36.1 miles of mainline for leaks, and repaired all leaks that were located. Again in 2002 the survey was completed for an additional 17.8 miles at an expense of \$9,172. It is the District's opinion that surveying for leaks was no more effective than the current methods of finding and repairing surface leaks.

The District has focused on pipeline replacement, as it's number one effort at demand management. Beginning in 2003, the District began replacing additional pipelines with a grant from the Department of Water Resources. The District has 70 miles of steel pipe remaining to replace. A new rate increase will fund pipeline replacements at the current level of funding the District is expending with the Grant Funds. Table 32 shows the pipeline replacement funding since 2000.

Year	2000	2001	2002	2003	2004	2005
Funding	\$0	\$0	\$0	\$0	\$0	\$0

**IMPLEMENTATION SCHEDULE:** Water system audits, leak detection and repair, and mainline replacements will continuously be implemented at the District. The replacement of aging facilities is a primary focus of the District for the foreseeable future.

**METHODS TO EVALUATE EFFECTIVENESS:** The tracking of unaccounted water will continue to evaluate the effectiveness of leak repairs and mainline replacements.

**CONSERVATION SAVINGS:** The completed grant funded projects are projected to provide a 445 acre-foot annual savings. The conservation of the additional projects the District finances has not yet been evaluated.

**BUDGET:** Proposed annual budget: \$1,200,000 (from operations and maintenance budget).

## **Metering with Commodity Rates**

**IMPLEMENTATION DESCRIPTION:** The District has historically required meters to all services and will continue this requirement into the future. The customer is billed a service charge with each billing and a consumption charge for all water passing through the meter.

Annually, the District has a meter replacement program and typically replaces 200-300 meters each year.

Appendix "D" shows the District's rate schedule effective February 1, 2006.

**IMPLEMENTATION SCHEDULE:** The District will continue to install and read meters on all new services, and will continue to conduct its meter calibration and replacement program.

**METHODS TO EVALUATE EFFECTIVENESS:** Periodic review of customer water use, comparing current water use per capita with historic data.

**CONSERVATION SAVINGS:** Residential customers using less than 85Ccf annually are eligible for a reduced service charge.

**BUDGET:** Meter installation costs are part of the cost for new service.

## Large Landscape Water Audits and Incentives

**IMPLEMENTATION DESCRIPTION:** The District has identified that only 2.6% of water consumption is by local agencies that would have large landscapes and 2.8% of water consumption is from irrigation customers. Only a handful of businesses in the District have large landscapes. Historically, the twenty largest consumption customers have consistently used in the aggregate 7% of the total District consumption.

Water Audits are available to these customers if requested. Meter readings are monitored for large usage indicating leaks. The largest irrigation customer is an apple grower and uses the latest information available for water use.

The District has just approved a new rate schedule for customers whose primary use of water is for outdoor recreation. The new rate is reduced, but has an inclining tier structure for consumption. In exchange for the reduced rate, the customer must agree to maintaining a leak free system and any voluntary reductions ordered by the District will be mandatory for these customers.

**IMPLEMENTATION SCHEDULE and METHODS TO EVALUATE EFFECTIVENESS:** The District will continue to monitor the usage patterns of large users and make contact if consumption is increasing. The evaluation of the new rate for outdoor users will be on a continuous basis.

**CONSERVATION SAVINGS:** Savings are difficult to calculate, but will be realized occasionally when a leak is detected by District staff.

**BUDGET:** The Budget impact to monitor large users is minimal.

## Landscape Water Conservation Requirements

**IMPLEMENTATION DESCRIPTION:** In 1993, the Town of Paradise established a landscape ordinance. These requirements are in the Paradise Municipal Code and address Landscape Materials for commercial and large business development projects (See Appendix "E").

**IMPLEMENTATION SCHEDULE:** The Town of Paradise has permanently incorporated this DMM into its ordinances.

**METHODS TO EVALUATE EFFECTIVENESS:** The ordinance provides for the assurance this DMM is incorporated into all projects that require this measure.

**CONSERVATION SAVINGS:** The landscape ordinance will lead to a reduction due to the installation of drought tolerant plants.

