CoAgMet/Colorado Mesonet Annual Report

FY 2016

Introduction

For many years the Colorado Agricultural Meteorological Network has survived and slowly expanded with piecemeal support from a variety of sources including Conservation Districts, CSU Extension, CSU research centers, commodities groups and USDA partners, to name a few. This was the first year since the network formed with modest block funding focused on improving the network and moving towards a multipurpose state "Mesonet" focusing both on agricultural and water resources but also long-term climate monitoring and short term real-time weather tracking to aid weather prediction, emergency management and other diverse uses.

The following is a summary of FY2016 accomplishments listed by task as presented in the original scope of work.

Task 1: Prepare an inventory/index of current and past weather and climate stations and data collected from 1991-2014 during the development and implementation of the Colorado Agricultural Meteorological Network. Identify gaps and critical areas for expansion.

Summary of task accomplishments:

- A summary/inventory/index of all current and past weather stations was created. The inventory includes location information (location description, latitude/longitude and elevation), station start date, station status (reporting, closed or moved), if the station is sponsored and who the sponsor is, data logger model (to identify stations needing upgrades especially for 5-minute data collection), communication type (land-line, cell modem or radio; again for possible upgrades), the service technician of the station (usually either Zach Schwalbe or Lane Simmons), irrigation type around the station, if the station is equipped with soil moisture sensor, and whether the station has 5 minute data collection and call interval (currently only 4 have this, and for upgrade purposes). This index has already been extremely useful when troubleshooting. It gives a "one stop shop" to find station information.

- After the index was initially completed, it quickly became apparent that this will be an ongoing index to keep updated as we make station additions and upgrades. We will also continue to add fields as they are needed. An example is "height above ground of meteorological sensors", which can be very important for evaluating subtle difference between stations.

- As for identifying gaps and critical areas for expansion, it appears most of the irrigated agriculture land in Colorado is covered reasonably well by CoAgMet. This will be particularly true after 10 proposed new stations in western Colorado are added later this summer and fall. We still have large gaps in most of the dry-land agriculture areas of Colorado and many non-ag areas that would be beneficial to have a station as a mesonet.

