

Colorado Drought Plan Survey



Conservation Planning Section
Colorado Water Conservation Board
Department of Natural Resources

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By

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Appendix A – Sample Drought Survey Work Sheet

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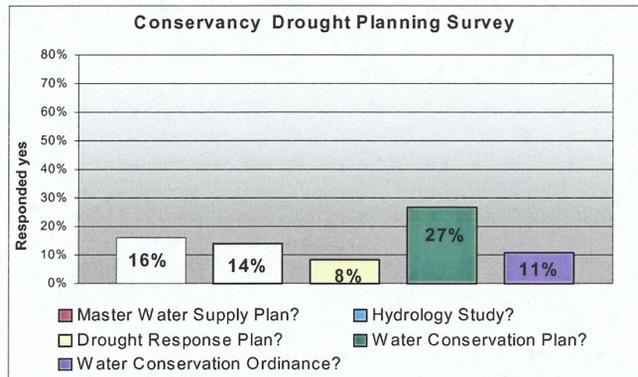
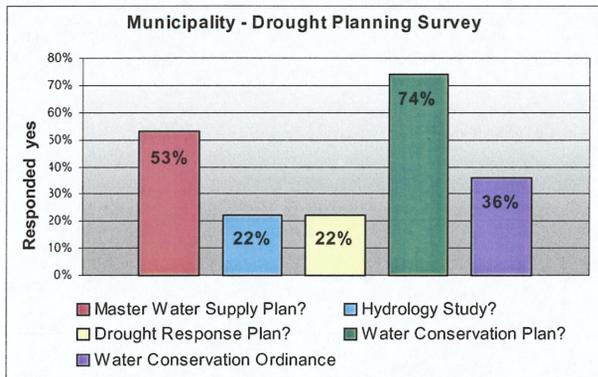
Executive Summary

Increasing population in many areas of Colorado has increased the vulnerability of public and private water systems to drought as municipal water demands increase.

Near the end of 1999, the CWCB conducted a survey to determine the degree and extent of drought planning in Colorado by municipal and agricultural water providers. In all, 67 municipalities and 47 water conservancy districts were contacted and responded.

Of the respondents, 22% of the municipalities and 8% of the water conservancy districts have done a drought response plan. Only 4% of the municipalities surveyed and none of the conservancy districts have completed all levels of drought planning. The following table shows the level of drought planning for each type of water provider.

Level of Drought Planning	Municipalities	Conservancy Districts
Master Water Supply Plan	53 %	16 %
Hydrology Study Considering Drought	22 %	14 %
Drought Response Plan	22 %	8 %
Water Conservation Plan	74 %	27 %
Water Conservation Ordinance	36 %	11 %



A review of comments offered to CWCB during the interview may be helpful in understanding the different dilemmas and situations of water managers in Colorado.

Colorado Drought Plan Survey

1.0 Introduction

Colorado is a "headwaters" state and the water dilemma in is very complicated. In this region competition between in-stream and off-stream users is growing and water rights are controversial. Agriculture in our region is vulnerable to drought and there are shortages in municipal water supplies during low flow periods. We are rapidly approaching maximum utilization of our water resources that are controlled by the interstate compacts. During dry periods there will be increasing conflicts among urban, agricultural, recreational and environmental uses of water.

More than once during the past century, people in virtually every river basin in Colorado have experienced drought and its adverse impacts on public and private water supply systems. Even the high elevation basins that normally receive abundant precipitation are at risk during severe droughts. Furthermore, in many areas the state is experiencing significant population growth, the vulnerability of public water systems to drought is increasing as water demands increase.

2.0 Purpose

The purpose of the survey was to determine the extent and level of drought planning in Colorado by municipal and agricultural water providers.

3.0 Acknowledgements

In August 1999, William P. Stanton, Chief of the CWCB Conservation Planning Section, began an informal telephone survey of several municipal water providers. The results showed only a few Colorado communities have done any serious risk based drought assessment or drought mitigation planning. Staff then expanded the survey to include all municipal water providers that provide 2,000 acre-feet or more of treated water and selected agricultural water users. CWCB Conservation Planning Section members Kathie Luckie and Joe Busto conducted the expanded survey. In all, 67 municipalities, 3 water conservation districts and 44 water conservancy districts were contacted and responded to the survey.

4.0 Methodology

The method of survey was to contact the various water management agencies by phone, fax, and even mail in some cases. The questions asked in the survey were as follows:

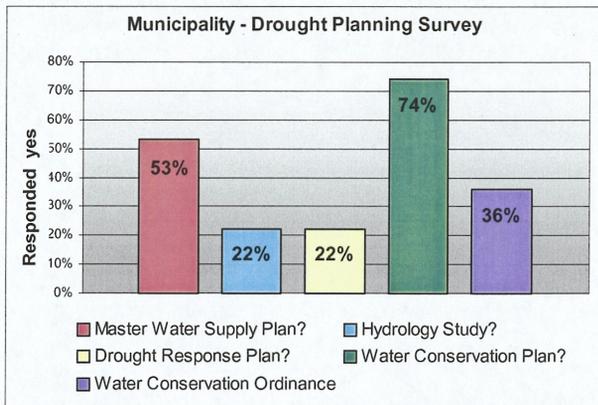
- Have you done any drought planning?
- Do you have a master water supply plan?
- Do you have a water conservation plan?
- Have you done a hydrology study that considers the risk of drought?
- Do you have a drought response plan?
- Is there an ordinance that prescribes water conservation in times of drought?
- Can you send us a copy of the work you have done?

