

**UPDATED INFORMATION PROVIDED IN
SUPPORT OF THE 2002 COLORADO
DROUGHT MITIGATION AND RESPONSE
PLAN**

**(IN CONFORMANCE WITH REQUIREMENTS OF
THE DISASTER MITIGATION ACT OF 2000)**

COLORADO WATER CONSERVATION BOARD

JUNE 2007

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JUNE 2007

PREPARED BY LEONARD RICE ENGINEERS, INC.
IN CONJUNCTION WITH COLORADO WATER CONSERVATION BOARD

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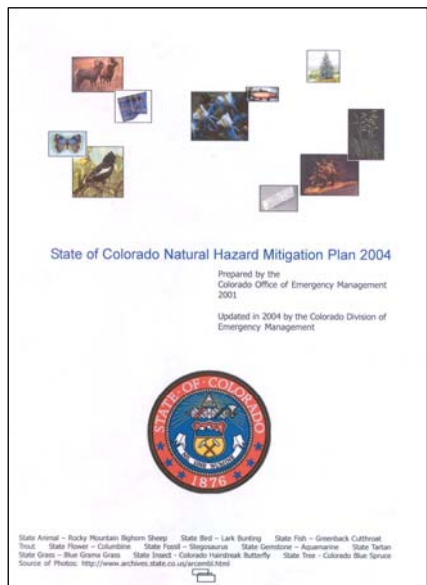
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INTRODUCTION

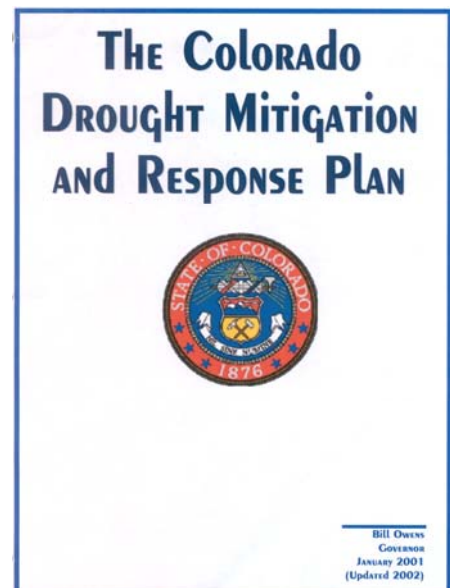
The Disaster Mitigation Act of 2000 (P.L. 106-390) requires states to conduct mitigation planning for natural disasters that may affect the state. In 2000, a new Mitigation Planning section (§ 322) was added, which emphasized the need for state and local coordination on mitigation planning and implementation, as well as continuing the requirement for a state mitigation plan as a condition of federal disaster assistance. It requires the state's natural hazard mitigation plan to be updated every three years. The Interim Final Rule which implements these requirements was published by the Federal Emergency Management Agency (FEMA) on February 26, 2002. To date, a Final Rule has not yet been published; until it is, the Interim Rule is to be used for updates.



The State of Colorado adopted and received FEMA approval on its Natural Hazard Mitigation Plan (NHMP) in 2004. The plan addressed several different natural hazards, including droughts. Information for all natural hazards that impact the state was compiled in the Natural Hazard Mitigation Plan. Additional information on drought activities was included as an Annex to the plan. This stand-alone document, The Colorado Drought Mitigation and Response Plan, describes in detail the process for drought planning in the state as well as long-term drought mitigation opportunities. Information on agency responsibilities and existing drought relief programs, drought resources, local drought plans, and contacts for local government outreach and assistance are also included in the Drought Plan.

This present report was developed in conformance with requirements of the FEMA Interim Rule, and is focused on updating the drought portions of the state's Natural Hazard Mitigation Plan. As such, it is built upon existing information contained in both the State of Colorado Natural Hazard Mitigation Plan 2004 and The Colorado Drought Mitigation and Response Plan (updated 2002). It is not an attempt to rewrite either of these documents; the Natural Hazard Mitigation Plan itself will be updated by the Colorado Division of Emergency Management (DEM), and changes to the Drought Mitigation and Response Plan will be evaluated and recommended within the next year.

Rather, this report provides information required by the FEMA statute and regulations to assist the DEM and Colorado Water Conservation Board (CWCB) staff with the 2007 update of the state's Natural Hazard Mitigation Plan.



PREREQUISITE

ADOPTION BY STATE

The State Hazard Mitigation Plan must be formally adopted by the state prior to submittal to FEMA for final review and approval. In addition, the Updated Plan must include assurances that the state will comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding, in compliance with 44 CFR 13.11(c). The state must also amend its plan whenever necessary to reflect changes in state of federal laws and statutes as required in 44 CFR 13.11(d).

Formal adoption by state

The 2004 State of Colorado Natural Hazards Mitigation Plan was approved and adopted by the State of Colorado, Department of Local Affairs, Office of the Governor¹. For this 2007 Plan Update, it will be the responsibility of the Division of Emergency Management to obtain the appropriate formal state approval.

Assurances of continued compliance with federal requirements

In the 2004 Plan Update, the following language was included: “The State of Colorado assures it will comply with all applicable federal statutes and regulations in effect with respect to the periods for which it receives grant funding in compliance with 44 CFR Part 13.11(c). The State will amend its Plan whenever necessary to reflect changes in state or federal laws and statutes, as required in 44 CFR 13.11(d). The adoption of this Plan demonstrates the State of Colorado’s commitment to fulfilling the mitigation objectives in the Plan and authorizes the agencies identified in the Plan to execute their responsibilities.”² It is recommended that this same language be included in the 2007 Plan Update

PLANNING PROCESS

DOCUMENTATION OF THE PLANNING PROCESS

The plan must include a description of the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how other agencies participated. New requirements include documentation of how the planning team reviewed and analyzed each section of the plan, and an indication in each section whether or not it was revised as part of the update process.

Description of plan preparation process

The process used to update the Hazard Mitigation Plan in 2004 is documented in Appendix G³.

For this update, the CWCB, through its staff, was responsible for providing relevant updates for the drought portions of the State of Colorado Natural Hazards Mitigation Plan 2007 Update. The CWCB then contracted with Leonard Rice Engineers, Inc. (LRE) to assist in this effort.

Working together, the team developed the following strategy to update the drought information for inclusion in the 2007 Update.

CWCB staff provided LRE with relevant information, including the following:

FEMA's *Blue Book Update Introduction* (11/02/06), *Standard State Plan Update Guidance* (11/02/06), *Standard State Updated Crosswalk* (11/02/06), DEM's *State of Colorado Natural Hazard Mitigation Plan 2004*, *Colorado Drought Mitigation and Response Plan* (updated 2002), and *State Emergency Operations Plan* (May 2006); and CWCB's *Drought and Water Supply Assessment* (2004). Several other key documents and studies were provided; all references used are listed in the bibliography.