**BUDGET:** There is not a budget requirement of the District for this DMM.

## Public Information

**IMPLEMENTATION DESCRIPTION:** The District promotes water conservation several ways. The primary source of conservation information to our customers is through our website. A section is dedicated to conservation and one of our most popular sites is the drought tolerant plant section. In the past year we have experienced 4,148 hits on our various conservation pages.

The District sponsors a water awareness day each year that focuses on the importance of water in our community, including conservation.

District staff has developed a program that is on our website and a display in our front lobby titled:

**“Ten Simple Ways to Save Water”**

1. Avoid loss at the faucet by checking for leaks.
2. Meet your meter, Monitor your usage.
3. Shower yourself with savings. Go low-flow.
4. Use food coloring in the toilet to detect leaks.
5. Water early to avoid evaporation.
6. Measure usage with tuna cans.
7. Time your water usage.
8. Install a Tank Bank.
9. Raise the blades on your lawnmower.
10. Use a water nozzle with a shut off valve.

Each fall customers are reminded to adjust their irrigation times for cooler weather.

Annually, the District conducts a Ridge Water Tour to provide information to the customers on our Water Supply and District issues. Information is provided on water conservation.

**IMPLEMENTATION SCHEDULE:** The District will continue to provide public information services and materials to remind the public about water and other resource issues.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will track the activity on our website regarding the information provided.

**CONSERVATION SAVINGS:** The District has no method to quantify the savings of this DMM but believes that this program is in the public's interest.

**BUDGET:** The District will continue to fund these low budgetary impact tools for conservation.

## School Education

**IMPLEMENTATION DESCRIPTION:** Every spring the District conducts water treatment plant tours for Paradise Elementary and Ponderosa Elementary schools. Approximately 120 students attend the 1-½ hour tour. The students learn about where their water comes from and why it is treated to make it safe. A continued emphasis on water conservation will be brought to the students.

Every year the District has worked with the Paradise High School, Regional Occupation Program for three to five students. The students learn about all aspects of the District and are instructed in water conservation.

**IMPLEMENTATION SCHEDULE:** The District will continue to implement this DMM at the levels described.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will continue to survey the institutions and educators on the number of programs, materials and attendance at water conservation activities.

**CONSERVATION SAVINGS:** The District has no method to quantify the savings of this DMM but believes that this program is in the public's interest.

**BUDGET:** The District will continue to fund these low budgetary impact tools for conservation.

## Commercial and Industrial Water Conservation

**IMPLEMENTATION DESCRIPTION:** There are very few commercial and industrial customers in the District. As with all customers, the District has offered water use audits to any commercial/ industrial/institutional (CII) customer who so requested.

**IMPLEMENTATION SCHEDULE and CONSERVATION SAVINGS:** The District will continue to implement this DMM.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will continue to conduct water audits at customer requests, and will initiate water audits if consumption is increasing.

**BUDGET:** The District will continue to fund these low budgetary impact tools for conservation.

## New Commercial and Industrial Water Use Review

**IMPLEMENTATION DESCRIPTION:** Potential new CII customers will be evaluated to ensure water saving devices will be installed.

**IMPLEMENTATION SCHEDULE:** The District will continue to implement this DMM.

**METHODS TO EVALUATE EFFECTIVENESS:** District staff will review the planned water devices and ensure water saving devices are installed prior to receiving service.

**CONSERVATION SAVINGS:** The impact to the District is too small for quantifying.

**BUDGET:** The District will continue to fund these low budgetary impact tools for conservation.

## **Conservation Pricing, Water Service**

**IMPLEMENTATION DESCRIPTION:** The District has an inclining block rate structure for all customer sectors except Multi-Family Units, Residential Care Facilities, and Crop Irrigation Customers. Residential customers that demonstrate an annual use less than 85 Ccf are eligible for a reduced monthly service charge.

Appendix "E" shows the District's rate schedule effective February 1, 2006.

**METHODS TO EVALUATE EFFECTIVENESS:** Annually, all residential customer accounts are reviewed to determine their eligibility for the reduced monthly service charge.

**CONSERVATION SAVINGS:** The incentive of this DMM is to decrease the customer's water costs and water use through price incentives as described above.