Several municipalities and water conservancy districts indicated they were working towards completing various water management plans. However, for the sake of the survey if their water management plan was not done their response was recorded as a no.

5.0 Results - Municipalities

67 municipalities were contacted and responded to the survey, and the results are as follows:

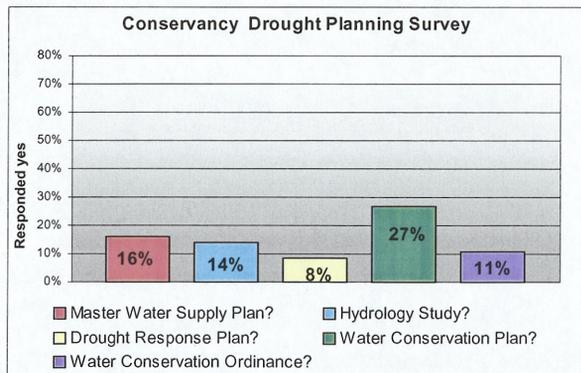
- 49% have done some form of drought planning,
- 53% have a master water supply plan,
- 74% have a water conservation plan,
- 22% have done a hydrology study that considers the risk of drought,
- 22% have a drought response plan, and
- 36% have a water conservation ordinance.



6.0 Results - Water Conservation & Conservancy Districts

Three water conservation districts and 44 water conservancy districts were contacted and responded to the survey, and the results are as follows:

- 18% have done some form of drought planning,
- 17% have a master water supply plan,
- 25% have a water conservation plan,
- 15% have done a hydrology study that considers the risk of drought,
- 9% have a drought response plan, and
- 6% have a water conservation ordinance.



7.0 Discussion

One of the most noticeable similarities in conversations with water managers was that both cities and water conservancy districts are not looking into the future. It was apparent that many of the conservancy districts have put little thought into drought planning. Many municipal water conservation and drought plans were very simple or "band aid" solutions consisting of voluntary lawn watering restrictions and educational programs. While this might slightly reduce demand in the short term, it does not address the real dynamics of supply and demand during a severe sustained drought.

It was evident that cities had more types of planning documents but also thought that drought planning was a good idea and that they were behind in that area. Some of the limitations to drought planning expressed by some of the districts were lack of money in their budgets, not actually owning but conveying water, and the Tabor Amendment. Many districts are small operations with little funds that operate on verbal agreements. While questioning we heard many times that "that is the way we have always done it."

General comments showed varying level of information but often helped paint a clearer picture of their role in water management in their area. In many cases the general comments showed: how far along in the water planning process, what types of water management plans they had, the types of water users, and the methods and determinations they use to in times of drought. What was surprising was that, while many districts had developed methods and verbal arrangements to manage water during drought, they often had not formally set triggers for drought responses in certain situations.

An underlying theme found while surveying was that water management is set up so users draw more in wet years and less in dry years. It is evident that this type of arrangement may work in short dry periods but may yield problems in extended drought episodes. We asked a few that responded this way what would happen at the end of a two or three year drought, and they indicated that they would be in trouble.

Some of the cities and water conservancy districts indicated that they would appreciate help in drought planning and would rely heavily on state assistance to do so. Districts that indicated they would like a good model of drought planning were the Grand Mesa WCD and the Lower South Platte WCD, Michigan River WCD, Upper Gunnison River WCD.

One district stated that state and federal agencies and laws, specifically the Endangered Species Act, have made it very hard to plan, implement, and complete water projects. Small cities and districts are often up against major opposition when trying to work with state and federal agencies.

A reoccurring response from the water conservancy district managers was that their shareholders have paid for their water and have the idea that they should use every drop since they have paid for it. There is no incentive for conservation and only sometimes concern for the guy down the river, a direct product of our "first in time first in right" water system. In many cases, if a user holds a senior water right they will get the water and the burden of drought falls on those downstream. A repeated statement was, "we are at the headwaters so why worry." An obstacle to surviving drought might be overcoming this mentality to shared the burden equally during drought periods.

At least three of the districts consider themselves as defunct organizations. The reason for this was that they formed as part of a water project that never materialized or that they do not own anything

and just convey water. One respondent even posed the question "If a district doesn't do anything does it need to exist. I am a lawyer and I have been trying to figure out for years how to dissolve this district."

Only a couple of people mentioned the recent statewide population boom. It is a known fact that while population has grown rapidly in Colorado, new reservoir construction has almost completely ceased. Compound this with the evidence that suggests we may be leaving a prolonged wet period and into a possible multi-year dry episode, you have the probability of serious water shortages in the very near future. Take into consideration the fact that water projects require many years from planning to completion and it is evident that many conservancy districts and communities need to start actively planning for future needs.

8.0 Examples of Good Drought Plans

A few municipalities and conservancy districts surveyed have produced good drought plans that could be used as a model by other entities when developing their own drought plans. Copies of these plans may be available through the CWCB or the preparing agency at nominal cost.

