

Understanding WMIS Data

Overview of Diversion Records

Cindy Yenter and Corbin Knowles

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What is WMIS?

Water Measurement Information System

- Database created around 1995 to manage ground water diversion data primarily in ESPA
- First created in Access, now in SQL.net
- The .net format provides for remote data entry and on-line viewing.
- Also used to store totalized surface water diversion data
- Contains multiple-year diversion data for around 7300 total diversions (some diversions outside of ESPA)
- Used by Water Districts, Ground Water Districts, consultants, IDWR and the public

Individual WMIS Records

- A measurement record for all diversions required to measure and report to IDWR or a Water District (most reporting done via GWDs)
- WMIS POD is usually analogous with the water right pod but may represent more than one water right
- All water uses – irrigation, commercial, municipal, community wells, industrial, hydropower, etc
- Mostly ground water, some surface water

What Information is Included?

- Water District and Reporting District
- PLS location
- Measurement method
- Site tag ID
- Identification of water rights associated with each well
- Annual diversion data
- Meter certifications and system measurements
- Contacts – owners and operators
- System and site visit information including some water level data

Quick Search:

[For assistance, email WMIS Info](#)

Search Method:	Reporting District	▼
Reporting District:	Magic Valley GWD	▼
WMIS Number:	100032	▼
Legal Description:	06S 23E 21 SE SE SE	▼
Metal Tag Number:	A0003663	▼

You are logged in as cyenter

[Point Of Diversion](#) [PCC](#) ▶ [Flow Meter](#) ▶ [Time Clock](#) [Alternate](#) [Contacts](#) [Data Summary](#) [Other](#) ▶ [Logout](#)

Point Of Diversion

You are viewing 100032; A0003663

Edit	WMIS Number	100032	Network Well	No
	Reporting District	Magic Valley GWD	Access Power	Yes
	Measurement Option	Flowmeter (1)	Water District	130
	Metal Tag Number	A0003663	Tag Location	TAG NAILED TO POLE 10 SE OF WELL, 6 FT HIGH
	Followup Date	01/01/2017	Comments	
	Diversion Name	KIMAMA FARM WEST WELL		

[Search Water Rights](#)

Contacts | [PLSS](#) | [Spatial Data](#) | [Water Source](#) | [Water Rights](#)

Water Right Number	Owner Type	Owner Name	Address	Phone	City/State/Zip	Email
36-2455	Current Owner	FLAT TOP SHEEP CO	PO BOX 99	(208) 481-2252	CAREY, ID 83320	
36-7021D	Current Owner	FLAT TOP SHEEP CO	PO BOX 99	(208) 481-2252	CAREY, ID 83320	
36-8273	Current Owner	FLAT TOP SHEEP CO	PO BOX 99	(208) 481-2252	CAREY, ID 83320	
36-8275A	Current Owner	FLAT TOP SHEEP CO	PO BOX 99	(208) 481-2252	CAREY, ID 83320	

What Information is not in WMIS?

- Data or associated information for diversions that are not required to report
 - *Total irrigation of 5 acres or less*
 - *Non-irrigation uses with total diversion rate ≤ 0.24 cfs*
- Annual diversion data from non-totalizing measuring devices
- Data from exempted diversions (single family domestic, stockwater or other de-minimis wells)
- Detailed GIS information; limited water right information

Why Measure?

- IDWR and water users agreed to measure ground water within the ESPA after the initial A&B call in 1994; surface water users advocated for measurement of ground water
- Orders creating ESPA water measurement districts required ground water measurement
- Idaho Law (IC § 42-613) requires water district assessments be based on diverted volume

Annual WMIS Data

- Four basic measurement methods –
 - Flow Meter*
 - Power Consumption Coefficient*
 - Hour Meter*
 - Alternate*
- Data from \approx 5,400 wells in the ESPA Area of Common Ground Water Supply from 2010 to 2014 were extracted from WMIS; data total more than 24,000 records

Measurement Type Distribution

ESPA Area of Common GW Supply

Reporting District	Flow Meter - Irrigation	Flow Meter - Nonirrigation	PCC	Hour Meter	Alternate	Unused	Total Wells in District
A&B Irrigation District	100%						186
Aberdeen AF GWD	1%	1%	96%	1%		2%	705
Bingham GWD		0.4%	95%	0.1%	0.1%	4%	951
Bonneville-Jefferson GWD	0.4%	1%	87%	6%		6%	236
City of Rupert	5%	14%	50%			32%	44
Falls Irrigation District	100%						24
Goose Creek Irrigation District	68%		21%			11%	19
INEEL		91%				9%	33
Jefferson Irrigation Company					100%		15
Magic Valley GWD	26%	0.2%	65%	1%		8%	555
Monteview Irrigation Company			5%		95%		21
North Snake GWD	10%	35%	42%	9%		5%	919
Producers Irrigation Company			25%		75%		12
Southwest Irrigation District	74%	1%	16%	3%		7%	227
Water District 100	1%	24%	49%	6%	4%	16%	83
Water District 110	0%	2%	92%	0%	1%	4%	763
Water District 120	6%	46%	27%	4%	4%	13%	321
Water District 130	7%	59%	14%	8%		12%	169
Water District 140	31%	40%	11%	8%		10%	163
Water District 34	50%	10%	5%		5%	30%	20
Total Wells in Meas Type	722	724	3471	158	70	321	5466

