Acknowledgements

This project was funded through a grant provided by the U.S. Bureau of Reclamation's Water Conservation Field Services Program. Dan Crabtree and Sandra Caskey acted as the project officers for the U.S. Bureau of Reclamation. Rebecca Nichols of RHN Water Resources Consultants LLC acted as the project manager and the primary author of this document.

Many people contributed to this project. A Steering Committee was formed from shareholders in the Redlands Mesa Water Users. The Steering Committee consisted of Lou Bridges, Reg Cridler, and Dave Whittlesey. The ditch rider for the Redlands Mesa Water Users, Steve Widener, also contributed his time and valuable knowledge. Phillip Ceriani from the Overland Ditch and Reservoir Company also sat on the Steering Committee.

John Milligan and Phil Ceriani conducted the GIS work for the Redlands Mesa distribution system.

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1

Water Management Plans

Background

The Redlands Mesa Water Users Association (RMWUA) is a small irrigation company that provides irrigation water to farms and ranches on Redlands Mesa northwest of and adjacent to the Leroux Creek drainage near Hotchkiss Colorado. Over the years the conveyance system has been repaired on an as needed basis, however, the RMWUA now wishes to conduct an overall plan for repairs and upgrades of the entire conveyance system. In an effort to obtain funding for the repairs and upgrades of the infrastructure of the conveyance system, the RMWUA Board of Directors decided to develop a Water Management Plan to facilitate requests for future funding. The RMWUA has obtained financial assistance from the U.S. Bureau of Reclamation's Water Conservation Field Services Program to develop this Water Management Plan.

Water Management Plans

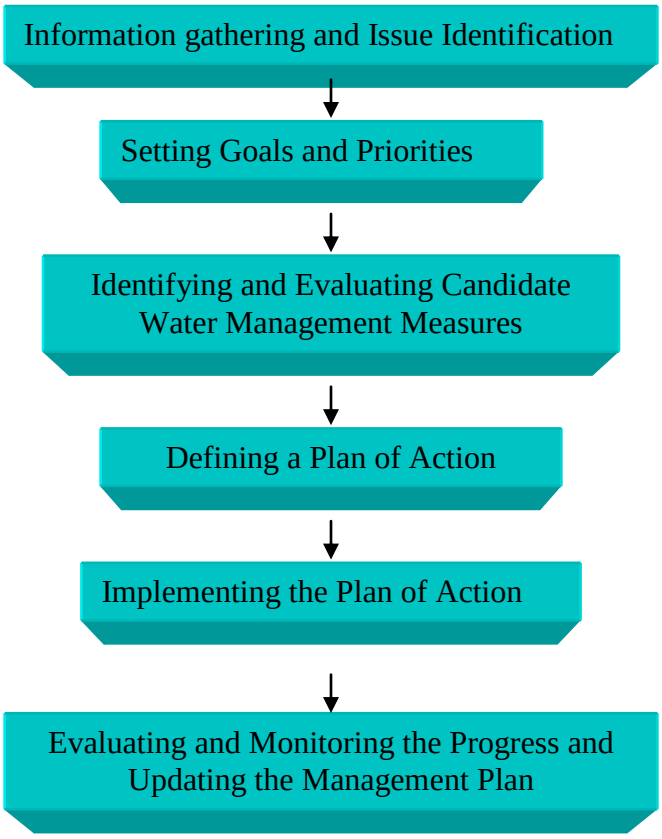
The purpose of the Water Management and Conservation Plan is to facilitate irrigation water providers in the improvement of their overall water management by addressing issues and problem areas and providing a defined method of solving problems and dealing with issues. The goal of the Water Management and Conservation Plan is to achieve long-term and lasting improvements in water use efficiency. A planning process is outlined in the publication *Achieving Efficient Water Management: A Guidebook for Preparing Agricultural Water Conservation Plans* (Hydrospere, 2nd Ed. September 2000). Figure 1-1 illustrates the steps involved in the development of a Water Management Plan. Additional benefits of the Water Management and Conservation Plan is the collection of important documents such as articles of incorporation and bylaws for the company, water court decrees, contracts, maps, and most importantly a description of the general operating procedures. Other important information that is included in the plan is historical water diversions and general water administration.

The Development Process of a Plan

A Steering Committee was formed to provide guidance and to set goals and priorities for the Water Management Plan. The Steering Committee members includes : Reg Cridler, Pete Klaseen, Lou Bridges, Dave Whittlesey, Lance Hanson, Steve Widner, and Phil Ceriani from the Overland Ditch and Reservoir Company.

Figure 1-1

The Development of a Water Management Plan



Step 1. Information Gathering and Issue Identification

Background information was gathered and documented in this plan to assist with identifying and analyzing water management concerns and opportunities. Information collected included company articles of incorporation and bylaws, water rights, contracts, general operating procedures of the facilities. Also included was the historical development of the Redlands Mesa Water Users and the relationship with the Leroux Creek Water Users and the Leroux Creek Exchange. Also collected and analyzed were the diversion records for 10 years, cropping patterns and irrigated acreage, conveyance losses and the water delivery efficiencies. This information is summarized in later chapters. Interviewing ditch riders, water commissioners, and major shareholders in the company helped identify water management problems or opportunities.

Step 2. Setting Goals and Identifying and Evaluating Candidate Water Management Measures

Water Management goals and measures were set based on the criteria of:

- Anticipated benefits to the water users
- Expected costs
- Feasibility, both financial and physical

Step 3. Defining a Plan of Action

Water Management plans of action were determined by evaluating proposed alternatives. The Plan of Action that best met the criteria was selected for implementation.

Step 4. Implementation of the Plan of Action

Each Plan of Action was prioritized for implementation based on its relative importance as determined by the Steering Committee. A planning-level budget and schedule was developed as well as prospective funding sources for each action.

Step 5. Evaluating and Monitoring the Progress and Updating the Management Plan

The Water Management Plan will be updated every five years.

Chapter
2

The Redlands Mesa Water Users

Climate and Topography

The RMWUA provides primary and supplemental irrigation water to irrigate approximately 4000 acres in Delta County, Colorado. The altitude of the area irrigated averages 6000 feet above sea level.

The climate of the acreage irrigated on Redlands Mesa is that of moderate winters and summers. The annual average precipitation ranges from 12-15 inches with half of the precipitation occurring as rainstorms from in the spring and fall months (Paonia Station).

Soils on Redlands Mesa consist of sandy loam of 0-60 inches with subsoil of clay loam and light clay, stony loam from 0-2 inches with subsoil of light and heavy clay from 2–24 inches underlain with cobbly or stony loam, and sandy loam that are well drained with a depth of up to 60 inches.