Ute Water Conservancy District

A comprehensive raw water management plan that was volunteered to the CWCB was from the Ute Water Conservancy District. The District's Raw Water Management Plan was prepared in 1990 to address water supply and projected water demand. The plan provides a means to estimate population growth, production, consumption, water losses, snowpack, surface water flows, and reservoir storage for the coming year. The plan incorporates a flow chart that provides quick reference and guidelines for general courses of action to be taken. The plan breaks drought into four categories: abundant supply, minor shortage, serious shortage, and severe drought and develops triggers at each level.

Denver Water

Denver Water prepared a Drought Response Plan in July 1997 which included an analysis of a synthetic 274-year tree-ring record to estimate that the drought in the 1950s had about a 29-year recurrence interval. Drought declaration triggers are tied to July 1 storage, and various response "option menus" for mild, moderate, and severe drought have been developed. In June 1999, Denver Water conducted an in-house exercise of the Drought Response Plan.

City of Louisville

This discussion of Louisville and their drought planning efforts comes from a presentation made at the Governor's Flood and Drought Conference December 1999 by Noel Hobbs and Joseph Stibrich. The City owns a variety of water rights on South Boulder Creek in the South Plate River watershed that were either originally decreed by the city or consist of agricultural water rights which have undergone transfer to municipal use. Faced with a diminishing supply of available senior water on South Boulder Creek the City initiated a Raw Water Master Plan to define its direction in meeting the future need of its service area.

The cornerstone of the master plan was the development of an operational computer model of the City's raw water supply system. The model was designed to simulate the diversion, conveyance, storage and delivery of water supply to current and future demands at the existing and proposed water treatment plant. The computer model simulates the operation of the City's system under various drought conditions patterned after historic droughts. Even though this model can show whether the existing system is capable of withstanding the drought occurring during that period, the results will not provide an estimate of the statistical "reliability" of the system. The analysis will not answer the question is the City protected against the once in a 50-year drought, the 100-year drought etc.

A statistical analysis of the historic streamflow record was conducted to characterize past drought in terms of magnitude, duration, and severity. Partial duration drought analyses were performed to

develop mass-frequency-duration curves of streamflow records. The MFDE curves were used to predict expected flow volumes for varying drought duration and recurrence intervals. A method was also developed to plot the MFD curves on a semi-logarithmic versus extreme value probability scale using standard spreadsheet software.

A concern with the partial duration analysis, particularly in areas such as the Front Range was the majority of the annual water runoff that occurs over a relatively short period of time as a direct result of snowmelt. The statistics for the analysis for a short drought duration of six months or less are biased by the inclusion of the low flow season data in the analysis. Frequency duration analyses were conducted using the Log Person Type III distribution on runoff season flow to evaluate the effect of such a bias.

The drought analysis results revealed that giving any period a specific drought label (e.g. the 50-year RI, 24-month duration drought) is not a clear-cut decision and can be misleading. Any such drought could also be shown to be comprised of a multitude of both dependent and independent drought of shorter duration and both lesser and greater severity. Rather than selecting the worst drought of record as the design period for the Master Plan drought periods in the historical record were located on the MFD curves. This was done to identify candidate simulation periods for modeling the City's system at acceptable levels of protection defined by both duration and frequency of occurrence.

City of Loveland

In cooperation with the CWCB, in August 1986 Loveland conducted a Phase I Drought Study based on a 1,000-year synthetic monthly supply record to determine 100-year drought conditions. The study led to the enlargement of Green Ridge Glade Reservoir, which is being financed by a loan from the CWCB Construction Fund.

The City was concerned about the systems capability to provide a firm water supply under drought conditions. To address these concerns, a comprehensive water resources planning study of the City's raw water supply system was conducted. This was to evaluate the ability to provide a reliable water supply under drought conditions for a 30-year planning horizon: 2) evaluate and recommend alternatives for providing an emergency and firm water supply; and 3) conduct an economic feasibility study of the recommended alternative.

Increases in raw water demands and acquisition of additional water supplies was projected for Loveland under three population growth scenarios. Two computer models were developed to simulate monthly operation to the City's system. The first model (BTRIVER) simulates the diversions of the City's and other water rights on the Big Thompson River. The second model (LOVESYS) simulates the operation of the C-BT and windy Gap systems and then allocates raw water source to direct demand and storage. Deficits are then computed where supplies are insufficient to meet demand. Using historic streamflow records on the Big Thompson and Colorado Rivers and regional precipitation data, 10000-year synthetic streamflow records on the big Thompson were developed and input into the models. The synthetic records allowed operational test of the system's ability to meet demands under a wide range of drought conditions providing a statistical basis to characterize the objective that sufficient water supplies should be developed through the year 2015 to eliminate deficits at the 100-year recurrence interval.

Twelve alternatives were identified and evaluated based on their ability to reduce or eliminate the projected 100-year deficit. The alternatives included additional raw water storage, purchased/lease of additional water, reuse, exchanges, water conservation, revised operations, ground water, and various combinations. The evaluation process considered cost, environmental and social impacts and operation constraints. Throughout the study public input was received via monthly citizens forum meeting and workshops. The recommended alternatives included the expansion of the City's reservoir and purchase of additional C-BT units. Both computer models were installed and are used to periodically update study results as population grows and additional water supplies are acquired.

Based on the planning study results the City Council approved a series of eight annual water rate increases to provide revenues for bonding the expansion of the reservoir. In addition up to 50% of the

construction and engineering costs of the recommended alternative can potentially qualify for state funding under the Colorado Water Conservation Board's –Construction Fund Program.