2015 WMIS Data QA

- WMIS data was reviewed by IDWR staff and watermasters (aprox. 24,000 records)
- QA focused on identifying missing data and/or clean-up of obvious calculation errors
- IDWR has compiled WMIS data for the years 2010-2014
 - *Diversions in the Area of Common Ground Water Only*
 - *Sorted by Reporting District, Irrigation and Non-Irrigation*

Overview of Measurement Methods

- PCC vs Flow meter
- Majority of measurement data in WMIS are calculated using PCC method
- Quality of data

Power Consumption Coefficient (PCC)

- PCC = the number of kilowatt hours (kWh) required to pump an acre-foot of water
- Total annual volume can be estimated for a ground water well as follows:
 - Annual Volume (acre-feet) = total annual kWh/PCC

Calculating PCC

- How PCC is calculated:
 - Water and electrical demand are measured at time of visit
 - Equation is used to apply flow rate and electrical demand information to calculate a seasonal volume
 - $PCC = \text{Power (KW)} / \text{Water (gpm)} \times \text{Constant}$
(units in kWh/ac-ft)

PCC values typically range from 200 -1800 KWH/AF

Calculating PCC Volume

- KWh data are shared with IDWR after irrigation season
- KWh consumed are used to estimate water diverted
 - - Volume (Acre-Feet) = KWh/PCC
- All operating conditions must be measured by hydrographer and estimated run times obtained from the operator
 - Ex. A: Pivot with end gun on, pivot with end gun off would be two conditions
 - Ex. B: Two pivots - both run at same time, each run separately part of season, results in three conditions
- Required to be re-measured every 3 years
 - Assume nothing changes after field visit
 - Assume TDH in the well/system remains constant
 - System wear not figured into equation
 - Cropping patterns can alter the PCC significantly

PCC - Be careful with assumptions

- Don't *assume* that field measurements are consistently representative of how the system works
- Don't *assume* that power demand is associated with well pumping only
 - IDWR found well sites where electrical meter was also measuring electrical use of canal re-lift pumps

PCC Pros

- Power consumption data (kWh) can be gathered independent of the operator
- PCC provides a reasonable diversion estimate for systems with just 1 to 2 operating conditions
- PCC results can be easily changed if “better” information is obtained (not always a pro)

PCC Cons

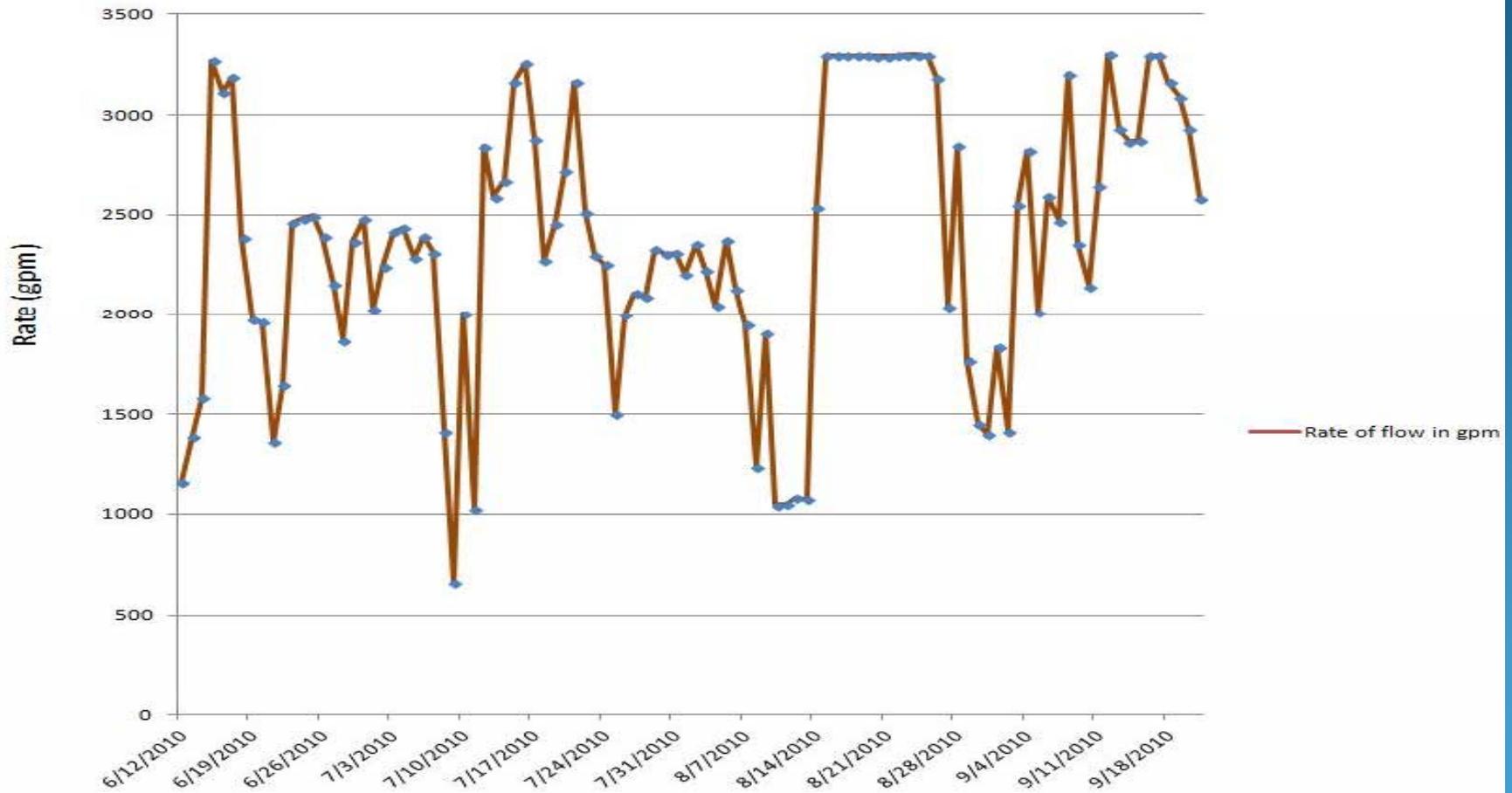
- PCC is only evaluated and calculated every third year (or worse in many cases)
- Multiple operating conditions and system run times must be obtained from operator (shouldn't be assumed)
- Operating conditions must be obtained and evaluated frequently
- Done correctly, PCC is time consuming
- PCC is dynamic from year to year
- Dependent on hydrographer/operator field reports every year