LRE then compared the federal requirements to the existing plans, and identified which section(s) of the current plans fulfilled the various FEMA requirements. Sections that needed to be updated were identified in concert with CWCB staff input. LRE reviewed several documents that had become available subsequent to the 2004 Plan, and identified information that could be used to update the existing drought-related portions of the plan. CWCB staff also identified outside agencies that should be contacted to provide updated information. In instances where there were new FEMA requirements that had not applied to the previous update, LRE and CWCB identified appropriate existing data and information that could be used to fulfill these requirements. In some cases, the information was simply not available, nor could it be obtained in time for the 2007 update. When this occurred, this report makes recommendations for obtaining the needed information and data during the next plan update cycle, so it can be incorporated into the 2010 update.



Who was involved

The following table identifies those that were involved or contacted for input in updating the drought portions of the plan.

Name	Agency
Genoveva McCaig (CWCB Project Manager)	Colorado Water Conservation Board, Office of Water Conservation & Drought Planning
Katie Fendel (LRE Project Manager)	Leonard Rice Engineers, Inc.
Mike Carnevale (LRE Senior Project Manager)	Leonard Rice Engineers, Inc.
Jack Byers (Deputy State Engineer)	Colorado Department of Natural Resources, Division of Water Resources, State Engineer's Office
Marilyn Gally (State Hazard Mitigation Officer)	Colorado Department of Local Affairs, Division of Emergency Management
Laura Nay	Office of Emergency Management
Mary Halstead*, **	Colorado Division of Wildlife
Barry Cress*, **	Colorado Department of Local Affairs
Jeff Tranel*	Colorado State University
Reagan Waskom*, **	Colorado State University
Stefanie Dalgard*	Colorado Office of Economic Development & International Trade
Klaus Wolter**	National Oceanic & Atmospheric Administration, ESRL
Bob Steger**	Denver Water Department
Jim Miller**	Colorado Department of Agriculture
John Henz**	HDR Engineering
Don West**	Colorado Department of Natural Resources, Division of Water Resources
Nolan Doesken**	Colorado State University, Climate Center
Richard Homann**	Colorado State Forest Service
Treste Huse**	National Weather Service
Andy Pineda**	Northern Colorado Water Conservation District
John Gordon**	U. S. Geological Survey
Jack Truby**	Public (formerly OEM)
Kevin Reidy**	Aurora Water Department
Mike Gillespie**	National Resources Conservation Services
Leon Sanders**	U.S. Department of Agriculture, Farm Service Agency

* Indicates member of Impact Task Force

** Water Availability Task Force participant

Those that participated in the 2004 plan update (and previous updates) are listed in Appendix H of the 2004 Hazard Mitigation Plan⁴.

Other agencies' participation in current process

Other agencies' participation in the 2004 update of the Hazard Mitigation Plan is documented in Appendix G and in the Executive Summary⁵. Efforts specific to the drought planning portion are described in the existing drought plan⁶.

Early in the process, LRE made presentations at meetings of both the Impact Task Force (ITF) and Water Availability Task Force (WATF). (See above table for members of these task forces that were in attendance.) The presentations focused on the update needs for the drought portions of the 2007 Hazard Mitigation Plan. Four separate information requests were then sent to members of the ITF, with specific questions related to each of the plan elements. The first request focused on the planning process; the second on the risk assessment section; the third on the mitigation strategy element; and the fourth on coordination of local mitigation planning and the plan maintenance process. Written comments were received back from several entities; follow-up meetings were requested and held with other members who had not yet responded to document their input. At the WATF meeting, an information request sheet was passed around for all participants to sign. They were also asked to indicate whether their agency had any new or updated information that would be relevant to the drought plan revision. Follow-up contacts were made with the seven participants who indicated they had information to share. LRE also attended follow-up meetings with both the ITF and WATF to obtain additional input. A draft of the final report was circulated to both the ITF and CWCB staff for comments. LRE worked closely with CWCB staff throughout the preparation of this report.

How plan was reviewed and analyzed

Documenting how the plan was reviewed and analyzed is a new requirement for the 2007 update process; it did not apply to the 2004 review. In 2007, as described above, the existing plan was compared against the federal requirements, and portions for which updated information was needed were identified. To help with this task, a multi-page working table was developed which included the following information:

- Section or element required by the State Hazard Mitigation Plan Review Crosswalk
- Location(s) in the current plan where information on this section/element is found
- Identification of more recent documents where new or updated data is found
- List of additional updated or new data needs not included in existing documents
- Identification of agency to contact for this additional data

This working table was then used as the basis for compiling the four information request packets that were sent to members of the ITF. The existing and new information compiled as the result of these efforts is presented in this report. Each section of the report identifies where each required section is found in the existing plan; provides updated information from reports and documents that have become available after the existing plan was adopted; and identifies new information that was provided by the various agencies in response to the information requests.

Indication of whether each section was revised

This is a new requirement; the 2004 update did not need to identify which sections were revised as part of the update process. As part of the 2007 review, most of the sections were updated with new or revised information. The following table shows which sections of the Hazard Mitigation Plan were revised. The listed sections each reflect a required element in the State Hazard Mitigation Plan Review Crosswalk.

Plan Element	Section Updated/Revised?
Prerequisite Adoption by the State	(to be done yet; see above discussion)
Planning Process Documentation of the Planning Process	Yes
Coordination Among Agencies	Yes
Risk Assessment Identifying Hazards	Yes
Profiling Hazards	Yes
Assessing Vulnerability by Jurisdiction	Yes
Assessing Vulnerability of State Facilities	Yes
Estimating Potential Losses by Jurisdiction	Yes
Estimating Potential Losses of State Facilities	Yes
Mitigation Strategy Hazard Mitigation Goals	Yes
State Capability Assessment	Yes
Local Capability Assessment	Yes
Mitigation Actions	Yes
Funding Sources	Yes
Coordination of Local Mitigation Planning Local Funding and Technical Assistance	Yes
Local Plan Integration	Yes
Prioritizing Local Assistance	Yes
Plan Maintenance Process Monitoring, Evaluating, and Updating the Plan	Yes
Monitoring Progress of Mitigation Activities	Yes

COORDINATION AMONG AGENCIES

FEMA recommends coordination among agencies be discussed; however, the absence of information on this piece will not cause FEMA to disapprove the plan. Agency coordination is discussed in more detail later in the “State Capability Assessment” section, page 23. Changes in coordination among federal and state agencies since approval of the last plan is discussed on page 27.

PROGRAM INTEGRATION

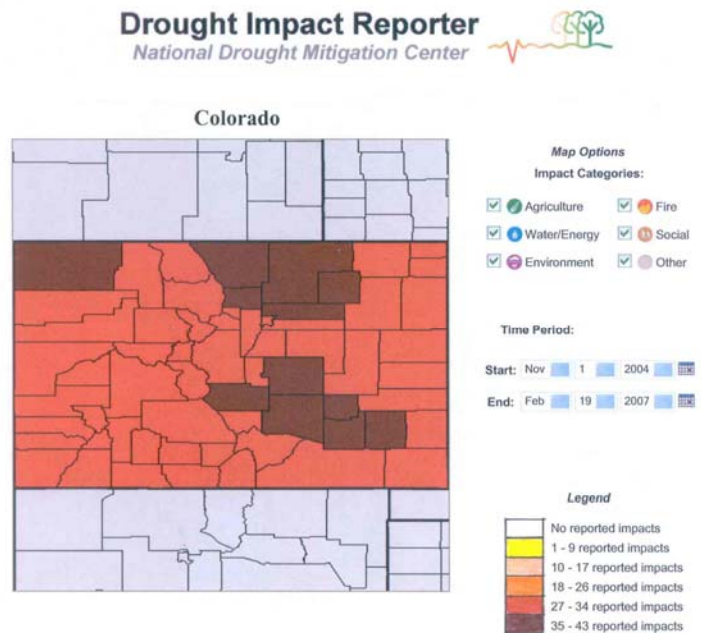
Again, FEMA recommends that program integration be discussed; however, the absence of information on this piece will not cause FEMA to disapprove the plan. Drought planning efforts are integrated into overall hazard mitigation plans and FEMA mitigation programs through the coordination efforts of the Division of Emergency Management.