Louisville

Doug Short is now the director of Public Works for the city of Louisville. While he was a manager for California's Belmont County Water District in the early 1990's he was apart of the districts development and adoption of a "Water shortage Contingency" plan. Elements of this plan were coordinated planning by involving the public, projecting water demand, inventorying water supply, developing stages of action and consumption limits, developing a water wasting ordinance, developing excessive use charges, analysis of revenue and expenditure impact, implementation, and water use monitoring procedures.

The basic premise of this plan was to develop consumption limits for indoor and outdoor use for the different water users and allot water by certain criteria. Users conserving water were allowed the opportunity to bank water through the system. Similarly excessive water users paid an increasing rate for units used. The "water wasting" ordinance made provisions to not allow customers to buy their way out of rationing with the threat of installing water flow restrictors. According to Doug Short the program was a success and promoted sound water use at many levels. Dough Short also plans to propose that the City of Louisville develop new water billing software. Various water billing software is out there but is often rigid not allowing the creativity needed to conserve and apportion water in times water shortage.

Greeley

Greeley has adopted a drought response plan where the plan administrator determines reservoir storage levels for the upcoming year, can change trigger levels and presents to the board projected storage for the following April 1st. The plan administrator utilizes four trigger levels and a storage reporting form. Reservoir target storage is 80%, 60%, 40% and 20% of average. Their forecasting indicators are the Colorado River Basin Surface Water Supply Index (SWSI) below -0.3, South Platte River Basin SWSI below 2.1, Big Thompson River Basin snow pack below 75%.

Greeley has three levels of drought policies that include suspending leases of water, voluntary water conservation, voluntary interruptible supply plans, public information program, and every other day and time lawn watering restrictions with penalties for non-compliance.

Greeley drought monitoring and response steps are as follows. 1) annual Calculation of Drought storage trigger levels 2) calculation of projected April 1st storage level 3) notify director and board when April 1st storage projection is below drought trigger levels 4) notify director/board of critical water lease requests which will trigger drought policies 5) director/staff report circumstances and recommendation for implementation of drought policies 6) decision by board on adopting drought policies 7) city emergency plan may be invoked if level 3 or 4 policies are implemented 8) monthly report on water supply 9) decision by board to rescind drought policies 10) updating drought emergency plan.

Drought Response Plan Resources

The following is a list of drought and climate internet resources that have graphics and information that are used as indicators or monitors to assess current and future water and precipitation situations. Also listed are drought publications that may be helpful in preparing a drought response plan.

- U.S. Drought Monitor
<http://enso.unl.edu/monitor/monitor.html>
- Surface Water Supply Index
<http://www.co.nrcs.usda.gov/snow/swsimap.gif>
- Snowpack
<http://www.co.nrcs.usda.gov/snow/swelsit/colavg.gif>
- Snow Water Equivalent
<http://www.co.nrcs.usda.gov/snow/resmap.gif>
- Reservoir Storage
<http://www.co.nrcs.usda.gov/snow/resmap/gif>
- Streamflow Forecast
<http://www.co.nrcs.usda.gov/snow/strmmap.gif>
- Standard Precipitation Index
<http://ccc.stmos.colostate.edu/SPI.html>
- Palmer Drought Severity Index
<http://www.srh.noaa.gov/FTP/ROOT/LCH/drought.html>

Water in the Balance. “**A History of Drought in Colorado.**” Publication by Colorado State University-Colorado Water Resources Research Institute. Written by Thomas McKee and Nolan Doesken. December 1999.

American Water Works Association. “**Drought Management Planning**”. Prepared by the Water Shortage Subcommittee. 1992.

National Drought Mitigation Center. University of Nebraska. “**Improving Drought Management in the West**”. Donald Wilhite. 1997.

“**The Governors Flood and Drought Conference**”. Speeches, papers and graphics from this conference are being developed into a publication by the Department of Natural Resources.

Appendix A

Sample Drought Survey Work Sheet

Appendix B

Summary of Drought Survey Comments



Colorado Water Conservation Board

Summary of Drought Survey Comments

Municipalities

Entity	Contacts	Remarks
Alamosa	Don Koskelin Public Works 719-584-6631	We are working now on an in-house drought plan and hydrology study.
Arvada	Ken Peterson 303-421-2550x3318	We are linked to Denver so, yes, they have a drought plan.
Aspen	Leigha Deesma Water Department 970-920-5110	Yes we have one. It takes up 3 pages in Aspen's Municipal Code. Mater Plan speaks to water rights and availability.
Aurora	Renee Reed Water Conservation Specialist 303-739-7381	In case of drought, we will enforce water conservation regulations. In essence we don't have a "drought plan," but we have rules if drought occurs.
Bancroft-Clover W & S District	Helen Whitney 303-922-1113	None
Boulder	Paul Lander Water Conservation Office 303-441-4081	None
Brighton	Rodney Evans Water Supervisor 303-659-4050	All our water comes from wells. We have a water augmentation plan under GASP in case of a drought year.
Broomfield	Mike Bartleson Utilities Director 303-469-3301	Water supply is under contract with Denver and is Big Thompson and Windy Gap. Have alternating days for watering restrictions. We intend to build additional supply through Windy Gap Project. Should be able to survive a once in 50 year drought.
Canon City	George Millican 719-269-9019	We have water conservation educational programs and our water restrictions would go into effect during a drought year.
Castle Rock	Billie Scott 303-660-1015	None
Centennial W & S District	Rick McCloud Water Resource Manager 303-791-0430	We have our own surface flow model and have done a drought risk hydrology study through Hydrosphere.
Cherokee Metropolitan District	Stuart Loosely 719-597-5080	Stuart has been monitoring rainfall since 1952 and many of these year were above average for rainfall. Two things are encouraging right now, use of the word "regional" in discussion. Efforts will be made into infrastructure and water official are working together.
Clifton Water District	Dale Tooker 970-434-7328	We are working on a drought plan; however, it is not complete. We do have a policy in place for water conservation during a drought period.
Colorado Springs	Anne Seymour Water Conservation Manager 719-448-4556	Yes, we have a drought plan, but it has not been updated for some time. A committee is being formed to revise it.