History of the Redlands Mesa Water Users

The Redlands Mesa Water Users (RMWUAA) were organized in 1951but did not file for incorporation with the State of Colorado until 1969. Bylaws for the RMWUAA were revised in 1962 and again in 1974. The object for the organization was and is for "the purpose of acquiring water rights, ditch rights, reservoir rights and to distribute water to its stockholders; to acquire water rights for exchange purposes and to negotiate and enter into agreements for exchange of water rights…by proper agreements with the North Fork Water Conservancy District…for the purpose of providing additional irrigation water and domestic water for the use of the stockholders…and to accept water owned by the Overland Ditch and Reservoir Company". The original components of the RMWUA ditch system were the Stull Irrigation Ditch Enlargement and Extension, the Lawhead Irrigation Ditch, the Clark Draw Irrigation Ditch, and the Cedar Gulch Irrigation Ditch, all of which irrigate Redlands Mesa. The company currently has 69 shareholders with 5685 outstanding shares. Appendix A contains a copy of the Articles of Incorporation and the Company Bylaws.

The Redlands Mesa Water Users Organization Structure

The Board of Directors of the Redlands Mesa Water Users is elected annually by the shareholders and is made up of 5 members that serve for two years. The President and Vice-President are elected by the Board of Directors as well as the Secretary-Treasurer, however, the Secretary-Treasurer may not be a member of the RMWUA. The duty of the Board of Directors is to carry out the normal business function of the corporation including but not limited to hiring employees, issuing stock certificates and levying and collecting ditch assessments. Three Board of Directors constitute a quorum in order to conduct business at any meeting.

Annual Budget

The RMWUA receives monies through annual assessments and shareholders are invoiced as the Board deems necessary. For the 2007 irrigation year, assessments were billed at $6.50 per share for the RMWUA water. The Leroux Creek Water Users bill the exchange water at $0.75 per share for B-2 shares and between $30 and $35 per share for the B-1 shares.

The 2007 receipts from the assessments totaled $73,593.00 and $835.00 for miscellaneous income of interest income, late payment assessments and transfer fees. The RMWUA also had a cash reserve on December 31, 2006 of $6,716.00. The RMWUA budget outlays of $66,227.00 support one seasonal ditch rider, the annual operation and maintenance of the RMWUA distribution system, administrative costs and professional services and fees as well as water purchases of $43,810.00. Figure 2-1 illustrates the 2007 income and cash assets for the Redlands Mesa Water Users and Figure 2-2 illustrates the 2007 budget distribution.

Figure 2-1

Redlands Mesa Water Users Income and Cash Assets for 2007

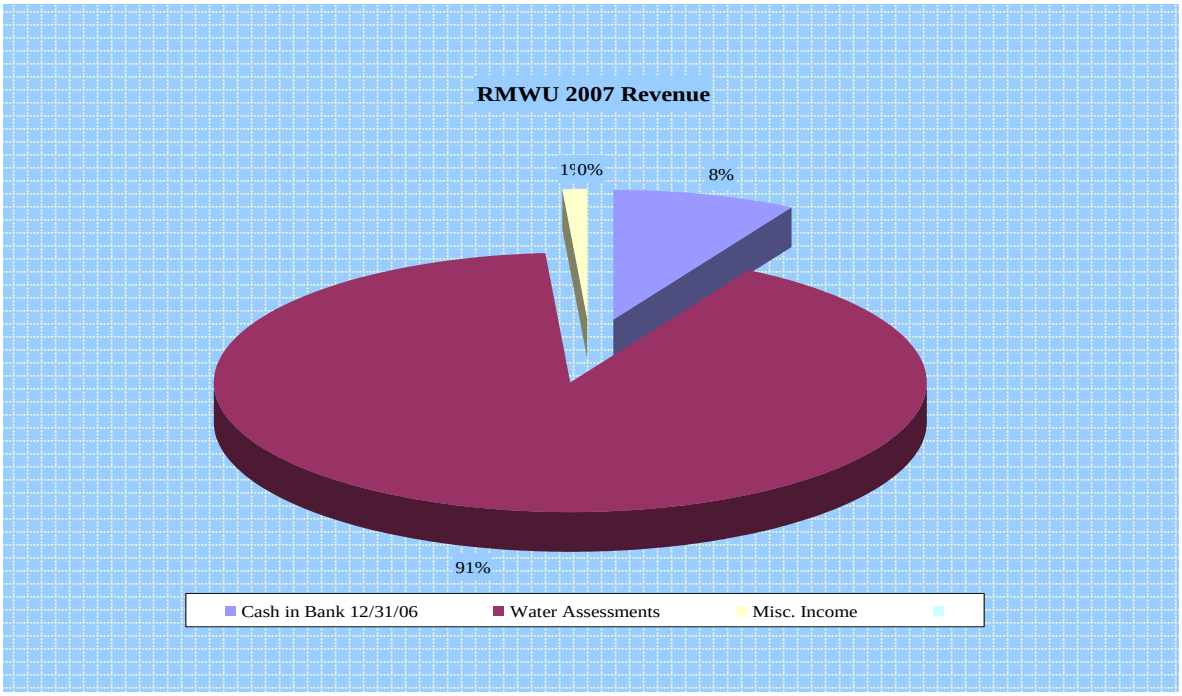
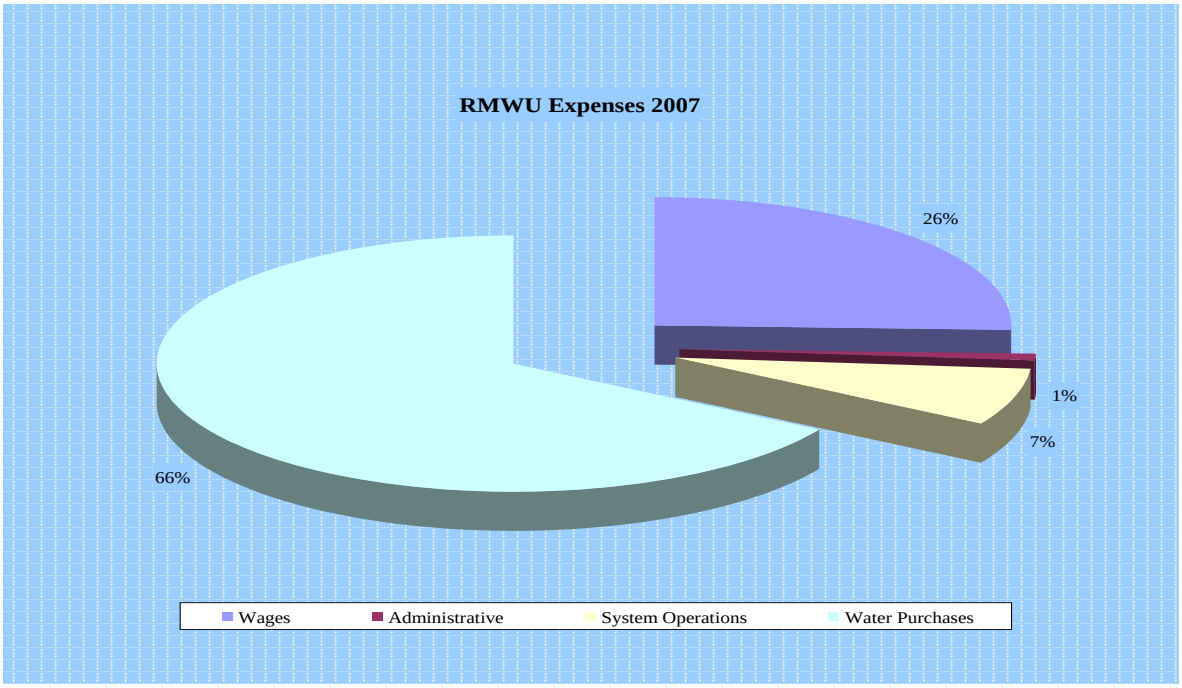