PCC use in the ESPA

- About 63% of wells within the ESPA use PCC methodology
- PCC calculations must be re-evaluated at least every three years, or more frequently if system changes
- About 20% of current PCC data represent conditions older than 3 years
- About 12% of current PCC data represent conditions older than 4 years

Mag-meter data associated with a VFD

A0001865 VFD with a Magnetic flow meter



PCC compared to Mag-meter data for VFD

- Mag-meter data = 1,074 AF
- PCC data = 767 AF
- 28% Difference

PCC Conclusions

- Accuracy of PCC data depends on frequent evaluation of each system and associated conditions of operation:
 - System changes and wear on irrigation equipment
 - Aquifer water level changes
 - System complexity > than 3 operating conditions
 - Interconnection with other wells, pumps or sources
- PCC data results vary from “Rough estimate” to “Fairly accurate” based on the quality of information used to support the calculation

Flow Meters

- IDWR currently requires that flow meters meet a minimum standard
- Third party flow meter accuracy verification completed at Utah Water Research Lab (UWRL)
- IDWR maintains a list of approved flow meters on IDWR website
 - List based on UWRL lab results
 - Meters must obtain 98% accuracy to make IDWR list

Flow Meters

Quality Data Obtained

- Properly installed and maintained flow meters provide high quality data, but provide no data if batteries die or the meter is neglected and fails
- Full profile magnetic flow meters or wetted transducer ultrasonic provide the required level of accuracy

Additional Benefits

- Reduce guesswork in water diverted at the field
- Provide real-time data on site to the operator
- Best level of data quality
 - Accuracy drift over time typically does not occur
 - Reduce time and effort collecting diversion data
- Easy to read

Comparison of WMIS and Metric data sets for Ground Water Use

- METRIC estimates field level consumptive use (Apple), *may or may not include effective precipitation*
- WMIS data represent estimate (PCC) or measurement (flow meter) of water diverted or pumped annually (Orange)
- Following are the results of a limited sample comparison of WMIS and METRIC data:

Comparison of WMIS and Metric data sets for Ground Water Use

- Field level comparison
- Ground water use only
- 2 or less PCC conditions identified by the district Hydrographer
- Following are the results of a limited sample comparison of WMIS and METRIC data:

Magic Valley GWD

WMIS #	Year	Field Acres	METRIC AF	METRIC AF/ac	METRIC CIR AF	CIR AF/ac	WMIS AF	WMIS AF/ac	%Diff WMIS v CIR
100035	2010	273	712	2.6	535	2.0	495	1.8	-7.5
100265	2010	301	817	2.7	608	2.0	628	2.1	3.3
100264	2010	312	748	2.4	531.6	1.7	391	1.3	-26.4
101732 & 101733	2010	571	1426	2.5	1040.3	1.8	784	1.4	-24.6
100035	2011	273	673	2.5	558.3	2.0	370	1.4	-33.7
100265	2011	301	771	2.6	637.5	2.1	816	2.7	28.0
100264	2011	312	837	2.7	698.4	2.2	594	1.9	-14.9
101732 & 101733	2011	571	1377	2.4	1,104	1.9	1635	2.9	48.1

Jefferson-Clark GWD

WMIS #	Year	Field Acres	METRIC AF	METRIC AF/ac	METRIC CIR AF	CIR AF/ac	WMIS AF	WMIS AF/ac	%Diff WMIS v CIR
300616	2010	298	809	2.7	621	2.1	652.0	2.2	5.0
300618	2010	416	974	2.3	693.8	1.7	710.0	1.7	2.3
300835	2010	135	280	2.1	167.5	1.2	312.0	2.3	86.2
1000370	2010	49	80	1.6	41	0.8	153.4	3.1	277.2
300616	2011	298	687	2.3	564.9	1.9	692.0	2.3	22.5
300618	2011	416	884	2.1	697.4	1.7	743.0	1.8	6.5
300835	2011	135	310	2.3	218.8	1.6	374.0	2.8	70.9
1000370	2011	49	84	1.7	53.0	1.1	112.4	2.3	111.9

METRIC – WMIS Summary

GWD Comparison

2011 Aggregate for MVGWD & JCGWD Examples

Total Acres	METRIC AF	METRIC AF/ac	METRIC CIR AF	METRIC CIR AF/ac	WMIS AF	WMIS AF/ac	% Diff WMIS v CIR
2,355	5,622	2.39	4,533	1.92	5,337	2.27	17.7