Entity	Contacts	Remarks
Consolidated Mutual Water Company	Monte Edwardson Water Supply and Treatment Manager 303-238-0451	In-house analysis of 12 years ago showed Maple Grove reservoir to be adequate for a three-year drought. Starting construction of Fortune Reservoir to impound water and meet goals. Drought plan is to have voluntary restrictions first year, mandatory second year and in-house use only the third year.
Cortez	Bruce Smart Public Works 970-565-3402	Drought is not a high priority now. We do not have a specific drought plan. We have 4.2 cfs senior direct flow rights and storage rights. In case of drought we would initiate our watering restrictions. But we have a big reservoir (McPhee) with so much excess water we would never cut it off.
Craig	Dan Alden	We only have a master plan.
Crestview W & S Department	Bill Roecker 303-429-1881	We are under contract with Denver and will abide by their drought provisions.
Denver Water Department	Liz Gardener	Denver has a "Drought Response Plan" with separate "Technical Appendices" dated July 1997. The drought response plan includes triggers for 3 levels of drought declarations and a menu of options to consider during a drought. The plan was "exercised" in 1999. Denver also has an Integrated Resource Plan called "Water for Tomorrow" with the same date. Their Water Conservation Master Plan was last updated in 1997.
Durango	Mike Amato 970-385-2282	We do have a master water supply plan for the future and we would enforce watering restrictions during a drought period.
East Cherry Creek W & S District	693-3800	None
East Larimer Count Water District	Web Jones	Have relied on City of Fort Collins work on hydrology study form Resource consultants. Have staged voluntary and mandatory conservation measures. We still have rental water we can access.
Englewood	John Boch 303-762-2643	We have an ordinance that prescribes water conservation in case of drought. I will check it out further and get back to you describing our drought plan.
Estes Park	Bill Lannane 970-586-5331	Yes we do have sort of a drought plan that would involve water restrictions in the Summer.
Federal Heights	Don Pardis 303-428-0422	No we have no drought plan. We are growing too fast and are entirely overwhelmed by it all.
Fort Collins	Dennis Bode 970-221-6672	Yes, we have a master water supply plan for the future and we have had a hydrology study based on the risk of drought. We have provisions for drought in our city code and an ordinance that prescribes water conservation in case of drought.
Fort Collins – Loveland Water District	Mike Ditullijo Manager 970-226-3104	We prepare for a 50 to 100 year drought.
Fort Lupton	Ramon Hernandez Public Works Director 303-857-6694	None
Fort Morgan	Perry Eisenach 970-867-4310	No, not formerly. However, we will have a new water supply next month.

Entity	Contacts	Remarks
Fountain	Nick Zaige 719-382-7591	We do have a master water supply plan for the future, and we are planning to update next year. I will check and get back to you with more information.
Glenwood Springs	Robin Millyard Public Works Director 970-945-2575	Have done limited drought planning and have watering restricts.
Golden	Fran McLean 303-384-8184	Initial response: I think Golden has not very concrete ideas about drought. I don't really think there is an ordinance or anything. We are not much concerned about it, but we have worked with Coors. Second Response: We do not have a drought plan, but we do have a "Dry Year Yield Water Supply Plan" which showed we could supply enough water in a dry year. We are building two new reservoirs.
Grand Junction	Greg Trainor (Ron Key) Department of Public Works 970-224-1564	Yes, I'm sure we do. I will check it out. We have a master water plan.
Greeley	Todd Williams 970-350-9291 Water and Sewer Department	We did a drought study last year. We used the MODSIM computer model to look at water supply yields in a 100-year drought. We also have a Drought Emergency Plan. We report three times a year on reservoir storage levels. We have modules for enacting water conservation measures. Our biggest issue is the dependency of rural domestic companies on leased water. We are working with them to become more self sufficient through the development of water acquisition plans with funding from DOLA.
Green Mountain W & S District	Judy Dahl 303-985-1581	Buy water from Denver and will follow their direction.
Gunnison	Ken Coleman 970-641-8020 Eddie Balch Water Superintendent 970-641-8330	NO! They don't appreciate the State's Water Planning; they want local control; they don't want to give water away, and they say it's none of the State's business. Second Response from Eddie Balch. For conservation plan provide irrigation water for residents. Regarding drought reservoir management is a major part of the battle.
Ken Caryl W & S District	Kells Waggoner	In Denver rules is water conservation measures.
La Junta	Joe Kelley 719-384-7358	We do not have a drought plan. We do have a Master Plan. We have participated with the SECWCD on a regional drought study. Our wells are augmented with Frying Pan Project agricultural water when they are out of priority.
Lafayette	Doug Short Director of Public Works 303-655-5588	We have purchased surface water rights to help drought proof. We are 90% of the way to our goal. Would like to implement measures used for water rationing and water banking used in California when I worked there.
Lakehurt W & S District	Dave Irish 303-985-7895	On long-term master agreement with Denver Water Dept. In drought response we inform new builders with 90 notice to stop selling new water taps
Lamar	Dan McMillan Public Works 719-336-2002	We passed an ordinance with mandatory and voluntary water conservation restrictions in times of drought. This is a two step process.
Left Hand Water District	Kathy Peterson General Manager 303-530-4200	Did a water rights analysis through Rocky Mountain Consultants of Longmont in 1990. Study determined yield of native supplies and amount of storage required to survive a drought.
Little Thompson Water	Hank Whittet	We have done a report for conservation plan and got funding through