Figure 2-2
Redlands Mesa Water Users Distributions for 2007



Chapter
3

Water Resources Inventory

Redlands Mesa Water Users and the Leroux Creek Exchange

When the North Fork Water Conservancy District was formed and the Paonia Project came on line, the Leroux Creek Water Users was formed in order to administer the Leroux Creek Exchange, a component of the Paonia Project. The object of the exchange was to provide more reliable flows to both the upper ditches and lower ditches that diverted from Leroux Creek. The Leroux Creek Exchange essentially divided the Leroux Creek waters between those water rights holders above the Fire Mountain Canal and those water rights holders below the Fire Mountain Canal. The water rights holders below the Fire Mountain Canal received shares in the Fire Mountain Canal and Paonia Reservoir and in turn deeded their water rights in Leroux Creek above the Fire Mountain Canal to the Leroux Creek Water Users.

With the inception of the LCWU and the Leroux Creek Exchange, the RMWUA committed to purchase 4300 shares of LCWU direct flow water (identified as B-2 shares) or approximately 30% of the B-2 shares and 1338 shares of Leroux Creek Water Users storage decrees (identified as B-1 shares). The RMWUA also receive approximately 67% of water diverted into the Overland Ditch which constitutes most of the mid and late-season water that irrigates Redlands Mesa. Appendix B contains a map of the distribution system.

Water Administration

The Redlands Mesa Water Users receive approximately 30% of the run-off water or B-2 water in Leroux Creek. Once the flows in Leroux Creek drop to 60 cfs, then the B-2 water is considered gone and all upper ditches in Leroux Creek are administered by their relative priority and the reservoir water or B-1water that is ordered. Concurrently, Overland Ditch and Reservoir (ODRC) water is delivered to the Redlands Mesa Water Users and is administered by the RMWUA ditch rider once the water reaches the “Moore Box”.

Prior to the Paonia Project and the Leroux Creek Exchange, ditch diversions were administered by priority and all calculations were done by hand. After the Paonia Project and the Leroux Creek Exchange came into existence, all diversions from the Leroux Creek Exchange were taken at the headgate of the Stull Ditch that had been reconstructed to accommodate the

exchange waters as well as the Stull Ditch decree water. The RMWUA refer to the reconstructed headgate and ditch as the Project Ditch. The Stull Ditch continues diverts under its priority and by virtue of the Leroux Creek Exchange through the Project Ditch headgate and diverts its water through a second headgate shortly down ditch of the Project Ditch headgate. All diversion records, including the water diverted by exchange, are recorded under the Stull Ditch. Appendix C contains an historical description of the Stull Ditch.

During 1990 Dan Hawkins wrote a computer program to facilitate the water distribution of the Redlands Mesa Water Users irrigation water. The program was originally DOS based but has been revised and migrated to an Excel platform. The program is used daily by the Operations Manager (aka the Ditch Rider) to determine the distribution of irrigation water for the Redlands Mesa Water Users. The program also lists all of the shareholders and their respective shares of the B-1 and/or the B-2 water as well as tracking the "Prorate" water or storage water that cannot be stored due to lack of reservoir space. Appendix D contains a description of the Redlands Mesa Water Distribution Program and reports that are calculated by the program.

Irrigation Deliveries

The RMWUA is a supply system for all direct-flow and Overland Reservoir water with 66 diversions and 18 miles of canals and laterals. Each shareholder essentially gets his portion of the flows according to his shares in the RMWUA and the ODRC. The B-1 shares, or late-season reservoir water, are ordered and are owned by the LCWUA. The B-2 shares are diverted by virtue of the Leroux Creek Exchange, and the ODRC water is run from the first part of May until the Overland Reservoir is empty.

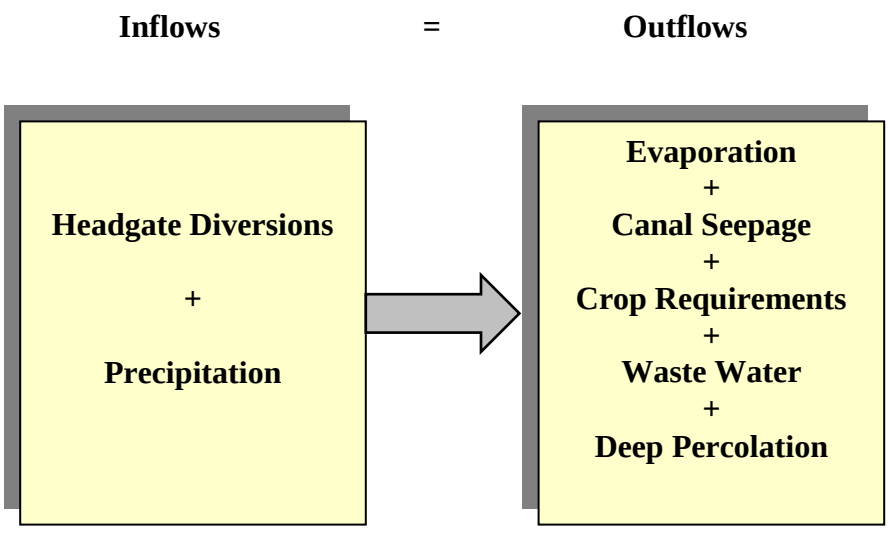
Once the ditches are turned on in spring, the ditch rider determines the amount of water coming into the Project Ditch headgate from Leroux Creek and reads the Overland flows from the satellite station at the Leroux Creek crossing. The total of these two numbers is the water coming onto Redlands Mesa for distribution. This number is entered into the Distribution Computer Program and the program prints cards that show the amount each shareholder is allowed. The Project water is carried by the Main Lateral off of which water is distributed into the Cedar Gulch (CG) lateral, the Lawhead Gulch (LH) lateral, the Clark draw (CD) lateral, and carried to the Durkee Ditch. The computer program converts RMWUA shares to equivalent Overland Ditch shares in order to compute the values for each lateral into the respective drainage. A computer print-out is posted at the drainage lateral when the Ditch Rider sets the lateral headgate. Figure 3-1 is a line diagram of the RMWUAA water distribution system.

Chapter
4

Water Budget

The water budget concept is a comparison of water inflows to water outflows (Figure 4-1). Water inflows consist of all sources of water supplied to the system by way of diversions and precipitation and outflows consist of water taken out of the system through evaporation, seepage, crop use, runoff, and deep percolation. The Water Budget provides a mechanism to examine operational efficiencies of an irrigation system.