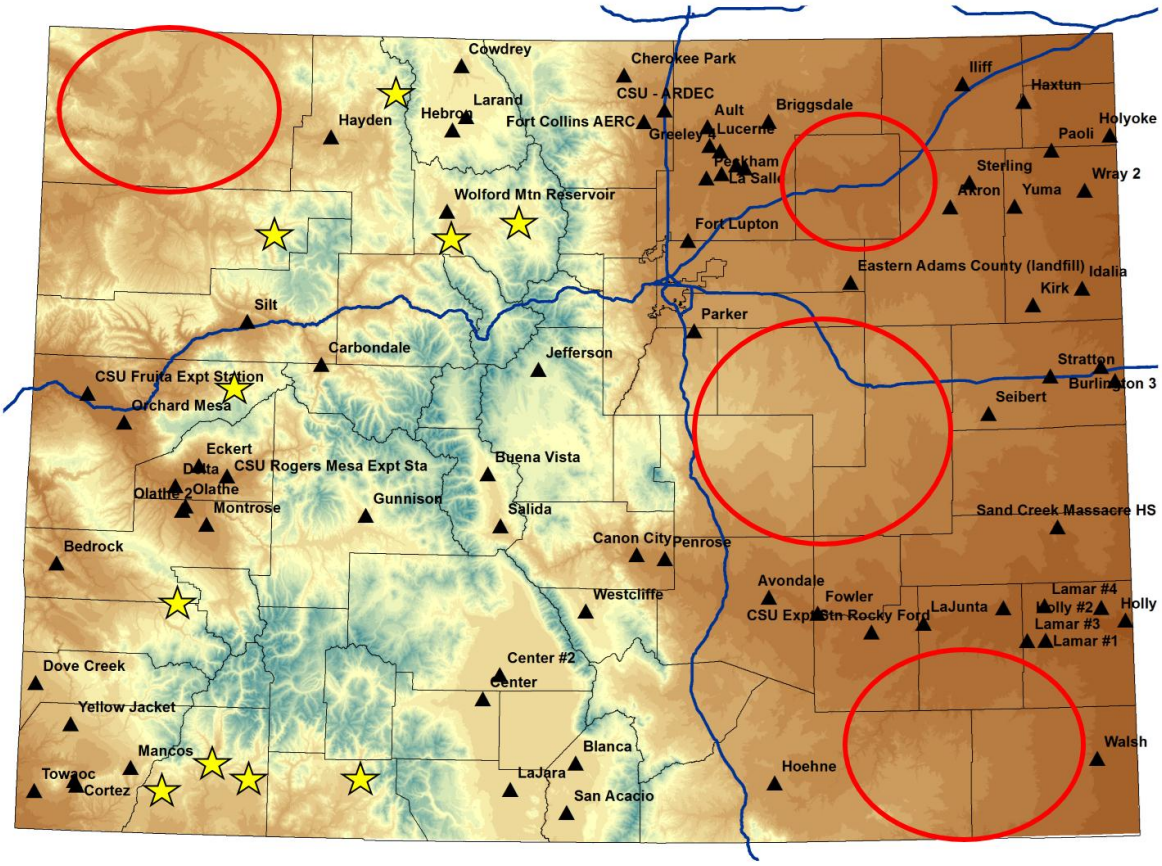

Figure 1: Current CoAgMet Station Locations (black triangles), proposed USBR Stations (yellow starts) and areas needed for expansion (red circles)

Task 2: Manage and maintain the data collection, archival and dissemination of weather and climate data collected by the Colorado Agricultural Meteorological Network (CoAgMet).

Summary of task accomplishments:

- The CoAgMet Network is healthy and we continued data collection, archival and dissemination of weather and climate data. Most of the 75 stations are collecting and reporting regularly. Both hourly and daily data are available, and most stations now are updating every hour. We have some station still on a landline dialup modem that we are able to call only once a day. We purchased cell modems for some of these stations for upgrade. Due to the rural and mountainous terrain of some stations, there is not enough cell phone coverage to upgrade from the landline. Four stations are reporting real time data at 5 minute increments. Two of those stations the data are downloadable from the website. We are working on making the other two available for download, and we are developing data tables that will be available on the CoAgMet website. We are now prepared in the coming year to begin updating many more stations to "real time" 5-minute communications.
- Zach Schwalbe and Lane Simmons (of the CSU Research Farm at Rocky Ford) continued to service stations and were able to replace temperature/relative humidity sensors and solar sensors at stations that were in need of calibration. We sent these sensors in to Campbell Scientific for laboratory recalibration. We purchased a new weather station that will be deployed near the Colorado Climate Center office and used as a new CoAgMet station, as well as a test facility where we can compare instrumentation, test new sensors and calibrate soil moisture measurements. This will be a great help in the development and expansion of the network and to help us in troubleshooting issues without having to drive to a station that may be in the other corner of the state.

- Challenges faced: Around the beginning of the year, our modems started dropping the connection and have required a physical reset of the modem to get them back online. This caused a period where the stations wouldn't report until the modem was reset. We used our resources of Extension offices, NRCS cooperators, site sponsors and services trips to reset the modems and get them back online. Luckily, no data were lost as the loggers were still running fine and able to collect data. Until the end of May, this was not much of an issue since only one or two stations would drop out