RISK ASSESSMENT

IDENTIFYING HAZARDS

The state risk assessment must identify and include an overview of all types of natural hazards that can affect the state. Drought continues to be one of the natural hazards identified in the state's risk assessment plan; this has not changed since the last update. The 2004 Colorado Natural Hazard Mitigation Plan included a great deal of information on drought, including a section specifically devoted to this hazard⁷. Drought hazard potential in Colorado as well as the United States in general were discussed. Current information through 2004 was included.

The adjacent figure updates this information since 2004. It shows reported drought impacts for all Colorado counties between the date the previous Plan Update was approved and the present⁸. Based on reports to the National Drought Mitigation Center, all counties recorded either the highest or second highest level of impacts. This shows that drought continues to have significant effect on the entire state in all impact categories, including agriculture, water and energy, environment, fire, social, and others.



PROFILING HAZARDS

Drought hazards are to be profiled by identifying the geographic location(s) of where droughts could affect the state, including the provision of information on previous drought occurrences, and by providing information on the probability of future events.

Previous occurrences

HISTORICAL DRY AND WET PERIODS IN COLORADO: 1893-1996			
YEARS	DRY	WET	DURATION
1893-1905	X		12
1905-1931		X	26
1931-1941	X		10
1941-1951		X	10
1951-1957	X		6
1957-1959		X	2
1963-1965	X		2
1965-1975		X	10
1975-1978	X		3
1979-1996		X	17
Sources: McKee, Doesken and Kleist 1999; Colorado Office of Emergency Management 2000			

The 2004 Update included general information on previous drought hazards in both the United States and Colorado⁹. Historical droughts in Colorado through 1996 were summarized in the adjacent table¹⁰. This table can be updated with information in the 2004 Drought & Water Supply Assessment (DWSA), which noted the following¹¹: The period 2000 through 2003 was a “significant multi-year statewide drought, with many areas experiencing [the]

most severe conditions in Colorado instrumented history”. For calendar year 2007 thus far, Colorado continues to experience moderate drought conditions (D1 drought intensity) and abnormally dry conditions (D0 drought intensity) in at least some portions of the state¹². During calendar year 2006, at least some portions of the state also experienced severe drought conditions (D2 drought intensity) between March and December, while additional parts of the state experienced extreme drought conditions (D3 drought intensity) between May and September¹³. Drought conditions for previous years can be found in the U.S. Drought Monitor archives¹⁴.

The 2002 Colorado Drought Mitigation and Response Plan included a more detailed discussion of several recent droughts, from 1989 through 2002¹⁵. Additional information on previous droughts in Colorado can be also found in Chapter 1 of the DWSA, titled “Historical Perspectives on Colorado Drought¹⁶”. This recent information was not included in the previous 2004 update.

Location/Geographic areas affected

Information was provided in the 2004 Update for each county. At that time, 35 of 64 counties identified drought as one of the natural hazards posing the greatest possible risk¹⁷. In response to one of the information requests, ITF members from the agricultural sector noted that drought should be included on all of the county fact sheets. Of the 64 Colorado counties, 59 of them indicated they had received a USDS Disaster Declaration due to drought in 2000 and/or 2002. Based on the Drought Impact Monitor chart shown on the previous page, it can be seen that all Colorado counties are susceptible to drought.

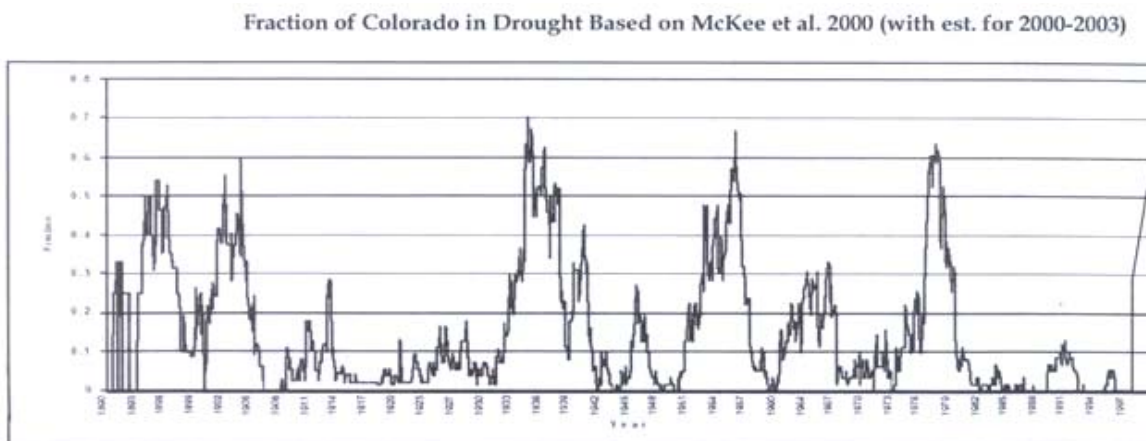
The 2002 Colorado Drought Mitigation and Response Plan listed thirteen Small Business Administration Declarations for drought that were open as of January 22, 2001¹⁸. These declarations included 48 counties. The Colorado Division of Wildlife (CDOW) reports that there have been no Secretary of Commerce declared fishery disasters post 2000.

Information on Secretarial, Presidential, and Administrator Drought Disaster Declarations for fiscal years 2003 through 2007 was provided by the U.S. Department of Agriculture. This information is included in Appendix A. This information confirms that all of Colorado's counties have been significantly impacted by drought over the past four years.

Probability of future events

The 2002 Colorado Drought Mitigation and Response Plan included a discussion on the probability of future drought events¹⁹. It cited a 1999 Colorado State University report²⁰ which noted the following. Three droughts, with a duration of at least four years, have occurred during the past century. Also, ninety-three percent of the time at least five percent of the state is experiencing drought at the 3, 6, 12, or 24 month time scale. It is unlikely that these probabilities have changed significantly since the previous update.

This information can be supplemented with the following figure from the recent DWSA, showing the fraction of Colorado that has historically been under drought conditions, from 1890 through 2003²¹.



The DWSA also included a discussion on what the future might hold with respect to drought in Colorado. It noted that “an extended period of drought appears likely within the next 50 years”, based on a paper presented at the Colorado Drought Conference in December 2002²².