Figure 4-1
A Water Budget



A water budget was developed for the Redlands Mesa Water Users using two scenarios. The first scenario examined conditions for an average water year of 2001and the other examined the drought year of 2002. Water budget results are summarized at the end of this chapter. The following sections describe the elements used to develop the water budget.

Diversions 1996-2006

The total minimum diversions occurred in the water year 2002 in the amount of 6,435.7 acre-feet and the total maximum diversions occurred in the water year 2005 in the amount of 19,155.4 acre-feet. Over the ten-year period, total diversions averaged 14,303.8 acre-feet from both storage and direct diversions.

Table 4-1 and Figure 4-2 and Figure 4-3 are summaries of the averaged diversions for the years 1996 through 2006. Figure 4-4 shows the percentage of irrigation water to Redlands Mesa from each source.

Figure 4-2

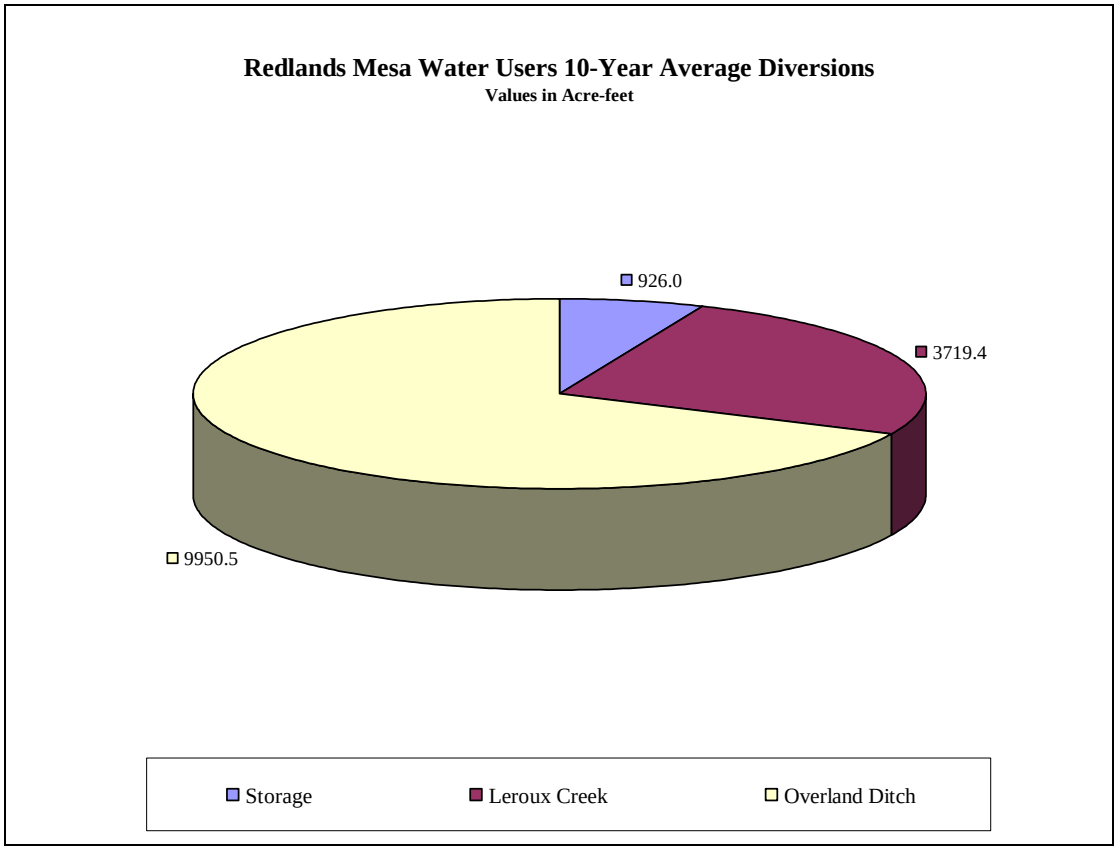


Figure 4-3

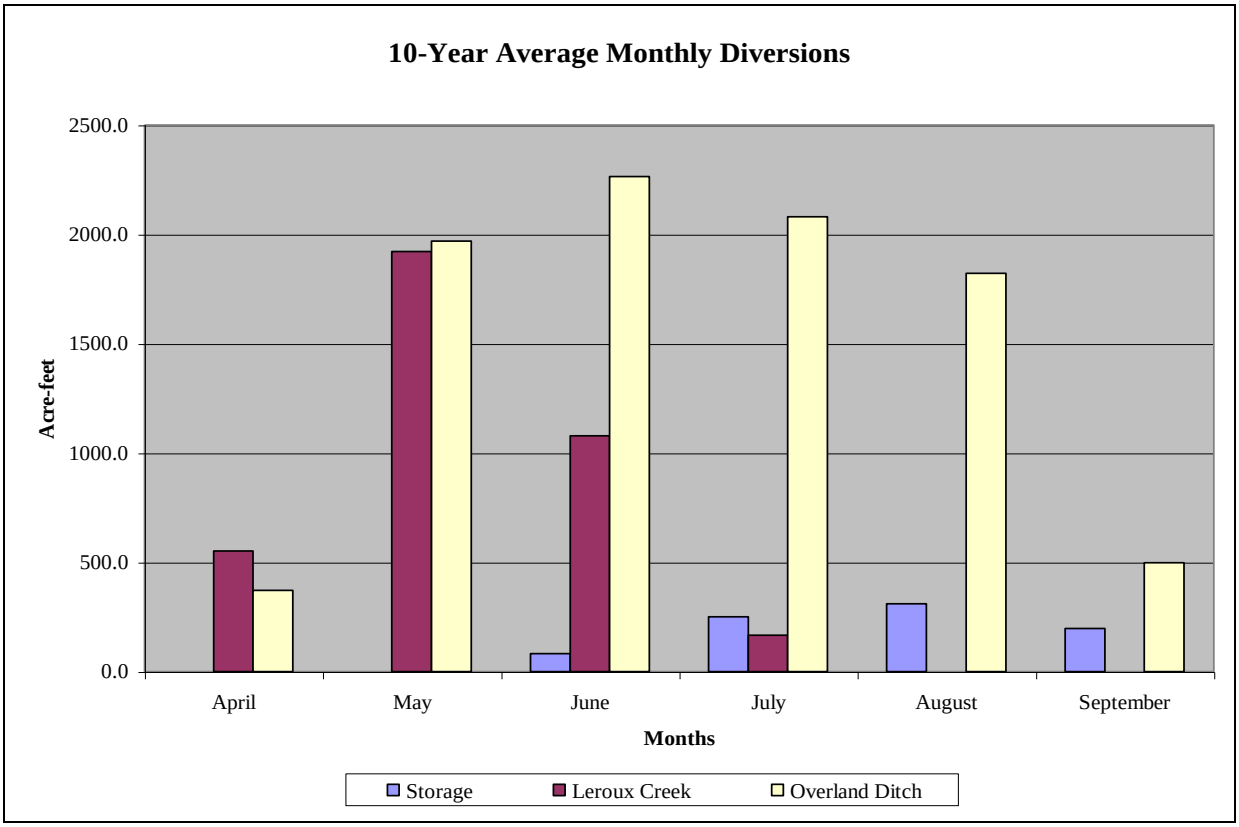


Figure 4-4

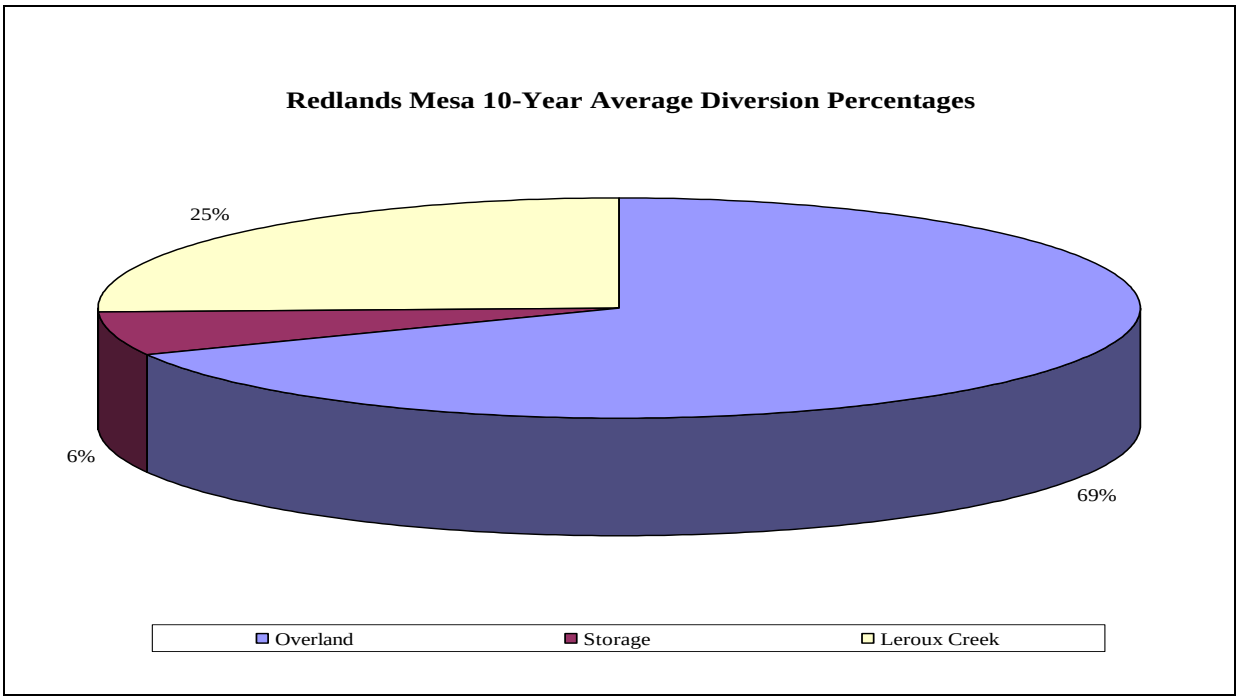


Table 4-1

Redlands Mesa
Diversions 1996-2006

Year:		April	May	June	July	August	September	October	Total
2006	Storage	0.0	0.0	35.7	264.8	365.4	250.9	33.7	950.5
	Leroux Crk	192.8	642.7	0.0	0.0	0.0	0.0	109.6	945.0
	Overland Ditch	599.0	3230.7	2301.4	2319.5	1143.8	0.0	0.0	10792.3
	Total	791.8	3873.4	2337.1	2584.3	1509.2	250.9	143.3	12687.8