Entity	Contacts	Remarks
District	District Manager 970-532-2906	library for xeriscaping project. We have a hydrology model we use. We are addressing the need for native supplies.
Longmont	Nelson Tipton Water Resource Analyst Water Resources Division 303-651-8365	We really don't have a drought plan, but we do have a drought study which we incorporated into our master water plan.
Louisville	Thomas Phare 303-666-6565	Indirectly we have a drought plan. We purchase water from Northern Colorado Conservancy District. We have done planning work and can foresee no projected shortages.
Loveland	Larry Howard (Gail) 970-962-3703	We have a two phased Drought Study. Phase 1 looked at existing resources and future deficits under a drought and a 3½ % growth rate. Camp Dresser & McKee completed Phase 1 in 1986. Phase 2 was an evaluation of 12 alternatives to develop more water supply and storage. We decided to enlarge Green Ridge Glade Reservoir based on the results. We have a water conservation plan, but there is no drought response plan or drought policy. Our ordinance includes watering restrictions developed in response to the limitations of our treatment plant capacity.
Monte Vista	Tony Martinez Public Works Director	Have done in-house conservation plan and have a plan for meter installation. We should work to be prepared for drought.
Montrose	Dick Marget 970-249-5935	We have no drought plan. Drought is an ugly word here. The valley has a surplus of water. We are only limited by our treatment plant capacity. We purchase Project 7 water. We have a water conservation plan.
North Washington Street W & S District	Jim Jamsay 303-288-6664	None
Northglenn	Russ Moore	Demand Modeling base on 1954 drought. Have done an in-house hydrology study.
North Weld County Water District	Don 970-356-3020	None
Parker	Don Pierce 303-841-2058	We do have a master water supply plan for the future and have had a hydrology study based on the risk of drought in the area. I will get back to you with more information regarding our drought plan.
Pueblo Board of Water Works	Bud O'Hara Board of Water Works 719-584-0236	We do not have a "drought plan," but we do have provisions in our water conservation plan that would become effective if there was a drought.
Rifle	Bob Jones 970-625-2841	We do have a master water supply plan for the future. I will check to see if we have had a hydrology study based on the risk of drought and also to see if we have a drought ordinance.
Salida	Lonnie Oversole 719-539-6721	We are in the process of writing our drought plan for our water supply for the future. We are also working on a hydrology study and we have an ordinance that restricts watering.
Security W & S District	Joe Cantrell Manager 719-392-3475	For drought response plan when the water table gets low we will limit water deliveries.
South Adams County Water & Sanitation	Lori Willener 303-286-6538	No, we do not have a present drought plan. We do have an ordinance that prescribes water conservation in case of drought.

Entity	Contacts	Remarks
District		
Sterling	Justin Stone 970-522-9700	We do not really have a drought plan. Drought may be discussed in our conservation plan or our water resources plan. But there is no drought policy.
Tri-County Water Conservancy District	Mike Berry, Manager 970-249-3369	We are a rural domestic water provider. We have no drought plan. We have 12,000 acre-feet of water available in Ridgeway Reservoir and only use 2,500 acre-feet per year. With such a small need, we have ample supply that could last a number of years. If the supply was only 30% of normal, we could still fill our reservoir.
Thorton	Mark Koebler 303-538-7209	We used the 1950's drought and historic streamflow records to create a system yield model.
Upper Eagle Regional Water Authority	Tom Fiddler 970-476-4080	Have two reservoirs but have not done much drought planning. We have summertime voluntary watering restrictions. We reclaim back wash water at the plant and do education and xeriscaping
Vail Valley Consolidated Water District	Tom Fiddler 970-476-4080	Have two reservoirs but have not done much drought planning. We have summertime voluntary watering restrictions. We reclaim back wash water at the plant and do education and xeriscaping
Westminster	Tom Settle 430-2400-2187	Yes, we have a drought plan, and we do have an ordinance that prescribes water conservation in case of drought.
WheatRidge	Walt Petit 303-424-2844	Water conservation techniques include three day spring calendar watering guide. Part of Denver water and endorse their recommendations.
Widefield Homes Water Company	Larry Bishop 719-390-7111	None
Willow Brook Water & Sanitation District	John Mead 303-489-0549	In emergency we can enact own lawn watering restrictions. We feel we have a strong conservation program and a newsletter. We are under a master water meter contract with Denver.
Willows Water District	Kahn Lee 303-770-8625	Water conservation Plan done through Colorado State University. During drought our problems will be solved by Denver Water.
Windsor	Terry Walker 970-686-7476	We do have a master water supply plan for the future, but no drought plan. We would enforce water restrictions during a drought period.