The 2006 State Emergency Operations Plan also gives hazard probabilities by area of the state for various natural and human-caused hazards, based on historical data. For drought, five of the nine All-Hazard Emergency Management Regions were given a high probability of occurrence. These included the Northwest, San Luis, South, Southeast, and Southwest regions. The Northeast, South Central, and West regions were assigned a moderate probability of drought. Only one region, the North Central, was assigned a low probability for drought.

CWCB staff also hopes to initiate efforts soon regarding climate change issues; the resulting need for water adaptation strategies; and the potential impact on CWCB programs. The

occurrence and duration of future droughts in the state may well be influenced by climate fluctuations, and should be explored as part of this new initiative.

ASSESSING VULNERABILITY BY JURISDICTION

The state risk assessment is to include an overview and analysis of the state's vulnerability based on estimates provided in both the local and state risk assessments. The plan must also identify those jurisdictions that are most threatened and most vulnerable to loss and damage due to drought. New requirements since the last update include the need to explain the process used to analyze information from the local risk assessments, as well as a requirement that the plan reflects changes in development in hazard prone areas.

Vulnerability based on local and state risk assessments

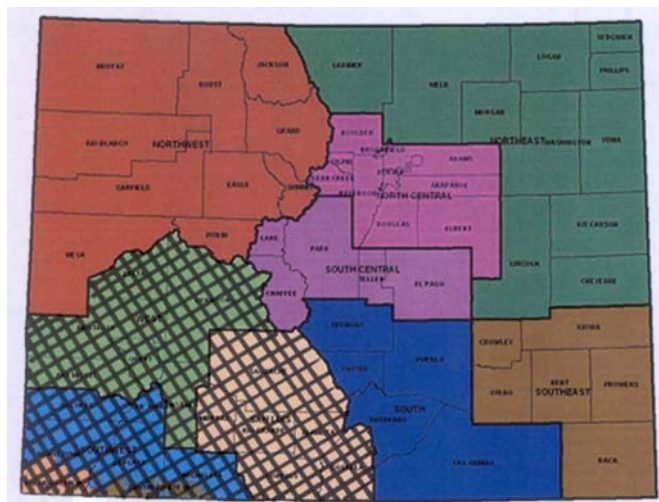
The 2004 Update to the Natural Hazards Mitigation Plan contains information on the risk evaluation that was conducted in 2003- 2004²³. Appendix B provides a copy of the Risk Assessment Forms that were sent out to various entities throughout the state. Appendix E summarizes the survey responses received from the local emergency managers and contains references to other local/regional documents that identify drought risk for the area (e.g., county hazard mitigation plans, area wide regional plans, etc.). It was also noted that: "Several counties did not respond to the survey and have not yet completed a local hazard mitigation plan." DEM staff confirmed that all counties have emergency operations plans; however, most do not have a drought mitigation component in them. It is recommended that the completion of these local hazard mitigation plans be made a priority during the next update cycle, and that this information be incorporated into the next update. CWCB will also strongly encourage local entities to include this information in a drought mitigation plan. CWCB will soon initiate an effort to encourage local drought mitigation planning.

The locally provided information was then compiled by emergency management region; the data for drought hazard can be seen in the following excerpt from the hazards summary table in Appendix E²⁴:

	SUMMARY OF HAZARDS BY REGION AND TYPE								
	COLORADO ALL HAZARDS EMERGENCY MANAGEMENT REGIONS								
TYPE OF HAZARD	WEST	SOUTH WEST	SOUTH EAST	SOUTH	SOUTH CENTRAL	SAN LUIS	NORTH EAST	NORTH CENTRAL	NORTH WEST
Drought	Medium-High	Medium-High	Medium	Medium	Medium	Medium-High	Medium	Medium	Medium
LOCAL EMERGENCY MANAGERS SURVEY, 2003									

Jurisdictions most threatened and most vulnerable to damage or loss

As noted in the above section, a survey of local emergency managers was completed in 2003. The nine Colorado All-Hazards Emergency Management Regions are shown on the following map. The three regions that identified the highest drought threat are cross-hatched, namely the West, Southwest, and San Luis Emergency Management Regions.



More recent information on the impacts of drought by county was obtained from the National Drought Mitigation Center's Drought Impact Reporter²⁵. The following table shows the total number of drought impacts reported from all sources (government, NOAA, public, media, other), by county, from the date the previous Natural Hazard Mitigation Plan was approved and the present²⁶.

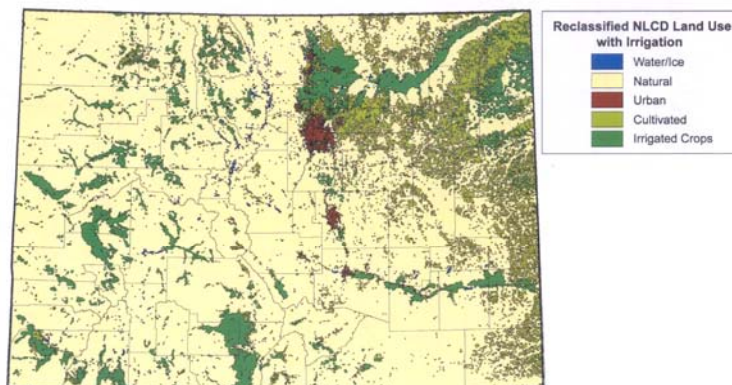
County	Agriculture	Fire	Water/Energy	Environment	Social	Other	Total
Adams	7	9	8	5	1	11	41
Alamosa	6	9	1	5	1	8	30
Arapahoe	5	9	3	5	1	9	32
Archuleta	5	9	1	5	1	8	29
Baca	5	9	1	5	1	11	32
Bent	6	9	2	5	2	11	35
Boulder	6	11	2	5	2	9	35
Chaffee	5	9	1	6	1	9	31
Cheyenne	5	9	1	5	1	11	32
Clear Creek	5	9	1	5	1	8	29
Conejos	6	9	1	5	1	8	30
Costilla	5	10	1	5	1	8	30
Crowley	7	9	1	6	1	11	35
Custer	5	10	1	5	1	11	33
Delta	5	9	1	5	1	8	29
Denver	5	9	3	5	1	9	32
Dolores	5	9	1	6	1	8	30
Douglas	5	10	1	5	1	9	31
Eagle	5	9	1	5	1	9	30
Elbert	5	9	1	5	1	10	31
El Paso	6	12	2	5	2	10	37
Fremont	6	11	1	6	1	11	36
Garfield	5	9	1	6	1	8	30
Gilpin	5	9	1	5	1	8	29
Grand	5	9	1	6	1	9	31
Gunnison	5	10	1	5	1	8	30
Hinsdale	5	9	1	5	1	8	29
Huerfano	5	11	1	5	1	10	33
Jackson	5	9	1	5	1	8	29
Jefferson	5	10	2	6	1	9	33
Kiowa	5	9	1	5	1	11	32
Kit Carson	5	9	1	5	1	11	32
Lake	5	9	1	5	1	9	30
La Plata	5	10	1	5	1	8	30