2005	Storage	0.0	0.0	0.0	158.2	334.2	330.3	149.3	971.9
	Leroux Creek	819.2	2333.6	1937.9	1013.2	0.0	0.0	0.0	6103.8
	Overland Ditch	31.4	2311.3	3964.3	2339.2	2641.8	791.7	0.0	12079.7
	Total	850.6	4644.9	5902.2	3510.5	2976.0	1121.9	149.3	19155.4
2004	Storage	0.0	0.0	79.3	221.2	297.5	247.4	117.5	963.0
	Leroux Creek	889.6	2529.0	1108.4	0.0	0.0	0.0	0.0	4526.9
	Overland Ditch	0.0	678.5	3981.8	1836.5	1871.8	110.0	0.0	8478.5
	Total	889.6	3207.4	5169.5	2057.7	2169.3	357.4	117.5	13968.4
2003	Storage	0.0	0.0	69.2	307.9	372.4	321.3	0.0	1070.9
	Leroux Creek	1386.5	2158.8	1201.7	0.0	0.0	0.0	0.0	4747.0
	Overland Ditch	499.6	2252.6	3296.7	2211.0	1508.8	0.0	0.0	10767.9
	Total	1886.1	4411.4	4567.6	2518.9	1881.2	321.3	0.0	16585.8
2002	Storage	0.0	10.4	231.6	391.7	281.2	0.0	0.0	914.9
	Leroux Creek	558.0	513.6	0.0	0.0	0.0	0.0	0.0	1071.6
	Overland Ditch	553.1	767.3	1530.3	492.2	0.0	0.0	0.0	4449.3
	Total	1111.1	1291.3	1761.9	884.0	281.2	0.0	0.0	6435.7
2001	Storage	0.0	0.0	149.3	246.5	280.1	314.4	27.8	1018.1
	Leroux Creek	696.2	2649.4	459.8	0.0	0.0	0.0	0.0	3805.4
	Overland Ditch	405.2	1258.0	1492.1	3172.6	2472.9	882.4	0.0	10493.7
	Total	1101.5	3907.3	2101.2	3419.1	2753.0	1196.7	27.8	15317.1
2000	Storage	0.0	0.0	198.2	210.3	470.6	123.0	12.9	1014.9
	Leroux Creek	277.7	2202.7	125.0	0.0	0.0	0.0	0.0	2605.3
	Overland Ditch	571.6	2368.2	1857.6	1894.3	648.0	124.3	0.0	8607.1
	Total	849.3	4570.9	2180.7	2104.5	1118.6	247.3	12.9	12227.3