at a time and we could get them back online quickly. The last week of May, around 20 stations stopped reporting. We got those modems reset. After talking with Campbell Scientific, other state mesonet operators and Northern Water Conservation District, we discovered a combination of modem software updates and logger updates to cycle the power of the modems daily are needed. The modem software updates can be taken care of from the office, however the logger updates will most likely require station visits.

Task 3: Begin developing a CoAgMet maintenance and metadata system including a tracking system for instrumentation upgrades, calibration, data quality and station photographic documentation that will eventually be incorporated into a comprehensive CoAgMet data management system.

Summary of task accomplishments:

- We worked with the eRAMS group in the Civil Engineering department of CSU to develop and test a CoAgMet maintenance and metadata system. This system has the ability to log all service visits and track instrument replacements, upgrades and calibrations. The system also logs station metadata such as location information, modem type, logger type, etc. We also have the ability to upload photos for every visit to the system to track land use changes around stations, such as crop rotations. Included in this system is the first ever mapping system for CoAgMet. The map plots hourly and daily data for all of our stations. Unlike other state mesonets, we have not chosen to implement contour analysis of data. While this is a very popular feature for other state mesonets, the varying terrain and high elevations between stations makes it impractical and unrepresentative to use standard mapping interpolation methods.
- We also created a data Quality Control app, thanks to Matt Bishop of the CSU Department of Atmospheric Science. This app allows us to view graphs and tables of hourly and daily data. The stations are grouped into regions to compare the data in each area. We can change the data in this app by typing in the correct value (such as 0.00 for precipitation after a station visit testing the tipping bucket rain gauge), or dragging and dropping the data point. The app also lets us flag data as “invalid”, “missing” and “subject”. The app requires logging into the

system so only those with proper credentials can use the system. We currently have a student working doing daily QC on all the data and preparing a daily network performance report for the network manager.