**BUDGET:** The cost to monitor accounts is included in the District's operation budget.

## **Landscape Water Conservation for New and Existing Single Family Homes**

**IMPLEMENTATION DESCRIPTION:** The District provides information to new customers encouraging water conservation. The District provides valuable information on our website regarding drought tolerant plants and landscape water conservation.

**IMPLEMENTATION SCHEDULE:** The District will continue to provide information and maintain it's website with relevant information.

**METHODS TO EVALUATE EFFECTIVENESS:** For a District of our size, the intangible benefits of a positive experience of customers makes the program effective.

**CONSERVATION SAVINGS:** The District has no method to quantify the savings of this DMM but believes that this program is in the public's interest.

**BUDGET:** The District will continue to fund the time needed for surveys and the conservation aids for customers.

## Water Waste Prohibition

**IMPLEMENTATION DESCRIPTION:** The District Board has adopted the following Wise Water Use Regulations that are permanently in effect:

- A prohibition on outside water uses between the hours of 12:00 noon and 6:00 pm.
- A prohibition on the excessive use of any outside watering, which results in runoff onto walks, driveways, streets, or any other surface not reasonably expected to benefit from the authorized use of water.
- Washing a vehicle is acceptable at any time of the day with the use of a shutoff nozzle.

Occurrences of non-compliance, reported to, or observed by a District representative will be followed by a personally delivered or mailed written warning. Only one such warning will be issued. Second and subsequent violations, observed by a District representative, will result in a personally delivered or mailed written notice of a \$25.00 Quantity Surcharge to appear on the next water bill.

The District has also implemented a new schedule of fees and charges a Wasteful Use Fee that would result in consumption charges being billed at two times the highest tiered consumption charge. This would be implemented on customers refusing to stop a wasteful use of water after being notified by the District.

**IMPLEMENTATION SCHEDULE:** Wise Water Use Regulations are in effect and will be maintained. The Wasteful Use Fee is scheduled for implementation on February 1, 2006.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will maintain a record of violations.

**CONSERVATION SAVINGS:** The District has no method to quantify the savings of this DMM but believes that this program is in the public's interest.

**BUDGET:** Enforcement costs are a part of the District's overhead.

## Water Conservation Coordinator

**IMPLEMENTATION DESCRIPTION:** The District is not a large organization and the District Manager shall coordinate the water conservation activities of the District.

**IMPLEMENTATION SCHEDULE:** The District will continue to require the District Manager to coordinate these duties.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will constantly evaluate the need to provide additional resources beyond the use of the District Manager.

## Ultra-low Flush Toilet Replacement

**IMPLEMENTATION DESCRIPTION:** The District adopted a new annexation policy in 2004 that requires any annexations to the District must mitigate the demands anticipated for the development. One option provided is the replacement of toilets with Ultra Low Flush Toilets. It was calculated for our District that the anticipated water savings per household would be 32.3 gallons per day.

The District has calculated that this equates to a savings of 0.0362 acre-feet annually per household. Assuming 2.5 toilets per home, a \$100 rebate per toilet would cost \$6,909 per acre-foot saved. The District has estimated that using the recently completed grant projects; the capital cost per acre-foot of average annual water saved over the life expectancy of the pipeline is \$2,105. This does not account for the reduction in leak repair costs the District will experience in the future.

Because of the cost difference between the two water saving measures, the District will continue to focus on replacement of leaking pipelines in the near future.

**IMPLEMENTATION SCHEDULE:** The District will continue to look for a grant opportunity to fund a toilet replacement program.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will annually compare the cost of a toilet replacement program with replacement of mainline.

## High-Efficiency Washing Machine Rebate

**IMPLEMENTATION DESCRIPTION:** Using information provided by the H2ouse.org website, it was determined that the use of high efficiency clothes washers provides a savings of 5.6 gallons per person per day. With the District average of 2.23 persons per household, it was calculated that the anticipated water savings per household would be 12.5 gallons per day.

The District has calculated that this equates to a savings of 0.014 acre-feet annually per household. A \$200 rebate per washing machine would cost \$14,283 per acre-foot saved. The District has estimated that using the recently completed grant projects; the capital cost per acre-foot of average annual water saved over the life expectancy of the pipeline is \$2,105. This does not account for the reduction in leak repair costs the District will experience in the future.