County	Agriculture	Fire	Water/Energy	Environment	Social	Other	Total
Larimer	5	9	1	6	1	13	35
Las Animas	5	11	1	5	1	10	33
Lincoln	5	9	1	5	1	11	32
Logan	7	9	2	5	1	10	34
Mesa	5	9	2	5	1	8	30
Mineral	5	9	1	5	1	8	29
Moffat	9	10	1	6	3	7	36
Montezuma	7	10	1	5	1	9	33
Montrose	5	9	1	5	1	8	29
Morgan	7	11	3	5	1	12	39
Otero	9	9	1	6	2	11	38
Ouray	5	9	1	5	1	8	29
Park	5	9	1	5	1	8	29
Phillips	5	9	1	5	1	11	32
Pitkin	5	10	1	5	1	9	31
Prowers	5	10	1	5	1	11	33
Pueblo	5	11	2	5	1	11	35
Rio Blanco	5	9	1	5	1	7	28
Rio Grande	5	9	1	5	1	8	29
Routt	5	9	1	5	1	8	29
Saguache	5	9	1	5	1	8	29
San Juan	5	9	1	5	1	8	29
San Miguel	5	9	1	6	1	8	30
Sedgwick	5	9	1	5	1	10	31
Summit	5	9	1	6	2	9	32
Teller	5	9	1	5	1	9	30
Washington	5	9	1	5	1	10	30
Weld	8	11	4	5	2	13	43
Yuma	5	9	1	5	1	11	32

In the recent Drought and Water Supply Assessment, the impacts of the 2000 – 2003 drought were discussed in detail²⁷. The impacts were described for each of eight different impact areas or sectors: agriculture, economic impacts, energy, health, municipal water, tourism, wildfire, and wildlife. Jurisdictions that are closely tied to any of these specialized sectors would be especially vulnerable to drought impacts, due to their heavy reliance on adequate water supplies.

The Agriculture Impact Task Force specifically noted that in Colorado, there are differences between those affected by hydrologic drought than by meteorological drought.

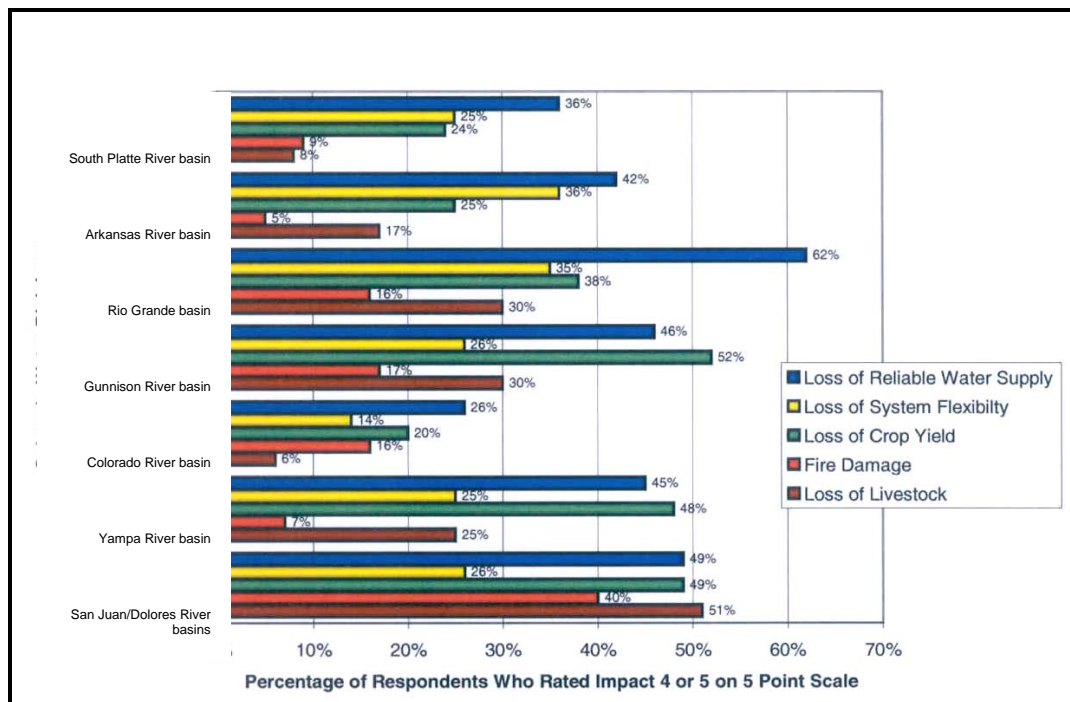
Colorado Agricultural Lands



Meteorological drought will reduce dryland crop production and will reduce forage on rangeland. (Non-irrigated farmland exists primarily in eastern Colorado and, to a lesser extent, in portions of southwestern Colorado. Northwest Colorado is primarily rangeland.) However, if there is a hydrologic drought (winter snowpack below average), irrigated areas could suffer. (Extensive areas of irrigated cropland can be found in the Platte, Arkansas, Colorado, and

Republican River basins, as well as smaller irrigation systems along the North Platte, Yampa/White, and Las Animas Rivers.) The state's agricultural croplands, both irrigated and non-irrigated, are shown in the adjacent figure.

The DWSP also included information about impacts on different water users²⁸. The greatest impacts identified were: loss of reliable water supply; loss of system flexibility; loss of crop yield; fire damage; and loss of livestock. Again, those sectors that are highly dependent on these water uses would be especially vulnerable to damage or loss. The following figure²⁹ summarizes these impacts by Colorado Water Division.