- These two systems are still being updated as we find more features we want and bugs that pop up after more and more use. We are pleased with year-one progress but still not 100% satisfied with the mapping and metadata system. The good news is the systems are working and nearly ready for public release. Once the map is released to the public and more data users begin hitting the system, there will surely be more bugs that arise and features that need to be added, so we plan to continue this into the next project year.

Task 4: Adapt and convert the newly acquired 17-station Colorado Regional Climate Reference Network (CO-RCRN) for inclusion with CoAgMet and other Colorado Climate Center climate monitoring activities. CO-RCRN is a high quality, high investment monitoring system for tracking climate over time in remote and pristine environments (formerly owned and managed by NOAA and deeded to Colorado State University in 2014-15). Design and develop a mechanism to incorporate RCRN data into climate monitoring products, services and databases.

Summary of task accomplishments

- All of the RCRN stations were visited and serviced in the last year to empty the water, oil, antifreeze mixture from the weighing buckets. The Western Regional Climate Center (WRCC) is pulling the data from the stations via satellite connection and we are working with them to get the data flowing into the CoAgMet system. We will then identify which stations have enough cell phone coverage to explore updating these to cell communications and adding wind, solar, relative humidity, and soil temperature and moisture sensors to these stations for potentially becoming ETr and soil moisture sensing stations.
- Challenge: One of the challenges with getting this network going is they are all currently on a satellite connection to the NOAA GOES satellite. This type of connection only allows one way communication (data from the station), so is impossible to talk back and forth with the stations to update a program. Since these stations are in remote and

pristine environments, not all stations have cell phone communication potential. This means we will still need to work through the WRCC for some stations or figure out how to pull the data on our own. Another challenge is WRCC is currently having to manually collect the data and upload it to their database. They are currently working on developing an automated system so we can pull data in real-time, which will make it easier for us to collect and display the data.

Task 5: Review the current CoAgMet website and data visualization and analysis tools. Provide prioritized recommendations for changes and improvements. Develop a Scope of Work to create an effective CoAgMet data management and delivery system and user interface.

Summary of task accomplishments:

- In this task, we decided a mapping system is a much needed data visiualization tool. Thanks to the work by the eRAMS folks we were able to get a good base for the mapping system. We also are needing and already creating the 5-minute tables and tools when we start ramping up our 5-minute data collection. We will be presenting our accomplishments and upgraded products as well as the original CoAgMet website to the Advisory Committee when we convene this fall. We hope to come out of this meeting with recommendations from the committee of changes and improvements that are most needed.

Task 6: Examine the formation and potential structure for a CoAgMet Advisory Team to help provide stakeholder input on current and future weather and climate data needs and opportunities for the State of Colorado.

Summary of task accomplishments:

We surveyed other state mesonets across our region and the country. Most do not have formal advisory teams but the most successful networks do or are considering this. Based on this feedback, we plan to convene and advisory team in FY2017. One can easily think of more than 20 logical individuals/organizations who would provide important perspectives on an agricultural climate and water resources network, but this would be unwieldy. We are currently planning on a group of about 12 advisors composed roughly as follows:

- One member from Colorado Dept of Natural Resources (likely CWCB)

- One from Colorado Dept of Ag
- One member from USDA (NRCS, FSA, ARS)
- One member from CSU Extension water team
- One member from CSUs county Extension directors
- One member from CSU's Ag college (research)
- One representative Colorado livestock industry
- One representative of Colorado commodities groups
- One representative of Colorado Certified Crop Advisors
- One representative of water and environmental consulting community
- One representative from the Colorado legislature
- One at large advisor (possibly from emergency management community)

Plans for implementation of this new advisory structure are written into the 2017 scope of work.

Task 7: Promote CoAgMet data and products at agricultural and water resources meetings to encourage broader awareness, use and application.