Because of the cost difference between the two water saving measures, the District will continue to focus on replacement of leaking pipelines in the near future.

**IMPLEMENTATION SCHEDULE:** The District will continue to look for a grant opportunity to fund a washing machine rebate program.

**METHODS TO EVALUATE EFFECTIVENESS:** The District will annually compare the cost of a washing machine rebate program with replacement of mainline.

# Water Shortage Contingency Plan

## Stages of Action

### Law

10632. The plan shall provide an urban water shortage contingency analysis that includes each of the following elements that are within the authority of the urban water supplier:

(a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

## Water Shortage Stages and Triggering Mechanisms

As the water purveyor, the District must provide the minimum health and safety water needs of the community at all times. The water shortage response is designed to provide a minimum of 50% of normal supply during a severe or extended water shortage. The rationing program triggering levels shown below were established to ensure this goal is met.

Although an actual shortage may occur at any time during the year, the District will use the Yield Analysis Model during the critical months of January through March to determine potential restrictions.

Table 33  
Water Supply Shortage Stages and Conditions

RATIONING STAGES		
I	Total Reservoir Storage < 10,400 acre-feet	15%
II	Total Reservoir Storage < 9,800 acre-feet	20%
III	Total Reservoir Storage < 8,600 acre-feet	30%
IV	Total Reservoir Storage < 6,100 acre-feet	50%

### Impacts to Customers

In Stage I shortages, customers may adjust either interior or outdoor water use (or both), in order to meet the voluntary water reduction goal.

Under Stage II and Stage III mandatory rationing programs, the District has determined that a reduction of 20% (Stage II) and 30% (Stage III) will be required. That amount of water is sufficient for essential interior water with no habit or plumbing fixture changes.

Under Stage IV mandatory rationing, which is likely to be declared only as the result of a prolonged water shortage or as a result of a disaster, the health and safety allotment is reduced to 50% of average use. This allotment still provides enough water for essential interior water use plus a minimal amount of outside use.

**Restriction on the use of water by Stages**

**Stage I - 15% Reduction**

- 1) There shall be no hose washing of sidewalks, walkways, buildings, walls, patios, driveways, parking areas or other paved surfaces and walls, except to eliminate conditions dangerous to public health or safety or when required as surface preparation for the application of architectural coating or painting.
- 2) Washing of motor vehicles, trailers, boats and other types of equipment shall be done only with a hand-held bucket or a hose equipped with a positive shutoff nozzle for quick rinses, except that washing may be done by a commercial car wash using recycled water.
- 3) All water users shall promptly repair all leaks from indoor and outdoor plumbing fixtures.
- 4) Prohibition on outside water uses between the hours of 12:00 noon and 6:00 p.m. everyday.

**Stage II - 20% Reduction**

- 1) Restrictions listed in Stage I shall be in effect, except that the restrictions on watering lawn, landscape or other turf area shall be modified to allow watering every third day except between the hours of 12:00 noon to 6:00 p.m.

**Stage III - 30% Reduction**

- 1) Restriction listed in Stage II shall be in effect, except that there shall be no residential outside watering of lawn, landscaping and other turf areas at any time.
- 2) The use of water from fire hydrants shall be limited to fire fighting and related activities and other uses of water for municipal purposes shall be limited to activities necessary to maintain the public health, safety and welfare.

**Stage IV - 50% Reduction**

- 1) Restrictions listed in Stages I, II, and III shall be in effect.
- 2) Commercial nurseries, golf courses, parks and other public open space and landscaped areas shall be prohibited from watering lawn, landscaping and other turf areas more often than every third day and between the hours of 6:00 a.m. and 6:00 p.m.

A water user may file an appeal for relief from any provisions of the various stages. The District Manager shall develop such procedures, as he or she considers necessary to resolve such appeals and shall, upon the filing by a water user of an appeal, take such steps, as he or she deems reasonable to resolve the appeal.

**Water Allotment Methods**

Customer allotments are based on a three-year period. This gives the District a more accurate view of the usual water needs of each customer and provides additional flexibility in determining allotments and reviewing appeals. However, no allotment may be greater than the amount used in the most recent year of the five-year base period.