2010 Aggregate for MVGWD & JCGWD Examples

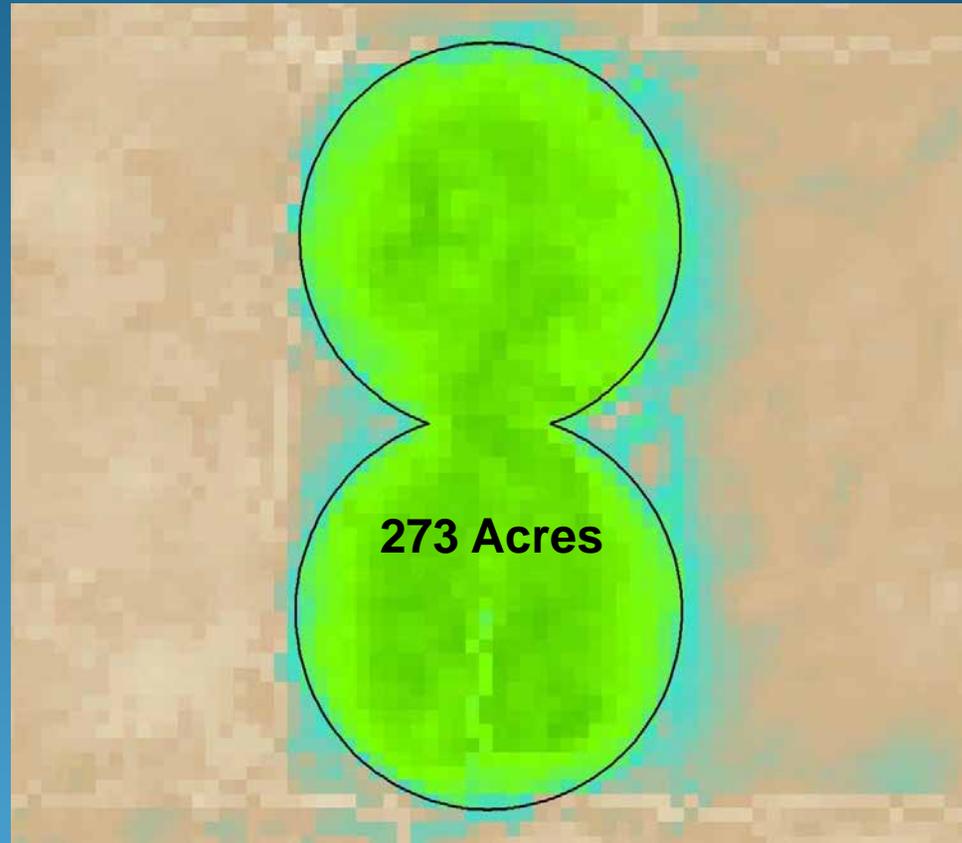
Total Acres	METRIC AF	METRIC AF/ac	METRIC CIR AF	METRIC CIR AF/ac	WMIS AF	WMIS AF/ac	% Diff WMIS v CIR
2,355	5,845	2.48	4,238	1.80	4,125	1.75	-2.7