Summary of task accomplishments:

- Zach Schwalbe attended the South Platte Watershed Forum in Loveland, Colorado with a booth and poster to promote CoAgMet data and products. He also attended and manned a booth at the Colorado Water Congress Annual meeting in January. To prepare for the Water Congress meeting, we developed a brochure to better promote CoAgMet data and products. We also attended the Governor's Forum on Colorado Agriculture. Not only did these meetings help promote CoAgMet, but it helped Zach meet more of Colorado's statewide ag leaders. These individuals and organization who are or may become important users and resource providers to the network and have been a great help to get stations restarted and reporting again. We have also promoted CoAgMet during Colorado Climate Center presentations in and beyond Colorado.

Task 8: Provide to the Colorado Water Conservation Board an annual report of accomplishments including station inventory, data quality assessment, network enhancements (accomplished and recommended), RCRN progress, Mesonet Advisory Board options, significant meteorological events observed, and recommendations for station and system improvements consistent with the itemized tasks above.

Summary of task accomplishments:

- This report meets the intent of Task 8.

Appendix A

CoAgMet Station Inventory/Index

ID	Station Name	Location	Latitude	Longitude	Elev.	First Obs.	Status	Logger Model	Temp/RH Model	Communication Type	Phone Number/IP Address	MDN	Fenced?	Service Tech	Irrigation Type	Has soil?
AKR02	Akron	USDA-ARS-GPRC	40.1548	103.142	4537	7/1/1992	Reporting	CR1000		Cell	166.131.103.14			David Poss (David.Poss@ARS.USDA.GOV)	Dry-land	
ALT01	Ault	1 mi SE Ault	40.569	104.72	4910	3/17/1992	Reporting	CR10		Raven	166.154.7.190	970-237-9348		Schwalbe	Fully Irrigated	
AVN01	Avondale	1 mi SE Avondale	38.2166	104.341	4580	6/4/1992	Reporting	CR10	HMP35a	Raven	166.149.106.201	970-305-1233		Simmons	Partial Irrigation	
BLA01	Blanca	8 mi SW Blanca	37.3905	105.557	7755	2/24/1997	Collecting no communication	CR10x	HMP45	Cell	166.130.24.253			Simmons	Dry-land	
BNV01	Buena Vista	CDW Area SW of Buena Vista	38.8315	106.129	7900	10/12/2010	Reporting	CR1000	HMP45	Raven	166.154.105.156	970-682-5634		Simmons/Schwalbe	Partial Irrigation	Yes
BRG01	Briggsdale	3 mi S Briggsdale	40.5947	104.319	4858	7/31/2002	Reporting	CR10	HMP35	Cell	166.154.7.195	970-286-1029		Schwalbe	Dry-land	
BRK01	Bedrock	1 mile NE of Bedrock	38.3279	108.855	4973	11/7/2013	Reporting	CR1000	Rotronics	Land-line (no cell service)	970-859-7285			Schwalbe	Dry-land	
BRL01	Burlington North (#1)	18 mi NNE Burlington	39.4998	102.074	3900	5/7/1992	Closed			Cell				Schwalbe	Partial Irrigation	
BRL02	Burlington South (#2)	6 mi SE Burlington	39.2651	102.109	4170	1/2/1992	Reporting	CR1000	HMP35	Cell	166.248.36.102	970-305-2506		Schwalbe	Dry-land	Yes
BRL03	Burlington 3	4 mi NE of Burlington	39.3374	102.196	4068	3/21/2008	Reporting	CR10x	HMP35	Cell	166.154.95.20	970-286-1202		Schwalbe	Fully Irrigated	Yes
CBL01	Carbondale	Carbondale	39.3623	107.208	6293	5/8/2015	Reporting	CR1000	Rotronics	Cell	166.164.23.250	970-305-0759		Schwalbe	Fully Irrigated	
CDG01	Cedaredge	Cedaredge	38.9142	107.932	6404	2/18/2006	Moved (Eckert)	-	-	-	-		-	-	Fully Irrigated	
CKP01	Cherokee Park	1 mile west of US 287 on Road 80C	40.8263	105.267	5956	7/25/2014	Reporting	CR1000	Rotronics	Cell	166.154.7.194	970-219-3861	-	Schwalbe	Dry-land	Yes
CNN01	Canon City	East of Canon City	38.4319	105.178	5273	12/31/2010	Reporting	CR1000	HMP45	Cell	719-252-8905.eairlink.com	719-252-8905	-	Simmons/Schwalbe	Partial Irrigation	
COW01	Cowdrey	9 miles north of Walden	40.8659	106.336	7895	6/10/2009	Reporting	CR1000	HMP45	RF450 Radio	69.29.141.99 (From NP Extension office		Yes	Schwalbe	Fully Irrigated	
CTR01	Center	CSU San Luis Valley Expt Sta	37.7067	106.144	7702	10/8/1993	Reporting	CR10	HMP35	Raven	166.148.85.226	970-658-6946	Yes	Simmons	Partial Irrigation	
CTR02	Center #2	Coors Research Farm	37.8288	106.038	7608	10/2/2003	Reporting	CR10x	HMP35	Land-line (no cell service)	719-754-0204			Simmons	Partial Irrigation	
CTZ01	Cortez	9 mi SW Cortez	37.2248	108.673	6015	1/2/1992	Reporting	CR10	HMP45	Raven	166.161.150.69	970-217-5623		Schwalbe	Fully Irrigated	
DLT01	Delta	3 mi W Delta	38.7342	108.118	5010	4/19/1995	Reporting	CR1000	HMP45	Raven	166.161.150.70	970-217-5649		Schwalbe	Partial Irrigation	Yes
DVC01	Dove Creek	4 mi NW Dove Creek	37.7265	108.954	6595	10/28/1992	Reporting	CR1000	HMP45	Raven	166.161.150.72	970-217-7123		Schwalbe	Dry-land	
EAC01	Eastern Adams County (landfill)	10 mi W Last Chance	39.7857	103.798	4907	7/17/2000	Reporting	CR10x	HMP45	Raven	166.161.184.106			Not responsible	Dry-land	
EKT01	Eckert	0.5 miles west of Eckert, CO	38.8398	107.973	5522	5/7/2015	Reporting	CR1000	Rotronics	Raven	166.140.1.139	970-817-4278		Schwalbe	Fully Irrigated	
FRT01	CSU Fruita Expt	2 mi ENE of Fruita	39.1667	108.75	4500	-	-	-	-	-	-		-	-	-	