It is the intent of the District to spread the reductions equally among all customers. Customers may be notified of their classification and allotment by mail before the effective date of the Water Shortage Emergency. New customers will be notified at the time the application for service is made. In a disaster, prior notice of allotment may not be possible; therefore notice will be provided by other means. Any customer may appeal the District's Manager's classification on the basis of use or the allotment on the basis of incorrect calculation.

### Three-Year Minimum Supply

**Law**

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

(b) An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

**Three-Year Minimum Supply**

The three-year minimum supply table shown below estimates the supply based on the historical three year driest on record. The three driest years on record correspond to the first three years of the multiple dry years estimates shown in the tables at the beginning of the plan (1930-1933). The demands were adjusted to estimate the stages of reduction the District would implement. The year 2005 has not been completed, but since the storage and rainfall experienced to date is above normal, a normal year supply was estimated for 2005.

Little Butte Creek – Surface Storage	24,249	11,357	14,867	10,070
<b>Total</b>	<b>24,249</b>	<b>11,357</b>	<b>14,867</b>	<b>10,070</b>

## Catastrophic Supply Interruption Plan

### Law

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

### **DETERMINE WHAT CONSTITUTES A PROCLAMATION OF A WATER SHORTAGE**

Interruptions in the District's water supply could be caused by events such as drought, fire, earthquake, flood, reservoir contamination and major power outages.

A proclamation of water shortage can be declared by following the steps outlined in this Water Shortage Contingency Plan. The various stages of this plan are dependent on the severity and nature of the catastrophe and its effect on the total water supply of the District. The following is an example of events and remedies that might likely affect the District's water supply and therefore require implementation of water rationing.

- **FIRE-** In the event of a major fire, the District's water treatment and distribution storage tanks will be operated at maximum capacity.
- **EARTHQUAKE-** In the event of a major earthquake where significant portions of the distribution system or treatment facilities are damaged District crews or contractors will work on isolating and re-routing water supplies. In the event that the District's raw water reservoirs are damaged beyond use, the District would activate the intertie agreement with Del Oro Water Company. An intertie with the DOWC has a maximum capacity of 1,000 gallons per minute (GPM) or 4.4 AF/day.
- **FLOOD-** Due to the terrain of the District, the possibility of flooding is quite remote.
- **RESERVOIR CONTAMINATION-** If contamination of the District's raw water supply occurs the District would implement rationing, activate the intertie agreement and begin pumping from the "D" Tank well site.
- **MAJOR POWER OUTAGES-** The District is able to operate, at full capacity, the raw water pump station and water treatment plant during power outages using a 500 KVA, diesel generator. External plumbing provisions have also been provided at the District's booster pump station to allow for portable pump hook-up.

### **STRETCH EXISTING WATER STORAGE**

Rationing provisions in the District's Water Shortage Contingency Analysis establishes a maximum level Stage IV rationing plan that ultimately conserves 50% of firm yield.

**OBTAIN ADDITIONAL WATER SUPPLIES**

The District has developed a groundwater source at one of its storage sites ("D" tank). Water can be pumped directly into the distribution system. The projected yield for this source is 350 AF per year based on a 50% utilization of the well. The well is capable of producing 450 gpm or approximately 2 AF per day. Currently the District has plans to develop up to two more wells within the distribution system.

During severe drought conditions water has been diverted from an adjacent watershed. Up to 1000 AF have been obtained under these conditions.

**CONTACT AND COORDINATE WITH OTHER AGENCIES**

The District has developed a PID Water System Emergency Response Plan. This plan sets forth the necessary manpower, equipment and other resources to deal effectively with various disasters.

The District also has an intertie agreement with Del Oro Water Company to provide mutual assistance during water shortage emergencies (1,000 acre-feet). The District has developed other emergency plans with the Department of Health Services, California Office of Emergency Services and Butte County Office of Emergency Services.

The Town of Paradise Disaster Plan and the PID Water System Emergency Response Plan include the following elements:

- Catastrophe and disaster preparedness plan
- Employee/contractor/Agencies on-call list
- Methods to communicate with the public
- Methods to prepare for water quality interruptions

## Prohibitions, Penalties and Consumption Reduction Methods

### Law

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

10632 (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

10632 (f) Penalties or charges for excessive use, where applicable.