Magic Valley GWD



2011 WMIS = 1.4 AF/ac

2010 WMIS = 1.8 AF/ac



2011 Metric Total = 2.5 AF/ac

2011 Metric CIR = 2.0 AF/ac

2010 Metric Total = 2.6 AF/ac

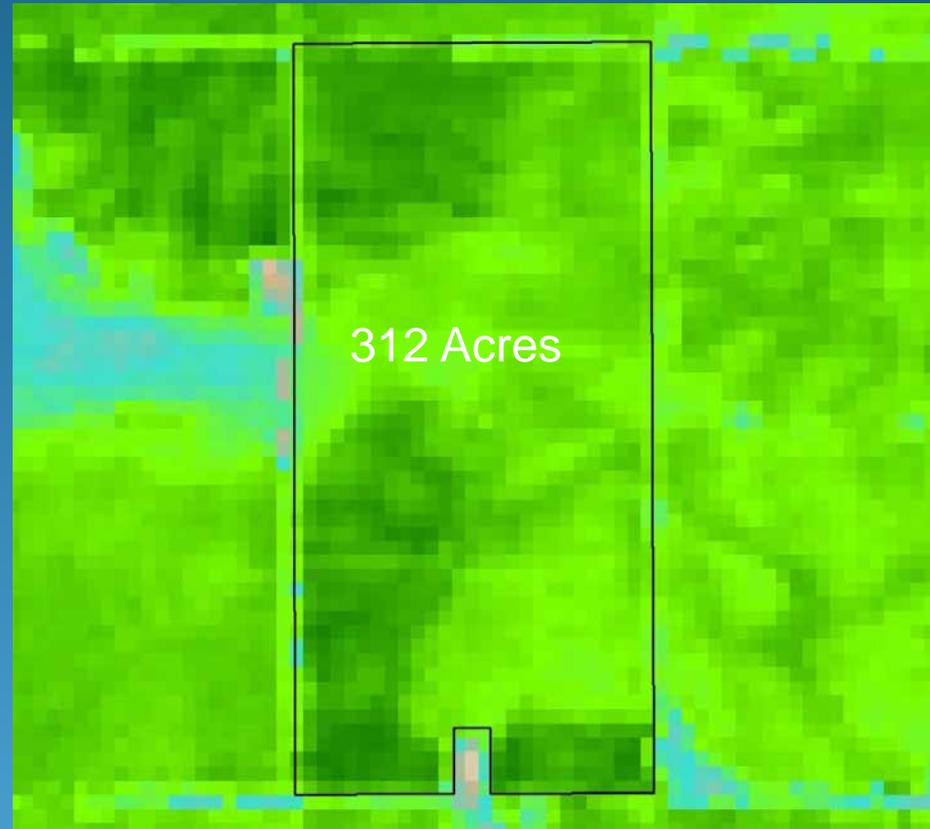
2010 Metric CIR = 2.0 AF/ac

Magic Valley GWD



2011 WMIS = 1.9 AF/ac

2010 WMIS = 1.3 AF/ac



2011 Metric Total = 2.7 AF/ac

2011 Metric CIR = 2.2 AF/ac

2010 Metric Total = 2.4 AF/ac

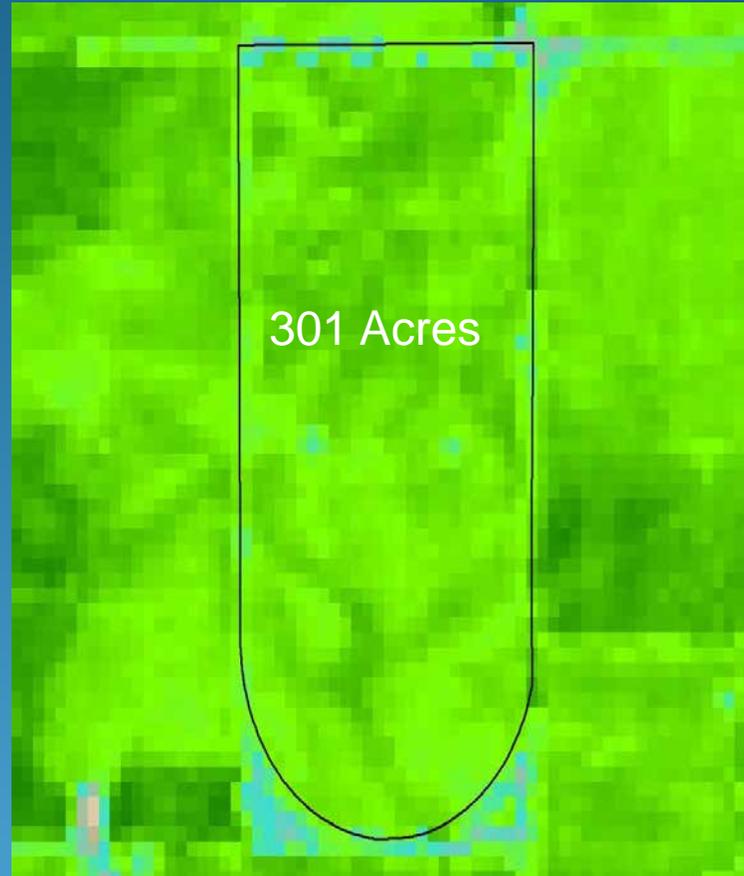
2010 Metric CIR = 1.7 AF/ac

Magic Valley GWD



2011 WMIS = 2.7 AF/ac

2010 WMIS = 2.1 AF/ac



2011 Metric Total = 2.6 AF/ac

2011 Metric CIR = 2.1 AF/ac