Process used to analyze information from local risk assessments

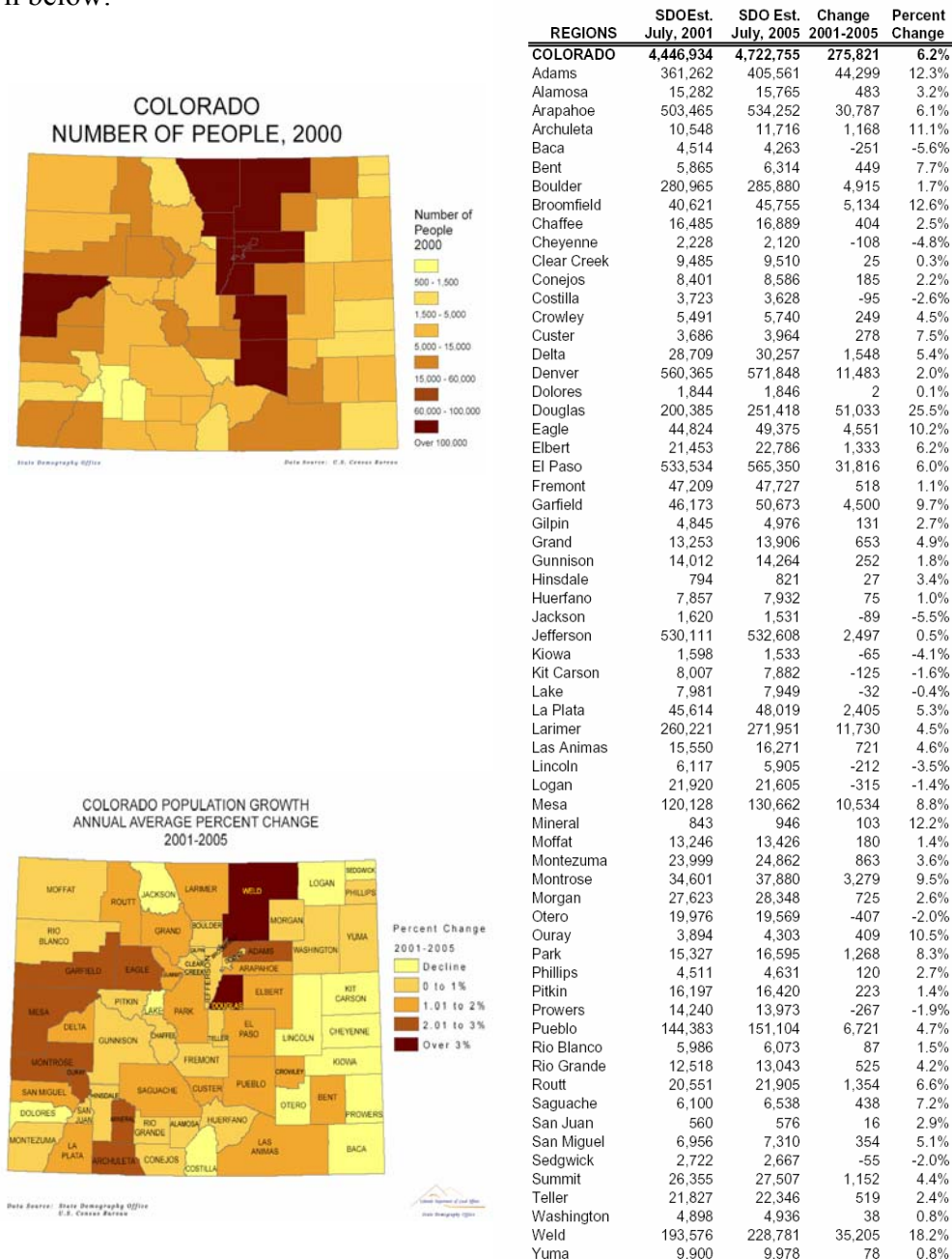
This is a new FEMA requirement for the 2007 update process. Documentation of the process used to analyze information from the local risk assessments did not need to be included in the previous update. However, the 2004 update did identify such information. The local risk evaluation described in the section above used both probability and potential impacts to identify the hazards that posed the greatest possible risk to each jurisdiction. The methods used by all local entities to assess risks are described in Appendix B of the 2004 Natural Hazard Mitigation Plan³⁰. Numerical codes were assigned to the various levels of probability, affected area, and primary and secondary impacts, to come up with a total score based on the following formula:

$$\begin{aligned}\text{Total Score} &= \text{Probability} * \text{Impacts} \\ &= \text{Probability Score} * (\text{Affected Area} + \text{Primary Impact} + \text{Secondary Impact})\end{aligned}$$

In this way, by using the same methodology, all local impacts could be compared equally. This process does not appear to need modification for the 2007 update.

Changes in development

This is a new FEMA requirement for 2007. The updated plan is to reflect changes in development for jurisdictions in hazard prone areas. In the case of drought, this would then apply to the entire state. The previous Plan Update included both maps and a table showing, by county, both the population, based on the 2000 census, and the percent change in population since 1990³¹. This information was updated in 2007 by the Department of Local Affairs, and is shown below:



The recent DWSA also provides information on recent population changes and forecasts, by State Water Divisions³². In addition, this report contains discussions of which parts of the individual Water Divisions are likely to experience population growth or decline (e.g., the southeastern agricultural portion, the northern urban areas, etc.).

ASSESSING VULNERABILITY OF STATE FACILITIES

The Plan Update is to describe the types of state-owned or operated critical facilities located in the identified hazard areas. Essentially the entire state is identified as a drought prone hazard area. The previous Plan Update included an assessment of state assets³³. State assets at risk from drought were specifically discussed on page 43 of Appendix F. It was noted that the occurrence of drought was statewide, with a high probability of occurrence. The at-risk critical assets, impacts, and approximate value of assets were shown in the following table³⁴.

State Assets At Risk Buildings, Landscaping, Vehicles, Equipment, etc.	Impacts	Approximate Value of Assets
Agricultural & Stock Businesses	Animal Program losses, economic loss, tourism, hatcheries, fisheries, stock ponds, agriculture and stock activities, etc.	Unknown
Division of Wildlife	Revenue from licenses, water activities, tourism	Unknown
Colorado State Parks	Revenue from visitors using park, revenue from water activities, biological loss – State Forest and park land trees – dead trees, beetle activity, fires, tourism	Unknown
State Buildings	Wells can dry up, would need to redrill	Unknown
Stream Flows	Economic loss, biological loss	Unknown

These “state assets at risk” were reviewed and updated, using both information from Appendix C of the current Drought Plan (drought impacts checklist) and experience gained from the recent drought. Specific drought-related impacts that were identified include:

- Impacts to State Trust Lands that are leased for ranching, grazing, and farming purposes.
- Recreation, grazing, and forestry losses due to drought conditions at the Colorado State Forest (in the Steamboat Springs district).
- Impacts to the state’s sixteen Fish Propagation and Restoration Facilities, including the critical Roaring Judy Hatchery for Endangered Colorado River fish.
- Economic losses due to decreased fishing and hunting license sales.
- Impacts to fish and wildlife throughout the state, since fish and wildlife are “owned” and managed by the state.
- Loss of revenues to State Parks.
- Actual drought-induced damages to State Park facilities.

- Drought-related impacts to state-owned instream flows, and resultant impacts on aquatic life, riparian habitat, wetlands, as well as lost benefits to existing junior instream flow rights.
- Impacts to State Wildlife Areas.

The previous Plan Update also identified several potential projects to help mitigate these losses³⁵, including items such as: monitoring forest and wildlife systems for impacts; monitoring impacts on state revenue; determining other state assets at risk from drought; the possibility of relocating or mitigating assets if feasible; and numerous other ideas. It is recommended that during the next update cycle, these (and possibly other) mitigation opportunities be revisited, updated, and implemented where possible.

Note that Appendix B³⁶ contains a questionnaire, which includes questions directly related to drought, such as:

- What types of assets would be affected by drought?
- [What are your] Recommendations of preparedness and prevention strategies for drought (state asset specific)?
- [What are your] Specific project proposals for drought (state asset specific)?

It is also recommended that this (or a similar questionnaire) be resent to appropriate state agencies during the next update cycle. Additional questions to supplement these should include questions related to the specific facilities that could be impacted by a drought for which each state agency is responsible, the estimated vulnerability (and ranking) of these facilities, and the estimated value (or worth to the state's economy) of these facilities.

ESTIMATING POTENTIAL LOSSES BY JURISDICTION

The Plan Update is to provide an overview and analysis of potential losses to the identified vulnerable structures, based on estimates provided in local and state risk assessments. A new requirement is that the plan must be reviewed and revised to reflect changes in development.