Table 4-1

Redlands Mesa
Diversions 1996-2006

Year:		April	May	June	July	August	September	October	Total
1999	Storage	0.0	0.0	0.0	241.0	113.0	120.0	281.2	755.2
	Leroux Creek	976.5	2223.1	1936.7	25.3	0.0	0.0	0.0	5161.6
	Overland Ditch	622.6	2913.7	1791.9	2516.1	2434.9	1063.0	0.0	12587.4
	Total	1599.1	5136.8	3728.6	2782.4	2547.9	1183.0	281.2	18504.1
1998	Storage	0.0	0.0	0.0	128.9	339.6	170.1	102.7	741.3
	Leroux Creek	37.9	2180.9	2619.1	697.6	0.0	0.0	0.0	5535.5
	Overland Ditch	31.4	1805.1	1010.5	1574.9	3151.6	1341.8	0.0	8978.1
	Total	69.3	3986.0	3629.6	2272.5	3151.6	1341.8	0.0	14513.6
1997	Storage	0.0	0.0	0.0	238.6	320.3	113.6	172.1	844.5
	Leroux Creek	80.9	1482.1	1469.0	107.0	0.0	0.0	248.4	3387.4
	Overland Ditch	491.7	2079.7	3074.1	2510.2	2340.7	1167.7	0.0	12647.5
	Total	572.6	3561.7	4543.1	2855.8	2661.0	1281.3	420.5	16879.4
1996	Storage	0.0	0.0	148.6	360.5	245.0	187.0	0.0	941.0
	Leroux Creek	162.7	2213.6	1005.7	0.0	0.0	0.0	0.0	3382.0
	Overland Ditch	277.9	2006.4	608.7	2024.6	1826.2	0.0	0.0	6743.7
	Total	440.5	4220.0	1763.0	2385.1	2071.2	187.0	0.0	11066.7
10-Year Average									
	Storage	**0.0**	**0.9**	**82.9**	**251.8**	**310.8**	**198.0**	**81.5**	**926.0**
	Leroux Creek	**552.5**	**1920.9**	**1078.5**	**167.5**	**0.0**	**0.0**	**0.0**	**3719.4**
	Overland Ditch	**371.2**	**1970.1**	**2264.5**	**2081.0**	**1821.9**	**498.3**	**0.0**	**9950.5**
	Total	**923.8**	**3891.9**	**3425.9**	**2488.6**	**2101.8**	**680.8**	**104.8**	**14303.8**

Note: The Leroux Creek water includes the Stull Ditch Enlargement and Extension for 10.8 cfs, and the 4300 shares of B-2 water from the Leroux Creek Water Users.

Delivery Losses

Losses to Redlands Mesa include reservoir evaporation, delivery losses that include canal evaporation and seepage, and water consumed by vegetation along the canal. Delivery losses were calculated for the Overland Ditch using diversion records from the 2006 water year which were comparable to the 2001 irrigation year. Delivery losses for the Overland Ditch to the Moore Box were calculated to average 25% of diversions for the irrigation season. Delivery losses for the Redlands Mesa distribution system was estimated in part and calculated in part.

Farm Headgate Delivery

Water delivered to the Farm Headgates is the water diverted less delivery losses. Monthly calculations of water delivered to farms are displayed in Table 4-2 for an average year and drought year scenario.

Crop Requirements

It is estimated that the Redlands Mesa distribution system delivers irrigation water to approximately 4000 acres with a crop mix of 87% alfalfa and grass hay and 13% grains and orchards. Crop water requirements were calculated using the Cedaredge climate data and the Natural Resources Conservation Services computer program for calculating crop consumption. The program was developed by J. Dalton in 2000 and is based on the Blaney-Criddle method of calculating crop consumption. Results are presented below in Table 4-2. Overall, an average water requirement of 2.6 acre-foot per acre was estimated for the average irrigation year but only 0.83 acre-feet of water per acre was delivered for the drought year of 2002.

Table 4-2

Crop Requirements

values in acre-feet

Average Year

Crop	Acres	April	May	June	July	August	September	October	Total
Grass Hay	2400	204.00	654.00	1096.00	1348.00	1102.00	630.00	244.00	5278.0
Alfalfa	1100	57.75	372.17	621.50	751.67	600.42	338.25	76.08	2817.8
Grains	300	9.8	90.8	191.5	128.0	3.3	0.0	0.0	423.3
Orchards	200	10.5	68.0	113.0	136.7	109.2	61.5	24.8	523.7
Total	4000	282.0	1184.9	2022.0	2364.3	1814.8	1029.8	344.9	9042.8

Drought Year

Crop	Acres	April	May	June	July	August	September	October	Total
Grass Hay	2400	290.0	800.0	1204.0	1496.0	1276.0	804.0	400.0	6270.0
Alfalfa	1100	69.7	441.8	674.7	825.0	684.8	420.8	105.4	3222.1
Grains	300	20.0	109.3	206.5	144.8	10.0	0.0	0.0	490.5
Orchards	200	12.7	80.7	122.7	150.0	124.5	76.5	38.0	605.0
Total	4000	379.7	1351.1	2085.2	2465.8	1970.8	1224.8	505.4	9982.6

Notes: Grass hay includes pasture grass

On Farm Water Demand

On Farm water demand is the amount of water that should be delivered to the Farm Headgate in order to adequately irrigate a crop. Standard On Farm water demand assumes a 50% irrigation efficiency which assumes that half of the water delivered to the farm is consumed by the crop and the remaining half of the water delivered to the farm is wasted back to the system through deep percolation and evaporation and tailwater. Since irrigation practices have improved over time to include gated pipe and sprinkler irrigation by side-roll and center pivot methods, it was estimated that overall irrigation efficiency has improved from 50% to 60%. On Farm water demand was calculated at 100% of the crop demand plus 40% of the crop demand for on-farm delivery loss. Figures 4-4 and 4-5 show the disparity between the water delivered, the base crop demand and the on farm demand.