Colorado Water Conservation Board

Summary of Drought Survey Comments

Water Conservancy Districts

Conservation District	Contacts	Remarks
Colorado River Water Conservation District	Eric Kuhn 970-945-8522	Water conservation plan and hydrology study are associated with water marketing program. Reservoir level triggers drought response. The District has an annual meeting with NOAA to discuss climate issues.
Rio Grande Water conservation District	719-589-6301	None
Southwestern Water Conservation District	970-247-1302	None
Conservancy District	Contacts	Remarks
Animas-La Plata Water Conservancy District	Mary Fenwick Secretary 970-247-2659	Wright Water Engineers is working on our Water Conservation Plan.
Arkansas River Water Conservancy District	Dale Cox Chariman 719-456-0073	Our responsibility is to maintain a flood control dyke around Las Animas Reservoir built by the Corps of Engineers in the 70's.
Badger Beaver Water Conservancy District	Don Mclary Attorney 970-842-4183	We are a small district that has board meetings once a year. Last year crops were good but prices were bad.
Basalt Water Conservancy District	R. Scott Fifer, Hydrologist Resource Engineering 970-945-6777	BWCD provides reservoir storage contracts and other water rights. Have 300 active contracts and 1,100 a.f. water under contract. Contract applicants are screened to insure uses are absolutely necessary. Contract amounts are calculated and awarded on conservation water use amounts to preclude water. The BWCD assists the local water commissioners and Division engineers office in requiring contractees to install and read water meters at points of supply. This insures the state and BWCD that water is not diverted in excess. These practices illustrate prudent water supply planning and water conservation.
Battlement Mesa Water Conservancy District	Edward Currier President 970-242-0905	Our District was formed years ago part of a Bureau of Reclamation storage project that never materialized.
Bluestone Water Conservancy District	George Letson Sec. Treasurer 970-285-7605	Has the feeling that some water users would like to get out from under the district but they realize its importance for the future. The District is left over from the oil shale days to protect the water interests.
Bostwick Park Water Conservancy District	Elaine 970-249-8707	We are currently writing a procedural manual for all superintendents. We got a grant from the Bureau of Rec. to use a GPS unit (stream gages?) and locate sites and where all the boxes are.
Central Water Conservancy District	Tom Chech Executive Director 303-825-0474	We have requested their 1 page drought plan, (1995 TCWCD).
Collbran Conservancy	Wes Hawkins	They are currently working on water management plan.

Conservation District	Contacts	Remarks
District	970-487-3306	
Conejos Water Conservancy District	Bob Robins 719-843-5261	We are in the process of developing a Water Conservation Plan for the Bureau of Reclamation due to be completed in March 2000. In Platoro Reservoir they allocate 50% of water in storage and 50% is carried over to next year. This has been the policy for 10 years. In 1998, three ditches used 1999 water and didn't get a drop in 1999.
Costilla County Conservancy District	Bob Green 719-672-3213	We have been farming here for 150 years using ditches, and drought is not a problem. The issues are gold mining and logging creating pollution.
Crawford Water Conservancy District	John Cunningham 970-921-3266	We will be creating water supply plan this year.
Dolores Water Conservancy District	John Porter 970-565-7562	We need to call them to see what plans we want.
Florida Water Conservancy District	John Ey 970-247-5332	Our Water Conservation Plan is ten years old, and it was done by John Ey. He has managed the dam for 23 years. In fall 1999 he had the intuition to not dump water after summer and keep the reservoir full. This proved to be the right decision. The dam was built in 1963. Water levels got low in 1997 and 1977. 1977 was the lowest. Every year we issue 70% of total supply. There is no leeway to put storage aside and keep the reservoir full. We have priority of cities over agriculture but haven't needed to do so. Snow pack ws 12% of average on 1/15/2000. After 1977 drought, Chuck Lile got board and ditch companies together to put water to most beneficial use. In drought years we give them options to store adjudicated water in the reservoir for a surcharge. This helps others and keeps water around, as opposed to the attitude "I must use every drop I am entitled to."
Fruitland Mesa Water Conservancy District	Bill Mugford Secretary Treasurer 970-921-7221	Has a gripe with the CWCB. It seems CWCB is concerned with domestic water rather than agricultural water issues. Have been trying to get water project but is harder now the BOR is involved.
Grand Mesa Water Conservancy District	Charles Richards Secretary Treasurer 970-856-6557	The district wants a copy of our findings. They have not done planning but have done reservoir rehabilitation. CWCB gave money years ago to do a study. Lots of hoops to go through when working through Corp of Engineers and USFS.
Great Northern Water Conservancy District	Rod Peck Attorney 970-824-6561	No activity as far as someone running the district. They have been inactive for 10 years.
Huerfano County Water Conservancy District	Ray Harriman President 719-738-3429	We have done hydrological study as part of our water resource manual done by Ted Zurich. We have not done drought planning. The Tabor Amendment leaves no budget money for such planning. We are monitoring stream flows. We are constructing one west of Walsenburg.
Jackson County Water Conservancy District	970-723-4660	None
Juniper Water Conservancy District	Tom Trevenen Secretary Treasurer 970-824-5311	We are a defunct board. Contact Daryle Steele for planning work. It was agreed some time ago that there would be no reservoirs on the Yampa. We have enough water for current irrigation needs.
La Plata Water	Clara Mae Schmitt	Our Water Conservation Plan is part of Animas La Plata "Lite."