FRT02	CSU Fruita Expt Station	2 mi ENE Fruita	39.1803	108.7	4519	6/16/1992	Reporting	CR10x	HMP45	Land-line	970-858-3629, x7			Schwalbe	Partial Irrigation	
FTC01	Fort Collins AERC	Fort Collins AERC	40.5947	105.137	5120	2/1/1992	Reporting	CR1000	HMP45	Raven	161.154.95.21	970-286-1201		Schwalbe	Partial Irrigation	Yes
FTC03	CSU - ARDEC	6 mi NE Fort Collins	40.6525	105	5110	5/8/1992	Reporting	CR1000	HMP45	Raven	ardec1000.eairlink.com	970-222-2606		Schwalbe	Fully Irrigated	
FTL01	Fort Lupton	6 mi SSW Fort Lupton	40.0011	104.849	5055	3/17/1992	Reporting	CR1000	HMP45	Raven	166.154.7.193	970-286-1027		Schwalbe	Fully Irrigated	
FTM01	Fort Morgan	8 mi W Fort Morgan	40.2585	103.954	4320	4/21/1995	Closed								Partial Irrigation	
FWL01	Fowler	Fowler Golf Course	38.1351	104.032	4335	3/17/2005	Reporting	CR1000	HMP45	Raven	166.241.147.239	970-305-0997		Schwalbe	Fully Irrigated	Yes
GJC01	Grand Junction	3 mi NW Grand Junction	39.1752	108.632	4869	10/1/1993	Closed								Dry-land	
GLY03	Greeley	2.5 mi NE Greeley	40.4394	104.647	4680	3/4/1992	Closed								Partial Irrigation	
GLY04	Greeley 4	1.5 mi N of Greeley Airport	40.4487	104.638	4683	6/5/2008	Reporting	CR1000	HMP45	RF maintained by ARS	64.234.251.54			Schwalbe	Fully Irrigated	
GUN01	Gunnison	5 miles North of Gunnison	38.6135	106.901	7894	2/25/2015	Reporting	CR1000	Rotronics	Raven	166.149.99.56	970-219-3398		Schwalbe	Fully Irrigated	
HEB01	Hebron	13 miles SW of Walden	40.5455	106.388	8170	6/10/2009	Reporting	CR1000	HMP45	RF450 Radio	69.29.141.99 (From NP Extension office			Schwalbe	Fully Irrigated	
HLY01	Holly	5 mi NW Holly	38.07	102.09	3636	9/27/2001	Reporting	CR10	HMP45	Raven	166.248.35.254	970-305-0646		Simmons	Partial Irrigation	
HLY02	Holly #2	8.5 mi NW Holly	38.1361	102.241	3570	5/21/2005	Reporting	CR10x	HMP45a	Raven	166.248.36.96	970-305-0647		Simmons	Fully Irrigated	
HNE01	Hoehne	NE Trinidad	37.2893	104.313	5625	2/14/2000	Reporting	CR10x	HMP45a	Raven	166.248.36.99	970-672-6883		Simmons	Partial Irrigation	
HOT01	CSU Rogers Mesa Expt Sta	4 mi W Hotchkiss	38.7917	107.792	5547	5/21/1998	Reporting	CR10	HMP35C	Raven	166.248.36.97	970-305-2042		Schwalbe	Partial Irrigation	
HRT01	Heartstrong	12 mi SSE Yuma	39.9552	102.625	4129	5/30/2005	Closed	-	-	-	-		-	-	Partial Irrigation	
HXT01	Haxtun	2.5 mi NW Haxtun	40.6722	102.647	4040	3/27/1997	Reporting	CR1000	HMP45	Raven	166.248.36.101	970-305-2479		Schwalbe	Partial Irrigation	Yes
HYD01	Hayden	4 mi E of Hayden	40.499	107.181	6454	11/16/2011	Reporting	CR1000	HMP45	Raven	9708194634.eairlink.com		Yes, barbedwire	Schwalbe	Fully Irrigated	
HYK02	Holyoke	12 mi SE Holyoke	40.4909	102.089	3735	1/2/1992	Reporting	CR10	HMP45	Raven	166.148.112.202	970-305-2505		Schwalbe	Dry-land	
IDL01	Idalia	2 mi N Idalia	39.7312	102.302	3975	1/2/1992	Reporting	CR10	HMP35	Land-line	970-354-7273			Schwalbe	Fully Irrigated	
ILF01	Iliff	1.5 mi NE of Iliff	40.7678	103.045	3822	2/2/2008	Reporting	CR1000	HMP45	Raven	166.149.99.54	970-413-0529		Schwalbe	Fully Irrigated	
JFN01	Jefferson	1 mile SW of Jefferson,CO	39.3542	105.811	9460	1/1/2012	Reporting	CR1000	HMP45	Raven	166.154.105.185	970-658-7035		Schwalbe	Dry-land	Yes
KRK01	Kirk	3 mi W Joes	39.6554	102.621	4213	5/13/1996	Reporting	CR10	HMP35	Land-line	970-358-4210			Schwalbe	Partial Irrigation	
KSY01	Kersey 1	2 mi SE Kersey	40.3768	104.532	4625	5/1/1992	Reporting	CR10	HMP35	Raven	166.139.104.251	970-286-1028		Schwalbe	Partial Irrigation	
KSY02	Kersey 2	4 mi SE Kersey	40.3629	104.478	4563	1/1/2015	Reporting	CR1000	HMP45	Raven	166.149.99.52	970-818-1572		Schwalbe	Partial Irrigation	
LAM01	Lamar #1	4.5 Mi S Lamar	37.9807	102.596	3776	8/3/1996	Reporting	CR1000	HMP45	Raven	166.248.36.100	970-672-6852		Simmons	Dry-land	Yes
LAM02	Lamar #2	7 mi NNE Lamar	38.1734	102.559	3736	7/31/2002	Closed	-	-	-	-		-	-	Dry-land	-
LAM03	Lamar #3	10 mi SW Lamar	37.9798	102.713	3918	7/31/2002	Reporting	CR10x	HMP35	Raven	166.248.36.98	970-672-6859		Simmons	Dry-land	
LAM04	Lamar #4	4.5 mi NNE Lamar	38.1539	102.599	3705	5/11/2005	Reporting	CR10x	HMP35	Raven	166.248.35.253	970-305-0421		Simmons	Fully Irrigated	
LAR01	Larand	8 miles south of Walden	40.6126	106.3	8252	6/10/2009	Reporting	CR1000	HMP45	RF450 Radio	69.29.141.99 (From NP Extension office			Schwalbe	Fully Irrigated	