Figure 4-5

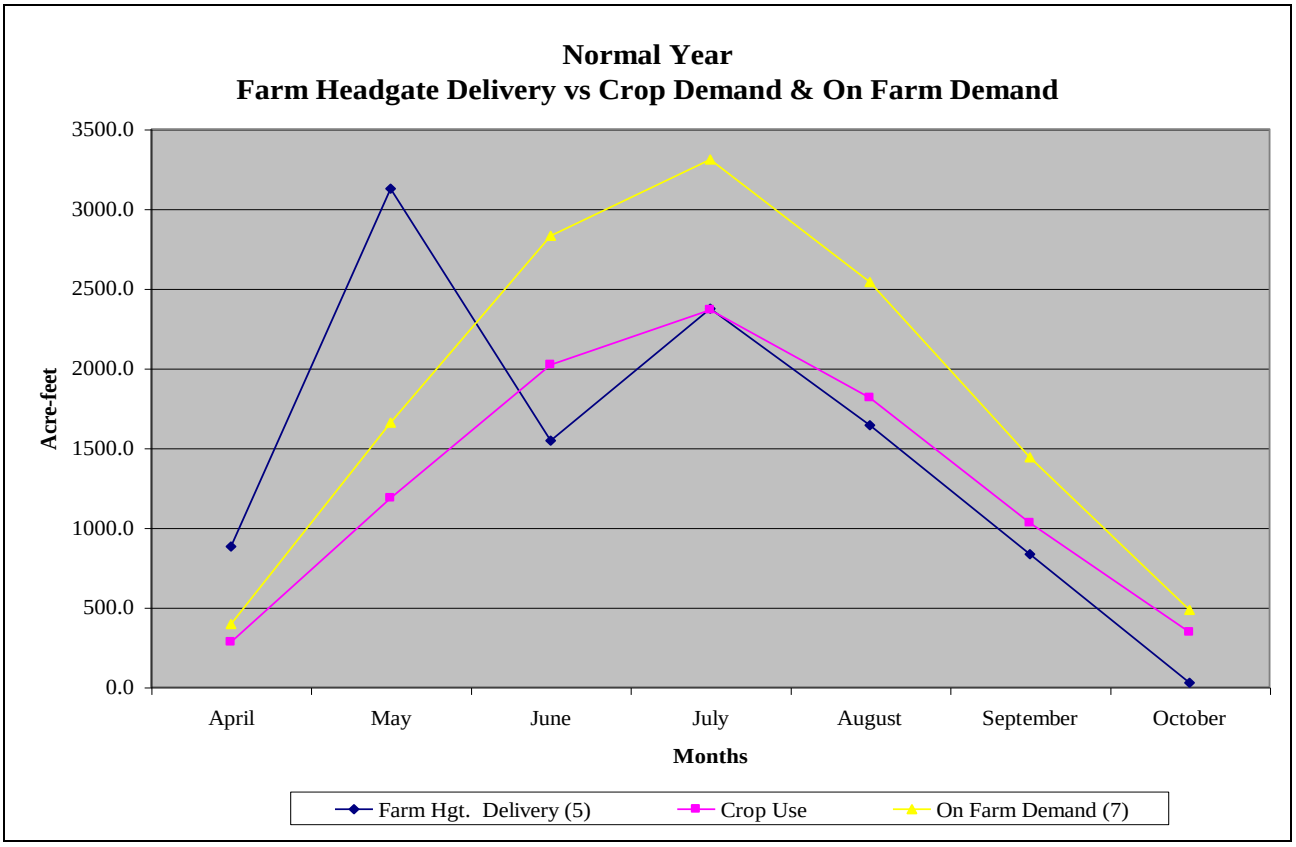
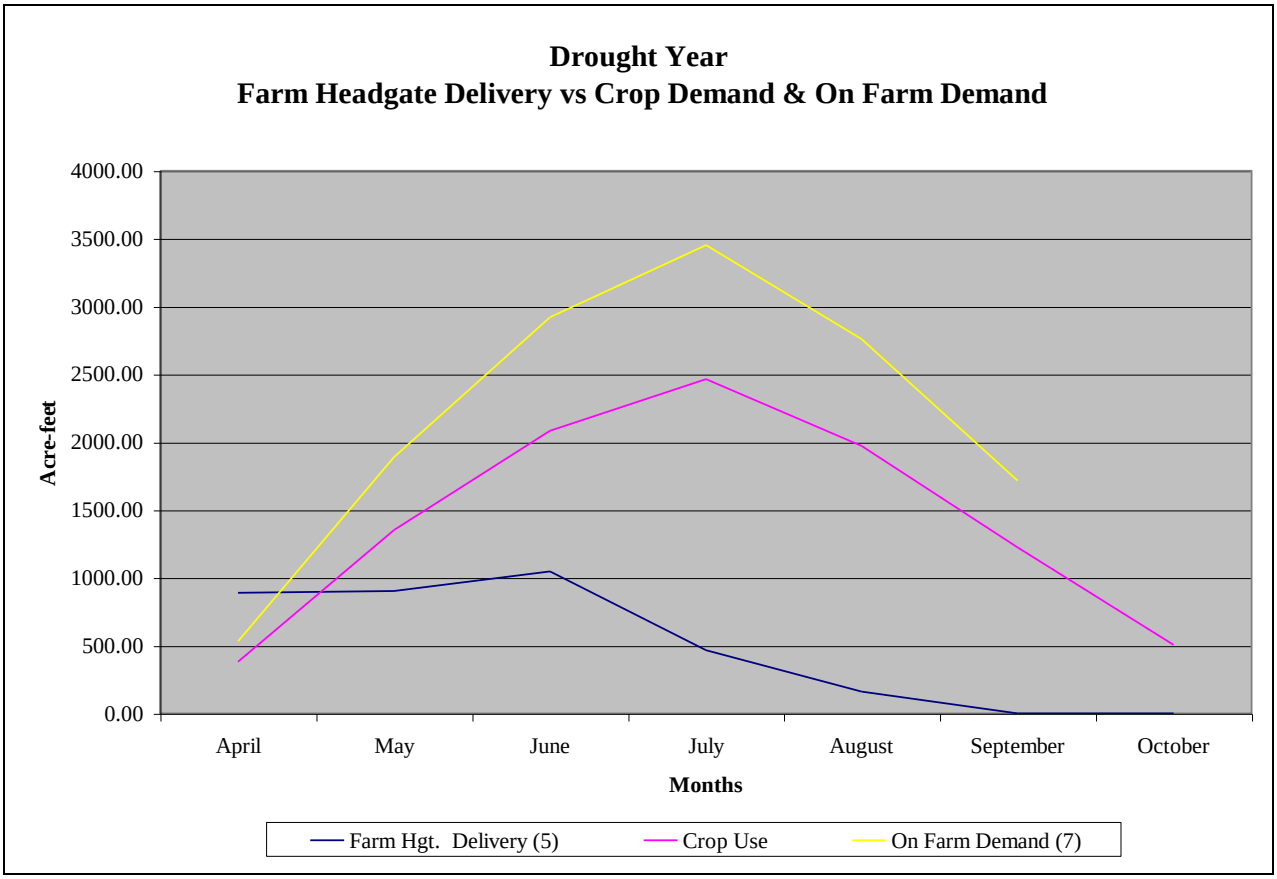


Figure 4-6



Efficiencies

One valuable aspect of the water budget is that it provides a means to calculate efficiencies. Estimating efficiencies helps identify potential areas for irrigation improvements. Efficiencies were calculated as follows:

- Overall Efficiency = Crop Use / Total diversions
- Delivery Efficiency = Farm deliveries / Total diversions
- Farm Efficiency = Crop requirements / Farm deliveries

The Overall Efficiency is a gross calculation that doesn't include delivery losses. The Delivery Efficiency is a more refined calculation that includes delivery losses and the Farm Efficiency shows the efficiency of the water delivered to the farm. Table 4-3 is a calculation of average efficiencies for RMWUA for 2001, an average water year, and efficiencies for the drought year of 2002. **Note**: When headgate deliveries were less than the estimated crop requirement or crop use, efficiencies were not calculated.