2010 Metric Total = 2.7 AF/ac

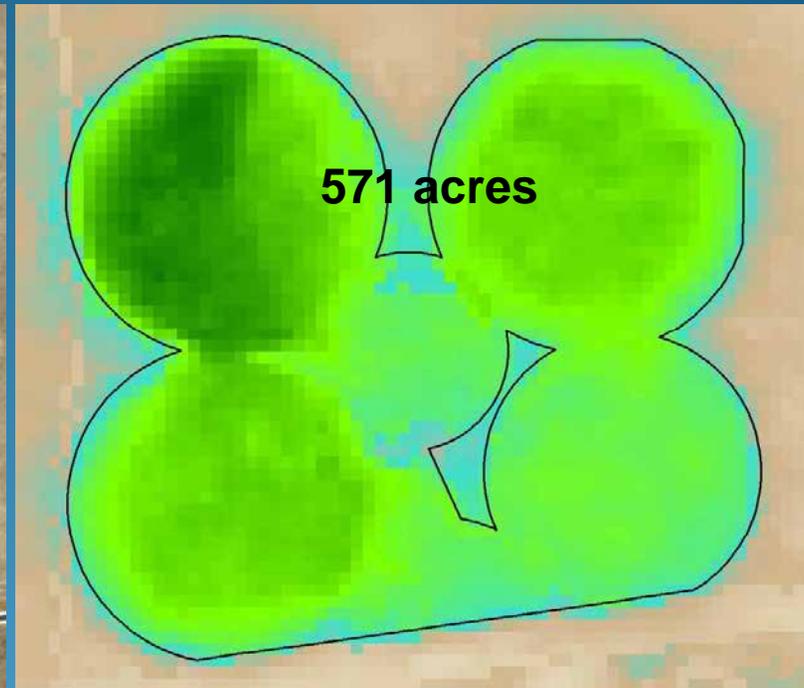
2010 Metric CIR = 2.0 AF/ac

Magic Valley GWD



2011 WMIS = 2.9 AF/ac

2010 WMIS = 1.4 AF/ac



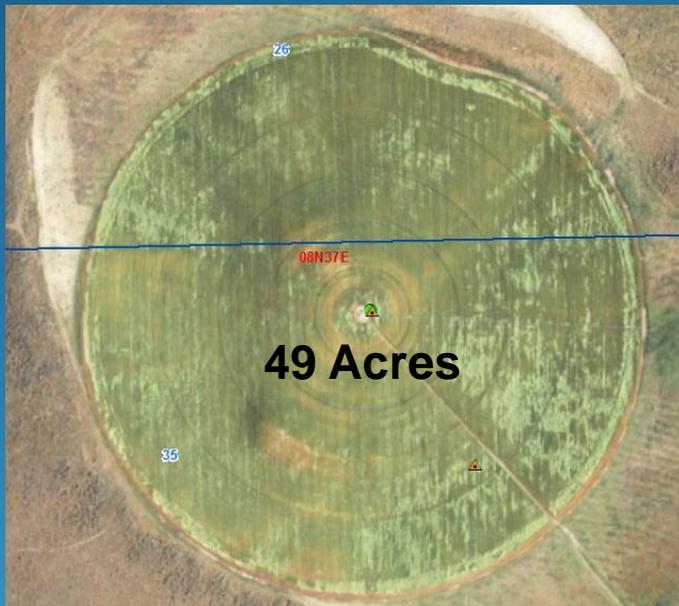
2011 Metric Total = 2.4 AF/ac

2011 Metric CIR = 1.9 AF/ac

2010 Metric Total = 2.5 AF/ac

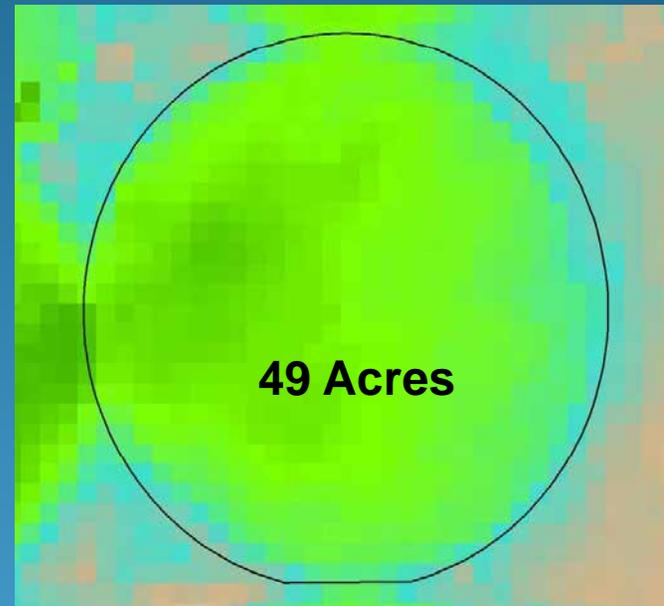
2010 Metric CIR = 1.8 AF/ac

Jefferson - Clark GWD Comparison



2011 PCC = 2.3 AF/ac

2010 PCC = 3.1 AF/ac



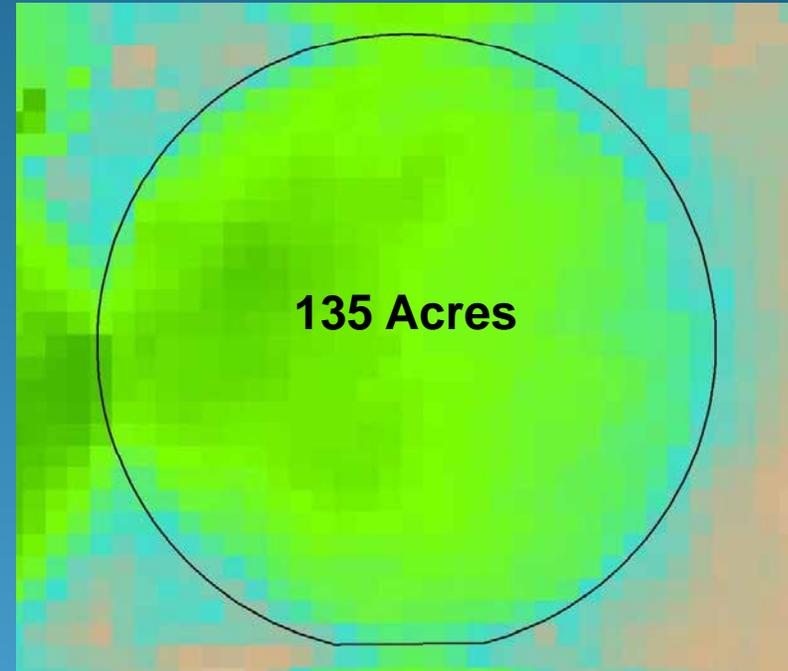
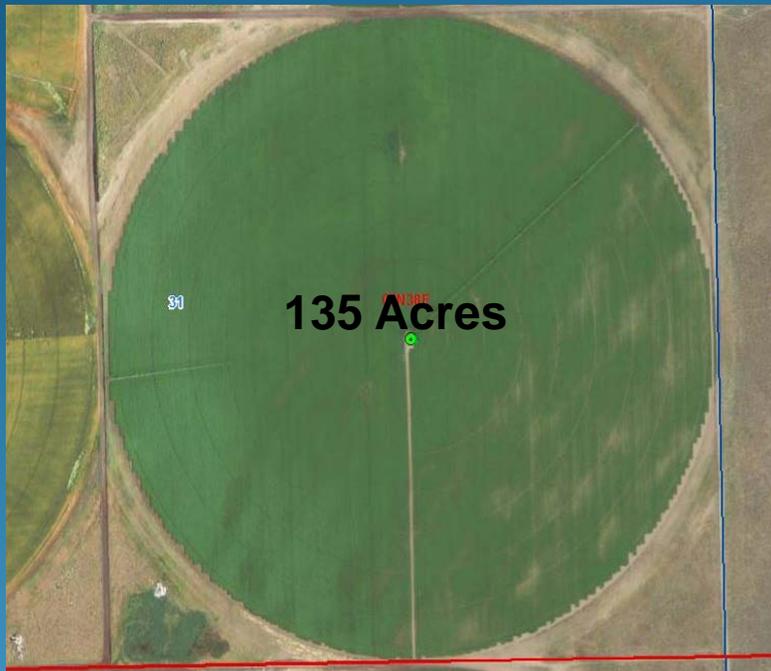
2011 Metric Total = 1.7 AF/ac