### Mandatory Prohibitions

The following table illustrates mandatory prohibitions that are shown in detail above under the Stages of Action section.

	Stage I
<b>Car washing except with bucket or hose w/positive shutoff</b>	Stage I
<b>Outside water use between noon and 6pm</b>	Stage I
<b>Watering only on every third day</b>	Stage II
<b>Residential irrigation prohibited</b>	Stage III
<b>Hydrant water for public health and safety only</b>	Stage III
<b>Water use only 6 pm - 6am for parks, golf courses etc</b>	Stage IV

**Consumptions Reduction Methods**

The following table illustrates the Consumption Reduction Methods at various stages.

**Table 36  
Consumption Reduction Methods**

Consumption Reduction Method	Restriction Stage	Penalty (\$)
<b>Use Prohibitions</b>	All	0-50
<b>Education Program</b>	All	0-50
<b>Voluntary Rationing</b>	I	15
<b>Mandatory Rationing</b>	II-IV	20-50
<b>Restrict for only priority uses</b>	IV	50
<b>Reduce pressure in water lines</b>	IV	50
<b>Flow Restriction</b>	IV	50

**Penalties**

In the past when the District placed restrictions on water use because of low supply, penalties were established in the resolution declaring the restrictions. It is expected penalties will be established at each stage of action. A warning is provided to the customer for a first offense. A second violation results in a \$25 penalty and a third violation would result in a \$100 penalty.

The District recently adopted a new schedule of fees and charges that provide for charging a customer a fee of two times the District's highest consumption charge if they are intentionally wasting water.

The District's rates are set on a tiered basis for all business customers and all residential customers that use greater than 85 Ccf in their previous year. The rate schedule to take effect on February 1, 2006 is attached at Appendix "D".

## Analysis of Revenue Impacts of Reduced Sales During Shortages

### Law

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.

The District charges a service charge and a consumption charge to customers. In 2004, the revenue from the consumption charges was 25.2% of total revenue or \$1,647,000. The following table illustrates the impact on revenue for each of the stages using 2004 revenues.

Stage	Consumption Charge Reduction	Service Charge Reduction	Total Revenue Impact
Stage I	15 %	3.8%	\$247,000
Stage II	20%	5.0%	\$330,000
Stage III	30%	7.6%	\$494,000
Stage IV	50%	12.6%	\$824,000

The District's long term financial plan has provided for the establishment of a contingency fund for water shortages to be established in 2007 at \$100,000 and increasing \$100,000 each year until a total fund amount of \$500,000 is reached.

After a water shortage has developed, the District will use a combination of rate adjustments, operational resource evaluations, and postponement of capital projects to address the revenue impacts of the reductions in consumption that the contingency fund cannot meet.

## **Water Shortage Contingency Ordinance/Resolution**

### **Law**

10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:

10632 (h) A draft water shortage contingency resolution or ordinance.

10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

### **Mechanism to Determine Reductions in Water Use**

Under normal water supply conditions, potable water production figures are recorded daily. Totals are reported monthly to the District Manager and incorporated into the water supply report to the Board of Directors.

During a Stage I or Stage II water shortage, daily production figures are reported to the Office Supervisor. The Office Supervisor compares the weekly production to the target weekly production to verify that the reduction goal is being met. Weekly reports are forwarded to the District Manager. Monthly reports are sent to the Board of Directors. If reduction goals are not met, the Manager will notify the Directors so that corrective action can be taken.

During a Stage III or Stage IV water shortage, the procedure listed above will be followed, with the addition of a daily production report to the Manager.

During emergency shortages, production figures are reported to the Supervisor hourly, and to the Manager. Reports will also be provided to the Board of Directors as well as to the Office of Emergency Services.

### **Draft Water Shortage Contingency Resolution**

The Draft Water Shortage Contingency Resolution can be found on the next page.