LCN01	Lucerne	1/4 mi SW Lucerne	40.4756	104.707	4750	3/4/1992	Reporting	CR10	HMP35	Raven	166.154.7.191	970-237-9327		Schwalbe	Partial Irrigation	
LJR01	LaJara	2 mi S LaJara	37.2551	105.964	7595	5/19/2005	Reporting	CR10x	HMP45	Land-line	719-274-3142			Simmons	Partial Irrigation	
LJT01	LaJunta	11 mi NE LaJunta	38.0778	103.366	3960	3/17/2005	Reporting	CR10x	HMP45	Raven	166.149.114.206	970-217-4327		Simmons	Fully Irrigated	
LMS01	Las Animas	1 mi NW McClave	38.1478	102.859	3895	3/17/2005	Reporting	CR10x	HMP45	Raven	166.248.6.97	970-219-1056		Simmons	Fully Irrigated	
LSL01	La Salle	4 mi SE of La Salle	40.3349	104.63	4676	2/10/2012	Reporting	CR1000	HMP45	Raven	9706820284.eairlink.com	970-682-0284		Schwalbe	Partial Irrigation	
MNC01	Mancos	3.5 Mi SW Mancos	37.322	108.338	6730	10/29/2010	Reporting	CR1000	HMP45	Raven	71996669027.eairlink.com	719-966-9027		Schwalbe	Fully Irrigated	
MTR01	Montrose	3 miles NW of Montrose	38.5469	107.914	5651	2/24/2015	Reporting	CR1000	Rotronics	Raven	166.149.99.57	970-237-1964		Schwalbe	Fully Irrigated	
ORM01	Orchard Mesa	Orchard Mesa	39.042	108.46	4600	1/2/2006	Reporting	CR10	HMP35	Raven	166.140.250.160	970-631-6051		Schwalbe	Partial Irrigation	
OTH01	Olathe	3 mi NE Olathe	38.6351	108.05	5324	7/28/1992	Reporting	CR10	HMP35	Land-line	970-323-5410			Schwalbe	Partial Irrigation	
OTH02	Olathe 2	4 mi W Olathe	38.6135	108.069	5450	8/12/2010	Reporting	CR10	HMP45	Raven	9709016644.eairlink.com				Fully Irrigated	
PAI01	Paoli	RD U & 59	40.4248	102.475	3875	9/26/2001	Reporting	CR10	HMP35	Land-line	970-774-5740			Schwalbe	Dry-land	
PAN01	Paonia	Paonia	38.8656	107.599	5643		-	-	-	-	-		-	-	-	
PBL01	Pueblo (defunct)	Pueblo	38.2317	104.467	4710	8/4/1993	-	-	-	-	-		-	-	-	
PKH01	Peckham	3 mi ENE Peckham	40.3125	104.727	4701	3/17/1992	Reporting	CR10	HMP35	Raven	166.154.7.192	970-237-8237		Schwalbe	Partial Irrigation	
PKR01	Parker	E470 and Chambers	39.5505	104.811	5813	3/12/2015	Reporting	CR1000	Rotronics	Raven	166.248.141.75	970-413-2656		Schwalbe	Dry-land	
PNR01	Penrose	near L and 13th Sts.	38.4119	104.998	5331	10/13/2010	Reporting	CR10x	HMP45	Raven	166.154.105.187	970-682-5638		Schwalbe	Fully Irrigated	
PTV01	Platteville	1 mi NW Platteville	40.2278	104.835	4700			-	-	-	-		-	-	-	
RFD01	CSU Expt Stn Rocky Ford	2.5 mi SE Rocky Ford	38.0385	103.695	4180	6/4/1992	Reporting	CR1000	HMP45	Raven	166.241.147.238	970-217-3286		Simmons	Fully Irrigated	Yes
RFD02	CSU Expt Stn Rocky Ford NRCS	Moved to HLY01	38.0385	103.695	4180	1/2/1999	Moved (HLY01)	-	-	-	-		-	-	Fully Irrigated	
SAN01	San Acacio	2 mi N Mesita	37.1417	105.611	7753	8/12/2000	Reporting	CR10x	HMP45	Land-line	719-672-0312			Simmons	Dry-land	
SBT01	Seibert	Livingston CRP land south of Seibert	39.1187	102.925	4852	4/2/2015	Reporting	CR1000	HMP45	Raven	166.164.23.248	970-294-2847		Schwalbe	Dry-land	
SCM01	Sand Creek Massacre HS	7.5 mi NNE of Chivington	38.5439	102.503	3963	7/24/2008	Reporting	CR1000	HMP45	Land-line	719-729-3337			Simmons	Dry-land	Yes
SLD01	Salida	Near Salida	38.5715	106.043	7227	7/28/2010	Reporting	CR1000	HMP45	Raven	166.154.105.188	970-682-5651		Simmons/Schwalbe	Fully Irrigated	
SLT01	Silt	Silt Mesa	39.5667	107.693	5620	5/8/2015	Reporting	CR1000	Rotronics	Raven	166.164.23.249	970-305-0695		Schwalbe	Fully Irrigated	
STG01	Sterling	Sterling	40.2744	103.014	4472	3/24/2006	Reporting	CR21X	HMP35	Land-line	970-522-1707			-	Dry-land	
STN01	Stratton	Stratton	39.2987	102.522	4321	4/2/2006	Reporting	CR1000	HMP45	Raven	166.149.99.53	970-413-0530		Schwalbe	Dry-land	
STT01	Stonington	Stonington	37.1613	102.122	3841	4/2/2006	Collecting no communication	CR21X	HMP35	-	-				Dry-land	
TWC01	Towaoc	Ute Mtn Ute Farm	37.1891	108.935	5319	6/30/1998	Reporting	CR1000	HMP45	Raven	166.149.99.55	970-631-7803		Schwalbe	Partial Irrigation	
UWR70	United Water	West of Wiggins	40.3806	104.35	4682	3/3/2011	Moved to KSY02	-	-	-	-		-	-	Dry-land	
VLD01	Vineland	13 mi SE Pueblo	38.2235	104.461	4420	8/4/1993	Closed	-	-	-	-		-	-	Fully Irrigated	