2011 Metric CIR = 1.1 AF/ac

2010 Metric Total = 1.6 AF/ac

2010 Metric CIR = 0.8 AF/ac

Jefferson - Clark GWD



2011 PCC = 2.8 AF/ac

2010 PCC = 2.3 AF/ac

2011 Metric Total = 2.3 AF/ac

2011 Metric CIR = 1.6 AF/ac

2010 Metric Total = 2.1 AF/ac

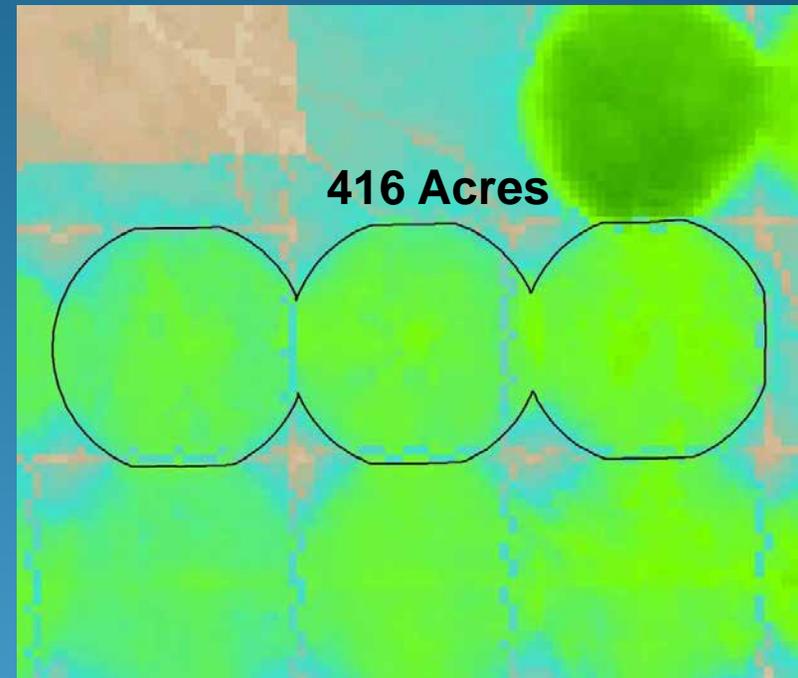
2010 Metric CIR = 1.2 AF/ac

Jefferson - Clark GWD Comparison



2011 PCC = 1.8 AF/ac

2010 PCC = 1.7 AF/ac



2011 Metric Total = 2.1 AF/ac

2011 Metric CIR = 1.7 AF/ac

2010 Metric Total = 2.3 AF/ac

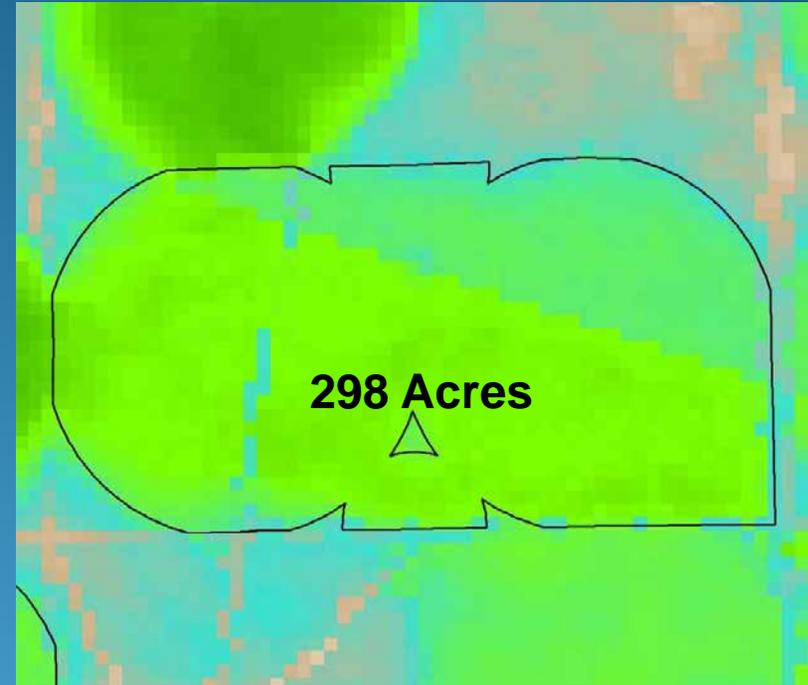
2010 Metric CIR = 1.7 AF/ac

Jefferson - Clark GWD Comparison



2011 PCC = 2.3 AF/ac

2010 PCC = 2.2 AF/ac



2011 Metric Total = 2.3 AF/ac

2011 Metric CIR = 1.9 AF/ac

2010 Metric Total = 2.7 AF/ac

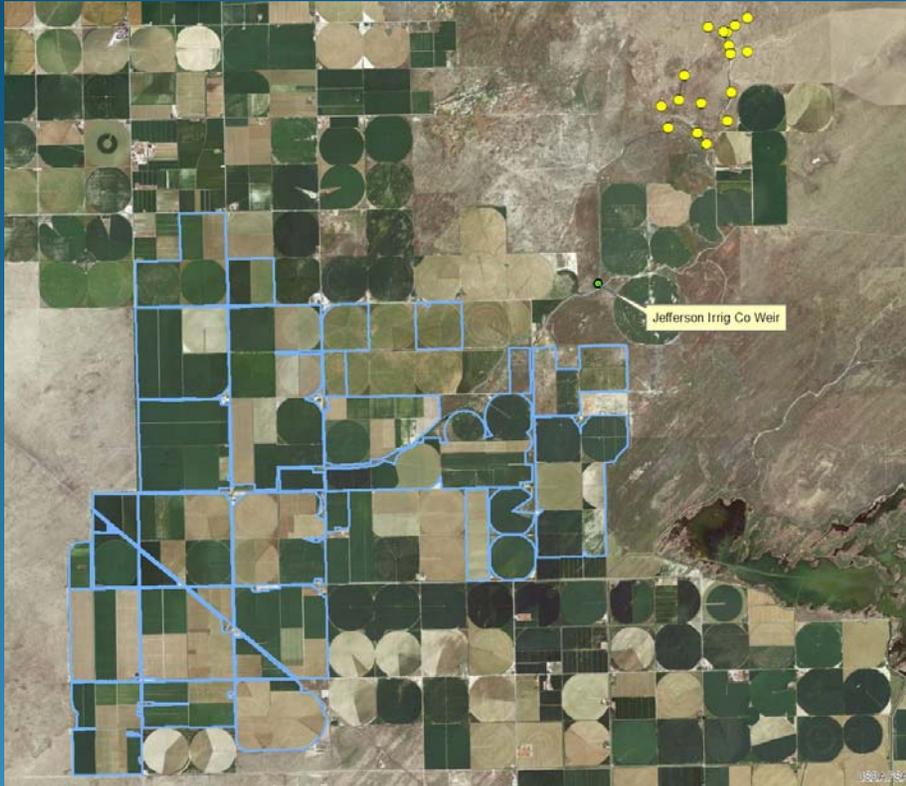