Conservation District	Contacts	Remarks
Conservancy District	Secretary Treasurer 970-588-3416	We watch for water filings, and we are developing a community spring for domestic use.
Lower South Platte Water Conservancy District	Bob Schott Manager 970-522-1378	We are working toward a plan. The district has a recharge project. We would like a good model of drought planning to assist us. Have new augmentation plan 700 days away and involves areas that are offstream for recharge projects.
Mancos Water Conservancy District	Gary Kennedy Superintendent 970-533-7325	We have done a simple Water Conservation Plan through the Bureau of Reclamation. In water management must fill up reservoirs or give the water up.
Michigan River Water Conservancy District	Newell Geer President 970-723-4691	We have built a reservoir and have a water release policy. During drought periods we meet with county commissioners to help make decision. We have an understanding regarding conservation in drought periods. We think a drought plan is a good idea and can be made to work. Since a shareholder is entitled to all the shares he has paid for through assessments it is difficult to tell him he can't use them all
Middle Park Water Conservancy District	Stanley Cazier Attorney 970-887-3376	Supplies for MPCD are Windy Gap operated and owned by the municipal sub-district of the NCWCD. Wolford Mountain Reservoir is operated by the CRWCD. We have filed an exchange application that will substitute Wolford for Windy Gap water in a drought situation.
North Fork Water Conservancy District	Jean Hampton Secretary Treasurer 980-872-2488	None
North La Junta Water Conservancy District	Roy Fritch President 719-384-7136	None
Northern Colorado Water Conservancy District	Eric Wilkinson 970-667-2437	We did a regional water demand study based on land use rather than population. Fort Collins is now metering to help with conservation.
Purgatoire River Water Conservancy District	719-846-7285	None
Rio Blanco Water Conservancy District	Ann Brady District Manager 970-675-5055	None
Saint Vrain & Left Hand Water Conservancy District	Les Williams Executive Director 303-772-4060	We have a Master Water Supply Plan prepared in the late 80's. The hydro study looked for new reservoirs (Power Authority and CWCB 1986). The City of Longmont probably has an ordinance. "Its been wet for so many years, we are worried about what would happen in a drought with the population increase"
San Luis Valley Water Conservancy District	719-852-2315	None
San Miguel Water Conservancy District	William Bray President 719-846-7285	We have a hydro study by Boyle Engineers in early 90's. We need new reservoirs and do not have enough storage in times of drought.
Silt Water Conservancy District	970-675-5055	Reservoir levels trigger drought responses.
Southeastern Colorado Water Conservancy	Les Williams Treasurer	We do not own facilities but allocate left over project water. The ratio is 51% municipal and 49% agriculture. Realistic figures for

Conservation District	Contacts	Remarks
District	And Tom Simpson Water Resource Manager 303-772-4060	now are 25% municipal and 75% agricultural. We will send CWCB our water conservation plan. Colorado Springs and Pueblo have ordinances to prescribe conservation.
Tri-County Water Conservancy District	Dennis Felmlee 719-852-2315	We must request a copy of their work (1995 TCWCD).
Trinchera Water Conservancy District	William Bray 970-327-4427	There has not been a drought since Deva was there in 1988. There is no plan but we know the amount we deliver and irrigate. Our philosophy is to try and use what we can and keep from contributing to Rio Grande water. We are not part of the Rio Grande Compact.
Upper Arkansas Water Conservancy District	Ken Baker General Manager 719-539-5425	Our Water Conservation Plan is (97CW84, Division 2, General Plan of Augmentation)
Upper Gunnison River Water Conservancy District	Kathleen Klein Manager 719-544-2040	We need to work on planning. Our problem is that we have numerous small suppliers. The district does not manage projects but manages releases from Taylor Reservoir. We would rely heavily on state assistance and guidance to address drought planning issues.
Upper South Platte Water Conservancy District	970-249-3369	None
Upper Yampa Water Conservancy District	Deva Dean 719-379-3467	We have done no drought planning. We are in the upper valley at the headwaters, so there is little worry. We promote water conservation. One year when Fish Creek was low before reservoir enlargement we did restrict lawn watering.
Ute Water Conservancy District	Tom Crumpton 970-242-7491	Drought planing is in our Raw Water Management Plan. We did our own conservation plan, and it was approved May 8th, 1996 by our board. We recommend the use of irrigation water in new subdivisions, but it is not mandatory. Each watershed is different and we need to build flexibility into our plans. Our concern this year is that it was dry going into winter, and spring runoff will get soaked up buy arid land.
West Divide Water Conservancy District	Janet Maddox 970-625-5461	None
Yellow Jacket Water Conservancy District	Frank Cooley 970-454-3377	The White River can suffer the effects of prolonged drought, such as in 1988, because of the vast storage and drainage area at elevations of 9,000 feet and above in two unmeasured aquifers, the Devonian quartzite and the Miississippian Leadville Limestone. Because of the small population, there will always be enough water for people but maybe not for hay.