Table 4-3

Water Budget for Redlands Mesa

Average Diversions Irrigation Year 2001

values in acre feet

	Month	Diversion (3)				Carriage	Delivery Loss (4)			Farm Hgt.	Crop Use	On Farm	Overall	Delivery	Farm Irrigation
		Overland	Storage	Leroux Crk	Total	Loss %	Evaporation	Carriage	Total DL	Delivery (5)	(6)	Demand (7)	Efficiency (8)	Efficiency (9)	Efficiency (10)
(1)	April	405.2	0.0	696.2	1101.4	20%	0.0	220.3	220.3	881.1	282.0	394.80	26%	80%	32%
	May	1258.0	0.0	2649.4	3907.4	20%	0.0	781.5	781.5	3125.9	1184.9	1658.86	30%	80%	38%
	June	1492.1	149.3	459.8	2101.2	25%	30.0	525.3	555.3	1545.9	2022.0	2830.80	96%	74%	*
	July	3172.6	246.5	0.0	3419.1	30%	20.0	1025.7	1045.7	2373.4	2364.3	3310.02	69%	69%	100%
	August	2472.9	280.1	0.0	2753.0	40%	10.0	1101.2	1111.2	1641.8	1814.8	2540.72	66%	60%	*
(2)	September	882.4	314.4	0.0	1196.8	30%	5.0	359.0	364.0	832.8	1029.8	1441.72	86%	70%	*
	October	0.0	27.8	0.0	27.8	0%	0.0	0.0	0.0	27.8	344.9	482.86	*	*	*
	Acres	4000				0.24				10400.9					
											Average Efficiencies:		**57%**	**72%**	**57%**
	AF/AC	2.60													

Water Budget for Redlands Mesa

Diversions for Drought Year of 2002

values in acre feet

	Month	Diversion (3)				Transit	Transit Loss (4)			Farm Hgt.	Crop Use	On Farm	Overall	Delivery	Farm Irrigation
		Overland	Storage	Leroux Crk	Total	Loss %	Evaporation	Carriage	Total TL	Delivery (5)	(6)	Demand (7)	Efficiency (8)	Efficiency (9)	Efficiency (10)
	April	553.10	0.00	558.00	1111.10	20%	0.00	222.2	222.2	888.88	379.7	531.58	34%	80%	43%
(1)	May	767.30	10.40	513.60	1291.30	30%	0.00	387.4	387.4	903.91	1351.1	1891.54	*	70%	*
	June	1530.00	231.60	0.00	1761.60	40%	10.00	704.6	714.6	1046.96	2085.2	2919.28	*	59%	*
	July	492.20	391.70	0.00	883.90	45%	20.00	397.8	417.8	466.15	2465.8	3452.12	*	53%	*
	August	0.00	281.00	0.00	281.00	40%	7.00	112.4	119.4	161.60	1970.8	2759.12	*	58%	*
	September	0.00	0.00	0.00	0.00	0%	0.00	0.0	0.0	0.00	1224.8	1714.72	*	*	*
	October	0.00	0.00	0.00	0.00	0%	0.00	0.0	0.0	0.00	505.4	707.56	*	*	*
	Acres	4000								3467.50					
	AF/AC	0.87									**Average Efficiencies**		*****	**66%**	*****

(1) Start date Apr 1 (2) End date Sep 15 (3) From Diversions Records (4) Average transit loss estimated to be 25% of diversions (5) Diversions minus Transit Loss (6) Blaney Criddle calculations
(7) Crop Use plus 40% of crop use for ET & transit loss (8) Crop Use divided by Total Diversions (9) Farm Headgate Delivery divided by Total Diversions
(10) Crop Use divided by Farm Headgate Delivery ***** indicates crop demand exceeded farm headgate delivery and efficiency exceeded 100%

Water Budget Results

Upon review of the Water Budget, Table 4-3, the following observations can be made:

1. In general, excess diversions occur during the run-off season and water shortages occur during times of high crop consumption. More efficient water delivery and irrigation could be obtained if additional storage was built in the lower watershed to store the excess run-off. Shortages will continue to occur until conveyance losses are reduced, water delivery scheduling is improved, and/or less water consumptive crops are planted and/or less acreage is irrigated.

2. Water budget results are sensitive to delivery loss estimates. Since some of the delivery losses were estimated due to lack of data, a new water budget should be developed after measuring devices are reset and/or new measuring devices installed on the main canal and the canal laterals.

3. The greatest efficiency improvements would be obtained by upgrading on-farm irrigation systems to more efficient methods such as surge or sprinkler irrigation and by improving delivery scheduling.

Chapter
5

The Redlands Mesa Water Users Water Management Plan

Water Management Issues and Opportunities

Several methods were used to identify management issues and opportunities. The Steering Committee for the RMWUA Water Management Plan provided information and identified issues that have been at the forefront of concerns and discussion.

Based on the information developed by the Steering, several water management issues were identified and placed into general categories:

1. Conveyance System

    - Water measurement
    - Delivery losses
    - Repair of laterals

2. Education of Shareholders

3. RMWUA Management:

    - Communication between RMWUA and the Overland Ditch & Reservoir Company
    - Billing of water that is delivered by the Redlands Mesa system to others not a part of the RMWUA

Existing Water Management Measures that RMWUA has implemented within the past five years are:

- Installation of new measuring devices on main canal

Water Management Goals and Objectives

The following goals for the RMWUA were developed after identifying the water management issues that the RMWUA faces:

Goal 1: Upgrade Water Distribution System

Objective: Provide more accurate water measurement
Objective: Reduce seepage and leakage of canal and laterals

Goal 2: Develop a Water Education Program

Objective: Provide information on the operation of the RMWUA system
Objective: Educate shareholders about the information on the water order cards

Goal 3: Improvement of the RMWUA Management

Objective: Better communication with the Overland Ditch & Reservoir Company
Objective: Develop billing guidelines for water recipients that are not members of the RMWUA

Water Management Measures

Table 5-1 summarizes and prioritizes the actions selected for implementation. Each action is briefly described below. RMWUA will actively work to make progress on high priority actions identified in this plan. As more detailed information becomes available, priorities may be modified and completion dates may be changed. Before commencement of each action, compliance reviews will be conducted to ensure all applicable federal, state, and local laws are followed. Specifically, any water management action deemed to be a federal action will comply with the National Environmental Policy Act and the National Historic Preservation Act before commencement.

Upgrade Water Distribution System

The RMWUA ditch system has been in operation since the early 1900s and is experiencing deterioration of the infrastructure. Although continued maintenance is expected in a water distribution system, there are laterals and portions of the canal that were identified by the Steering Committee that are in need of repair and rehabilitation and/or upgrading and are beyond the District's budget. The following actions were identified as high priority projects:

- Installation of a Satellite Monitoring Station at the Project Ditch measuring device to provide real-time data for the distribution calculations.

- Control seepage losses by piping approximately 100 feet of the main distribution canal.

- Develop a priority list of laterals and farm headgates that are in need of repair.

- Install two new measuring devices at the bottom of Cedar Gulch and Lawhead Gulch.

Develop a Water Education Program

- Develop an informational brochure that describes the operation of the RMWUA water system including a detailed description of the meaning and importance of the information written on the water order cards.

- Provide cross-training of ditch riders

Improvement of the RMWUAA Management

- Work toward cost sharing for ditch improvements and upgrades with the ODRC.

- Develop a policy for billing water recipients that are not a part of the RMWUA

- Write an operation manual for the computer program so that operational information is not lost with any change of personnel.

Expected Results and Monitoring

The RMWUA Board of Directors has not designated a Water Management Coordinator but will annually review the progress of this Water Management Plan. The plan will be up-dated on a five-year cycle. The RMWUA will continue to collect information from water users, personnel, and coordinating organizations. Future updated plans will reflect new water management information as it becomes available.

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Appendix A

Articles of Incorporation and Bylaws

Appendix B

Maps of the Redlands Mesa Water Distribution System

Appendix C

Description of the Stull Ditch

Appendix D

Description of the Redlands Mesa
Water Distribution Program