WAV01	Waverly	NW of Douglas Reservoir	40.7102	105.103	5229	2/17/2012	Closed	-	-	-	-		-	-	Dry-land	
WCF01	Westcliffe	2 mi NW Westcliffe	38.1503	105.499	7734	9/20/2010	Reporting	CR1000	HMP45	Raven	166.154.105.189	970-217-8307	-	Simmons/Schwalbe	Fully Irrigated	
WFD01	Wolford Mtn Reservoir	5 mi NNW Kremmling	40.1387	106.415	7520	11/30/2004	Reporting	CR1000	HMP45	Raven	166.161.150.73	970-217-8307		Schwalbe	Dry-land	
WGG01	Wiggins 06	NNE of Wiggins	40.3333	104.036	4447	4/1/1997	Closed	-	-	-	-		-	-	Partial Irrigation	
WGG02	Wiggins 39	ENE of Wiggins	40.2998	103.952	4421	4/1/1997	Closed	-	-	-	-		-	-	Partial Irrigation	
WLS01	Walsh	Plainsman Research Center in Walsh, CO	37.383	102.294	3974	4/11/2012	Reporting	CR10	HMP45	Land-line	719-324-5643			Simmons	Dry-land	
WLT01	Wellington	I25 & 58.5 Rd	40.6762	104.997	5144	8/8/2005	Closed	-	-	-	-		-	-	Fully Irrigated	
WRY01	Wray	10 mi N Wray	40.1924	102.203	3681	5/9/1996	Closed	-	-	-	-		-	-	Fully Irrigated	
WRY02	Wray 2	Lenz Farm north of Wray, CO	40.2187	102.265	3736	4/1/2015	Reporting	CR1000	HMP45	Raven	166.164.23.247	970-294-2908		Schwalbe	Fully Irrigated	
YJK01	Yellow Jacket	2.5 mi NW Yellow Jacket	37.5289	108.724	6900	1/2/1992	Reporting	CR1000	HMP45	Raven	166.154.213.37			Schwalbe	Fully Irrigated	
YUC01	Yucca House	Mesa Verde Natl Monument	37.2478	108.687	5975	8/23/2002	Reporting	CR3000	HMP45	Raven	166.161.150.71	970-217-6174		Schwalbe	Dry-land	Yes
YUM01	Yuma	6 mi E of Yuma	40.1035	102.606	4000	5/19/1993	Closed	-	-	-	-		-	-	-	
YUM02	Yuma	2 mi N Yuma	40.1504	102.724	4104	5/8/1996	Reporting	CR1000	HMP35	Land-line	970-848-0752			Schwalbe	Fully Irrigated	Yes