2010 Metric CIR = 2.1 AF/ac

WD110

Irrigation Companies

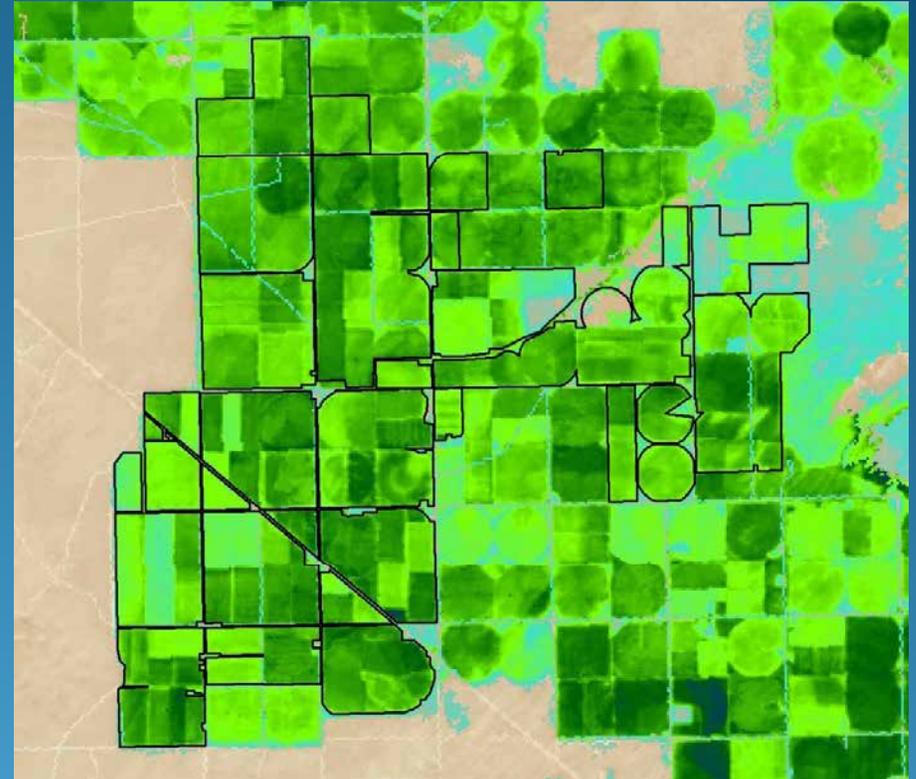
Name	Year	Acres	METRIC AF	METRIC AF/acre	METRIC CIR AF	CIR AF/ac	WMIS AF	WMIS AF/acre	% Diff WMIS v CIR
Producers IC	2010	2,072	5,219	2.5	4061.0	2.0	12,343.4	6.0	203.9
Monteview IC	2010	4,051	10,434	2.6	8136.8	2.0	15,508.0	3.8	90.6
Jefferson IC	2010	10,003	27,172	2.7	20,731	2.1	27,137.1	2.7	30.9
Producers IC	2011	2,072	5,118	2.5	4353.3	2.1	9,709.6	4.7	123.0
Monteview IC	2011	4,051	10,337	2.6	8,860	2.2	14,551.0	3.6	64.2
Jefferson IC	2011	10,003	26,742	2.7	22734.2	2.3	26,014.6	2.6	14.4

Jefferson Irrigation Company



2011 Measured = 2.6 AF/ac

2010 Measured = 2.7 AF/ac



2011 Metric Total = 2.7 AF/ac

2011 Metric CIR = 2.3 AF/ac

2010 Metric Total = 2.7 AF/ac

2010 Metric CIR = 2.1 AF/ac