**DRAFT**  
**PARADISE IRRIGATION DISTRICT**  
**RESOLUTION NO. XX-XX**  
**DECLARING WATER SHORTAGE EMERGENCY CONDITION**

WHEREAS, Paradise Irrigation District ("District") reservoirs contain approximately \_\_\_\_\_ acre-feet of water, being approximately \_\_\_\_\_ percent of their capacity; and,

WHEREAS, the District's projected water supply for \_\_\_\_\_, including a prudent carry-over supply for \_\_\_\_\_, is inadequate to provide for the ordinary demands and requirements of water consumers; and,

WHEREAS, section 22257 of the Water Code of the State of California provides that the District may establish equitable rules for the distribution and use of water, and sections 353 to 358, inclusive, of the Water Code provide that upon declaring the existence of a Water Shortage Emergency Condition, the District may adopt regulations and restrictions on the delivery and consumption of water for the purpose of conserving the water supply for the greatest public benefit; and,

WHEREAS, the Board of Directors of the District has conducted a duly noticed hearing at which the consumers of the District's water supply have had the opportunity to be heard and present their respective needs to the Board;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Paradise Irrigation District as follows:

1. The said Board finds and determines that the ordinary demands and requirements of the District's water consumers cannot be satisfied without depleting the District's water supply, including a prudent carry-over for \_\_\_\_\_, to the extent that there would be insufficient water for human consumption, sanitation and fire protection; and,

2. The said Board declares that a Water Shortage Emergency Condition exists within the District, and that it is necessary to conserve the District's water supply for the greatest public benefit.

**PASSED AND ADOPTED** at a regular meeting of the Board of Directors of Paradise Irrigation District held on \_\_\_\_\_.

## **Water Recycling**

### **Wastewater System Description**

#### **Law**

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area...

### **Responsibility of Wastewater**

The area served by the District is entirely served by individual septic systems and no centralized sewer system exists. The Town of Paradise is responsible for the collection, treatment, and disposal of wastewater.

### **Participation in a Regional Recycled Water Planning**

The District will work with the Town of Paradise by providing water use information necessary for the development of clustered septic systems that may be developed to provide recycled water.

### **Wastewater Collection and Treatment in the Town of Paradise**

There are no centralized sewer systems in the area served by the District, or in the Town of Paradise. A few clustered septic systems do exist, but in discussions with Town staff, it was determined it was not economically feasible for them to include recycled water.

The Town of Paradise has engaged the services of Northstar Engineering and Questa Engineering to provide a feasibility study of the disposal of wastewater in the business corridors in town. A portion of the study will include the investigation of developing recycled water for use at cemeteries and parks in the town.

## Wastewater Generation, Collection & Treatment

### Law

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

### Individual Septic Systems

The only treatment used in the District's service area is individual or clustered septic systems. The following table estimates the interior demands in the District by analyzing winter consumption patterns. This estimates the disposal of wastewater in the District.

Table 38  
Disposal of wastewater (non-recycled) AF Year

	2005	2010	2015	2020	2025	2030
On-site septic systems	2,707	3,050	3,203	3,361	3,527	3,698

## **Wastewater Disposal and Recycled Water Uses**

### **Law**

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

10633 (c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

10633 (d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

10633 (e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

### **Recycled Water Currently Being Used**

Since there is no centralized sewer system, there is no current use of recycled water in the distribution area of the District.

At the District's treatment plant, all water used for flushing clarifiers and backwashing filters is returned to the raw water reservoir. Treatment levels meet those required by the District's National Pollution Discharge Elimination System permit.

### **Potential Uses of Recycled Water**

The topography of the District's service area prohibits an economical large-scale recycle project. There is a large difference in elevation from the top of the District to its lower levels. Pumping costs alone at today's energy prices make any projects not economically viable.

The District will continue to work with Town of Paradise staff in their development of smaller scale recycle projects. Information is not available on the projected use in the next 20 years.

## **Encouraging Recycled Water Use**

### **Law**

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:

10633 (f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

10633 (g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

### **Encouraging Recycled Water**

The District will continue to work with the Town of Paradise in finding potential recycled water projects. If the projects can be supported to provide water to outdoor recreational facilities, the District may be able to offer financial incentives because of the benefit to the overall water supply. Any incentives would be on a case-by-case basis and any benefit to the District will be considered. There is not enough information available to project any results from this action.

### **Optimizing Plan**

This District is committed to assisting the Town of Paradise in establishing a plan for recycled water use. The District could provide construction services necessary for the installation of a dual distribution service in the community.