

The 2005 Mesa County Irrigation Audit Program

Final Report



Catch Cans in place for the Advanced Level Audit

Report Submitted by:

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and

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Ardith Blessinger,
Irrigation Audit Specialist
and her team of Master
Gardener volunteer
helpers

Introduction:

It is estimated that 7.6 square miles or 4,864 acres of the Grand Valley consists of high water-using landscapes. If the water application on all 4,864 acres was reduced by 40%, a savings of **11,187 acre feet** or over **3.6 billion gallons** of water would result. With an average of 1600 new home permits approved each year, water use in the Grand Valley and its over application will continue to rise.

Over irrigation flushes 600,000 tons of salt into the Colorado River from the Grand Valley soils each year. These salts negatively impact plant and animal health throughout the Colorado River basin. Proper watering of lawns will significantly reduce this problem. Additional benefits from improving irrigation management of turf would result in:

- Reduced water use and fewer dollars spent on irrigation water
- Reduction of runoff
- Reduction of water lost below the root zone (deep percolation)
- Reduced fertilizer and chemical requirements to maintain the lawn
- Fewer insect and disease problems
- Proper timing of water applications based on local weather patterns.
- Improved irrigation system performance
- Improved landscape appearance; fewer wet or dry spots

Master Gardener volunteers received training and conducted a limited number of irrigation audits of turfgrass areas in Mesa County in 2003 and 2004. Based on this experience it was determined that a full-time summer employee was needed to continue this project.

The 2005 Program:

Two levels of audits were conducted:

The basic level audit involved an inspection of the irrigation system to determine needed repairs. A map of the property and location of heads, valve boxes and irrigation zones was provided to the clients. Turf and soil problems were identified and corrective procedures detailed. Handout material on turf care was provided each participant along with guidance on how to irrigate based on visual symptoms.

Problems noted during a basic level irrigation audit result in over watering a lawn by 20 to 70 percent, for an accumulative average of 40 percent. The annual historical evapotranspiration (ET)¹ rate for the Grand Valley is ~61 inches and the ET rate during the irrigation season (Apr through Oct) is ~49 inches. Since a typical sprinkler system is ~70% efficient, in order to apply 49 inches of water to the soil, ~70 inches are required. The remaining 21 inches (70–49) are lost to evaporation before it reaches the soil surface.

Problems noted in a basic audit are typically responsible for 40% more water being applied than the 70 inches already required. This equates to an over application of 28 inches (2.3 acre feet).

Sixty-eight basic level audits were conducted in 2005 covering 18.7 acres. Assuming the problems noted were all corrected, **a water savings of 43** acre feet of water or **14,013,797 gallons** of water would result (see Table 1).

The advanced level audit determines the precipitation rates and distribution uniformity of each irrigation zone. Catch cans are used to collect precipitation data from each zone or overlapping zone. When combined with the historical Evapotranspiration (ET) data for this area, the soil type, rooting depth and microclimate, this information provides detailed guidance on how each participant should set their irrigation clocks. This includes the number of days each zone should be watered each month, and the number of cycles and length of time for each cycle. Fifteen advanced audits were conducted and details were provided to each participant on how to accurately set their irrigation clocks each month from April through October.

Problems noted in the basic level audit should be corrected before the advance level audit is conducted.

¹ ET indicates the amount of water given off by the plant through transpiration plus the water evaporating from the soil surface.



Dry Spots



Excess runoff



Flooded/swampy areas



Disease problems

Common problems noted:

- Different types of heads were found on the same zone (pop-up spray heads with impact rotors.) Spray heads apply more water over a given area than impact heads. When included on the same zone some areas are over watered while others do not receive adequate water.
- Impact heads rotating in full circle and partial circle with the same nozzle size results in more water being applied to some areas with other areas not receiving enough water to keep the lawn green. Several owners increased the amount of time on those zones in order to get more water to the dry areas. This resulted in areas with partial circle heads receiving more water than can be absorbed. By changing the nozzle size on the partial circle a more uniform application with less waste and less plant damage results.
- Leaks were discovered during these audits. In one instance, water was running into a window well and basement. Another break in an irrigation line flooded the neighbor's yard and continued into the gutter.

- Sprinklers out of adjustment were a major cause of wasted water. By making simple adjustments to the spray heads, water could be applied to the turf areas and not the hardscapes.
- Low pressure was a problem for one customer with one zone not having enough pressure to rotate the heads. This caused heads to remain stationary and resulted in water running off the sidewalk into the gutter.
- Most participants were required to water based on the schedule of the subdivision. Watering between 10 p.m. and 6 a.m. helps reduce evaporation and results in fewer turf disease problems. Information on when to water was provided all participants in hopes the subdivision watering schedules could be changed.

Program Evaluation:

Surveys were conducted. The following results were determined:

1. Who is your irrigation water provider?

Table 1

Water Provider	Square footage	Gallons of Water Saved ²
Ute Water	12,227	210,395
City of Grand Junction	6,580	49,005
Grand Valley Irrigation Company	126,569	947,430
Redlands Water & Power	123,874	914,760
Palisade (Ute Water)	33,046	247,845
Grand Valley Water Users' Assoc.	469,830	3,523,725
Mesa County Irrigation District	7,347	55,102
Orchard Mesa Irrigation District	35,452	265,890
Totals	18.65 acres	14,013,797

2. Did you make the suggested repairs? If not, why?

Participants were provided a list of firms licensed in Grand Junction to perform such repairs. Many participants were unable to locate a sprinkler repair service that had the time to make the adjustments necessary.

3. Who did the repairs?

Most did the repairs themselves due to not being able to locate a repair service.

4. What was the total cost of the repairs?

Average = \$200

5. Has the audit helped you?

² Based on corrections of problems noted in basic level audit

All comments were very positive.

6. Was the information you received relevant?

All comments were very positive.

7. Have the changes resulted in improvement in your lawn or reduced water use?

Improved the lawn and reduced water use.

Too soon to tell.

8. What can we do to improve the audit?

All comments stated the audits were excellent. A service that can correct the problems noted in the basic level audit needs to be provided to the participants.

Summation:

The Mesa County irrigation audit program combined with an extensive educational effort will result in reduced water use in landscaped areas. The continuation of this program will help reduce deep percolation, the flushing of salts into the Colorado River, and the excessive use of fertilizer and pesticides. This project will enhance the riparian habitat for flora and fauna.

The Irrigation Audit program will be conducted again in 2006 if funding is available. A service to assist participants with repairs is being considered.

Attachments:

Sample packet:

Cover folder explaining the program

Letter to participant

Map showing zones and location/spacing of sprinkler heads & problems

Calculated Watering Requirements - details on setting irrigation clock – if advanced audit

Handouts on watering, fertilizing, general lawn care, and problems noted