Overview and analysis of potential losses to identified vulnerable structures

Note that the FEMA rule only requires the state to analyze losses to structures. However, the state is encouraged to analyze the potential economic and human impact of the hazard as well. The term “identified vulnerable structures” is somewhat of a misnomer to drought planning. As is noted in the 2002 Drought Plan, when droughts occur, the state is impacted with a variety of ambiguous and complex problems. The most significant impacts are related to water-intensive activities, such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation, as well as a reduction of electric power generation and water quality deterioration³⁷. A comprehensive list of the drought impacts on the state is included in Appendix C of the 2002 Drought Plan³⁸. It is noted that there are no “structures” *per se* identified in this list. However, Appendix C does include numerous other non-structural

impacts of drought; these include losses to various economic sectors (e.g., agricultural and livestock producers) and environmental impacts (e.g., damage to animal species).

As noted previously, the recent DWSA discussed the impacts of the 2000 – 2003 drought in detail³⁹. Economic impacts were given where available. For example, impacts to the agricultural community included approximately \$150 million for ranchers and \$300 million for farmers. For the health and municipal water supply sectors, the Colorado Water Quality Control Division and Department of Local Affairs developed and updated a list of public water systems that experienced operational problems related to the recent drought; approximately 20 systems contacted the Division for technical or financial assistance. Impacts to tourism included a loss of \$1.8 million in fishing and hunting license sales, and a 23% reduction in reservations and a 3% decline in visitation to Colorado State Parks. Wildfire impacts were estimated to cost state and local governments \$6.5 million in 2000, and the total suppression costs to federal, state, and local governments in 2002 were estimated at over \$150 million. Similar impacts were also seen for the wildlife and energy sector. Other impacts from the 2002 drought include the following⁴⁰:

- Dryland wheat production was only 45% of the ten-year average.
- Irrigated corn production was 50 to 85 percent of average; dryland corn was almost a total loss.
- Sunflower crop yields were down 71%.
- Estimated direct cost to crop producers during 2002 was in excess of \$300 million.
- Cattle breeding stock was reduced by 45 to 50% statewide. Southern Colorado ranchers sold almost 80% of their herds. Losses to ranchers neared \$460 million.
- Dairies (500 head size) lost approximately \$15,000 to \$20,000 per month.
- Outfitters estimated that visitation was down 40% with an expected \$200 million impact.
- Fishing license sales were down by 93,000, with a \$1.8 million impact to CDOW.
- Landscaping and nursery industries estimated a loss of 15,000 jobs and \$75 million in sales.
- There were 4,612 wildfires during 2002, which burned over 619,000 acres (compared to a 10-year average of 3,119 fires and 70,000 acres/year). Wildfire suppression costs were approximately \$152 million; 81,435 people were evacuated; 1,000 structures were burned, ten lives were lost.
- Decline in visitation to privately owned parks was reported as 15% to 30%.
- Fishing license sales decreased by approximately 15% from 2001 levels. (In 2001, the economic output resulting from anglers fishing 9.3 million recreation days was estimated to be \$646 million. Fifteen percent of this would be nearly \$97 million, assuming a 15% decrease in license sales translated into a 15% decrease in total economic output.)
- Restaurants in resort areas reported a 10-30% decline in sales during the summer of 2002.
- River outfitters estimated visitation was down 40%, with an expected \$200 million impact in 2002⁴¹.
- In 2002, the CWCB reported an estimated \$1.1 billion impact to agriculture, tourism, and recreation from drought conditions⁴².

Impacts from the 1977 drought include estimated revenue losses of \$78.6 million to the Colorado ski industry. The state's agricultural producers and municipalities received more than \$110 million in federal drought aid as a result of the 1976/1977 drought⁴³.

Potential losses based on estimates in local and state risk assessments

The potential losses described above and in Appendix C of the Drought Plan are based on estimates in both the available local risk assessment information, and on the state risk assessment. Appendix C is also consistent with the general descriptions of losses due to drought provided for each county in the Drought Plan⁴⁴. These include agricultural losses, livestock impacts, tourism impacts, fire-fighting challenges, limited municipal water supplies, and other economic impacts.

Impacts on losses from changes in development

Updated information on the population change for each county from 2000 to 2005 was provided previously in this report. As the population grows, and especially as more pressures are put on the state's limited water resources, the losses from future droughts would be anticipated to go up without additional drought mitigation measures, which will be discussed below.

ESTIMATING POTENTIAL LOSSES OF STATE FACILITIES

In the Plan Update, the state must estimate the potential dollar losses to state-owned or operated buildings, infrastructure, and critical facilities located in the identified hazard areas. The current Hazard Mitigation Plan identifies the number and dollar value of state buildings and contents by county⁴⁵. However, as noted above, there are no buildings or other similar infrastructure affected by drought; the impacts are more related to economic and environmental losses. These potential economic losses include costs and losses to agricultural and livestock producers; loss from timber production; loss from fishery production; losses to the recreation and tourism industries; energy-related effects; costs and revenue shortfalls to water suppliers; decline in food production; and other general economic effects. Environmental losses include damage to animal species; hydrological effects; and loss of cultural sites.

Included in the previous section on "Assessing the Vulnerability of State Facilities" was a table which showed the at-risk critical assets, impacts, and approximate value of assets for state facilities vulnerable to drought. However, the value of the identified assets was in each case listed as "unknown". The state is generally self-insured for liability losses, and purchases commercial insurance for property losses. The State Office of Risk Management tracks and generates periodic reports on the state's losses and insurance activity.

Recent information was obtained from various state agencies and other reports⁴⁶ were used to provide the following information required by the FEMA regulations:

Potential Economic Impacts to State Facilities	Where Potential Losses And Effects Could Be Exhibited	Information Re: Estimated Overall Economic Benefits To State And Potential Drought Losses
Costs & losses to agricultural & livestock producers	<ul style="list-style-type: none"> State lands leased for crops to agricultural producers for farming and livestock producers for grazing Grazing, recreation, forestry uses of Colorado State Forest 	<ul style="list-style-type: none"> The State Land Board generates over \$37 million annually in revenues from leases and royalties (including land leased for ranching/grazing, farming, mineral, oil & gas leases, and recreation). For example, in 2007 the state will receive between \$7.64 and \$10.22 per AUM (animal unit month) grazed on state lands. Currently there are 3 million surface acres of state trust lands; 400,000 acres leased by CDOW for hunting, fishing, and other wildlife recreation.
Loss from fishery production	<ul style="list-style-type: none"> State-owned fish propagation and restoration facilities Fishing license sales Fish in streams throughout state (all wildlife "owned" by state) 	<ul style="list-style-type: none"> CDOW operates 16 fish propagation facilities, including the Roaring Judy Hatchery for the propagation of Endangered Colorado River fish. In 2005, the fish production hatcheries and rearing units reared and stocked 54,300,000 warmwater fish; 3,349,792 catchable trout; 794,771 native cutthroat trout; and 12,297,000 fry and fingerling trout. 1,765,267 pounds of fish were stocked in 2005. In 2001, economic output resulting from anglers estimated at ≈ \$646M from 9.3 million recreation days. In 2002, anglers spent ≈\$459M on trip/equipment expenses in Colorado. Secondary impacts ≈ \$820M. Total annual impact ≈\$1.28 billion (from 10.1 million recreation days). This activity supports ≈10,950 full-time jobs in Colorado. In 2002, fishing license sales declined by ≈15% from 2001. There was a 13.4% decline in fishing recreation days from 2001 to 2002.
Losses to wildlife	<ul style="list-style-type: none"> Hunting license sales Wildlife throughout state (all wildlife "owned" by state) 	<ul style="list-style-type: none"> In 2002, hunters spent ≈\$338 million on trip/equipment expenses in Colorado. Secondary impacts ≈\$603 million. Total annual impact ≈\$941 million (from 2.1 million recreation days). This activity supports ≈ 8,250 full-time jobs in Colorado. In 2001, trip & equipment expenditures primarily for wildlife watching activities > 1mi. from home estimated at ≈ \$562M. Secondary impacts ≈ \$378M. Total annual impact ≈\$940M. This supports ≈13,000 jobs.
Costs & losses to state parks	<ul style="list-style-type: none"> Revenues Damage to parks themselves 	<ul style="list-style-type: none"> Colorado's 41 State Parks attracted over 11 million visitors in FY 2005-2006 Visitors to Colorado State Parks contribute over \$200 million annually to local economies. In 2002, State Parks experienced a 3% decline in visitation.
Losses due to hydrological effects	<ul style="list-style-type: none"> State-owned instream flows 	<ul style="list-style-type: none"> CWCB has appropriated instream flow water rights on nearly 1500 stream segments covering 8500 miles of stream and 476 natural lakes.

Additional information on the potential magnitude of such losses is found below: this information is based on documented impacts of the 2002 drought. The 2003 Wildlife Task Force Report⁴⁷ noted that the estimated economic impacts of the 2002 drought to the CDOW were \$1 million for 2002. This is based on an estimate of lost revenue. CDOW estimated it actually lost \$1.8 million from a decline in fishing license revenue, but this was offset in part by the sale of drought mitigation hunting licenses⁴⁸. Other impacts identified by CDOW for 2002 included the loss of a crown jewel fishery due to the draining of Antero Reservoir; additional losses from the draining of Tarryall Reservoir, nearly one-half of Spinney Mountain Reservoir, and the loss of 40,000 AF of water from Elevenmile Reservoir; the loss of fishery resources due to draining most of the major reservoirs in the lower South Platte System; a total loss of fish in the San Luis Valley Reservoirs (Home, Smith, Mountain Home, Million, and La Jara); significant losses to the Dolores River fishery below McPhee Reservoir; sterile conditions in Florida River from Lemon Dam downstream; significant fish kill in Bear Creek; and loss of quality habitat in the South Platte, Animas, La Plata, Los Pinos, and Mitchell Creek Watersheds. The ITF Chairs also

identified loss of the Brassey and Plains minnows in the Alamosa area. The Tourism Impact Task Force reported⁴⁹ that reservations to State Parks were down 23% from June 1, 2002 through September 30, 2002, with a 3% decline in visitation. Four boat ramps at State Parks were out of water by mid-July 2002; ramps at 14 State Parks were closed by mid-September 2002.

It has already been recommended that a questionnaire be sent to appropriate state agencies during the next update cycle, to obtain information on state facilities and their risk and opportunities for mitigation of that risk. It is recommended that the questionnaire be expanded to obtain additional information on the potential dollar losses to state-owned or operated buildings, infrastructure, and critical facilities that could be vulnerable to drought. As part of the responses to the information requests sent out to the ITF heads, a representative from the wildlife sector noted that a vulnerability analysis has not been done on CDOW facilities, and that it was not clear how to even conduct such an analysis. Therefore, it is also recommended that the questionnaire include recommended procedures as to how to document the vulnerability and potential losses to state facilities that could be susceptible to drought; it appears that standard reporting practices (such as costs of buildings and contents) will not apply to the unique circumstances surrounding droughts.

MITIGATION STRATEGY

HAZARD MITIGATION GOALS

The state risk assessment is to include a description of state goals to guide the selection of activities to mitigate and reduce potential losses. A new requirement is that the plan must also be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities.

Description of mitigation goals

The mitigation goals of the previous State Natural Hazard Mitigation Plan are summarized below⁵⁰. Each goal then has several objectives and actions designed to help meet the goal; details on these can be found in the 2004 Hazard Mitigation Plan⁵¹.

State Hazard Mitigation Goals

- **REDUCE THE LOSS OF LIFE AND PERSONAL INJURIES FROM NATURAL HAZARD EVENTS**
- **REDUCE DAMAGE TO STATE CRITICAL, ESSENTIAL, AND NECESSARY ASSETS**
- **REDUCE STATE AND LOCAL COSTS OF DISASTER RESPONSE AND RECOVERY**
- **MINIMIZE ECONOMIC LOSSES**
- **REDUCE DAMAGE TO PERSONAL PROPERTY**

The above goals and objectives are from the 2004 Update. These goals were derived from the goals and objectives of the 2001 document, and the recently updated hazard mitigation annexes, including the 2002 Drought Plan. Next, a problem solving methodology was used to evaluate the goals; this process involved identifying the hazard(s), assessing the vulnerability, assessing current safeguards, determining acceptable risks, and developing an action plan. After this step, the goals and objectives were revisited to confirm they were supported by the data. Additional goals for the 2004 plan were identified as needed.⁵²

As noted above, goals specific to drought mitigation efforts were developed as part of the 2002 Drought Plan. These goals, as well as recommended actions to implement them, are presented in the table below. Many of the recommendations came from special interest breakout sessions at the Governor's Flood and Drought Conference in December 1999. These six goals are listed below:

1. Improve Water Availability Monitoring
2. Increase Public Awareness and Education
3. Augment Water Supply
4. Facilitate Watershed and Local Planning
5. Reduce Water Demand/Encourage Conservation
6. Impact Reduction

Reassessment of goals for validity or need for revision

CWCB staff, DWR staff, and the ITF chairs discussed the above drought mitigation goals and recommended eight goals to replace the existing six. These are listed below:

1. Improve Water Availability Monitoring
2. Increase Public Awareness and Education
3. Support Substitute Water Supply Plans and Leasing Options to Augment Water Supply
4. Facilitate Watershed and Local Planning
5. Reduce Water Demand/Encourage Conservation
6. Impact Reduction
7. Develop Intergovernmental and Interagency Stakeholder Coordination
8. Evaluate Potential Impacts from Climate Change

Recent changes in development patterns (as presented previously) do not affect the validity of these goals. Progress in statewide mitigation efforts and changes in priorities are discussed later in this report under the Mitigation section.

STATE CAPABILITY ASSESSMENT

The state mitigation strategy must include a discussion of the state's pre- and post-disaster hazard management policies, programs, and capabilities to mitigate the hazards in the area, including an evaluation of state laws, regulations, policies, and programs related to drought mitigation as well as to development in drought-prone areas, and a discussion of state funding capabilities for hazard mitigation projects.

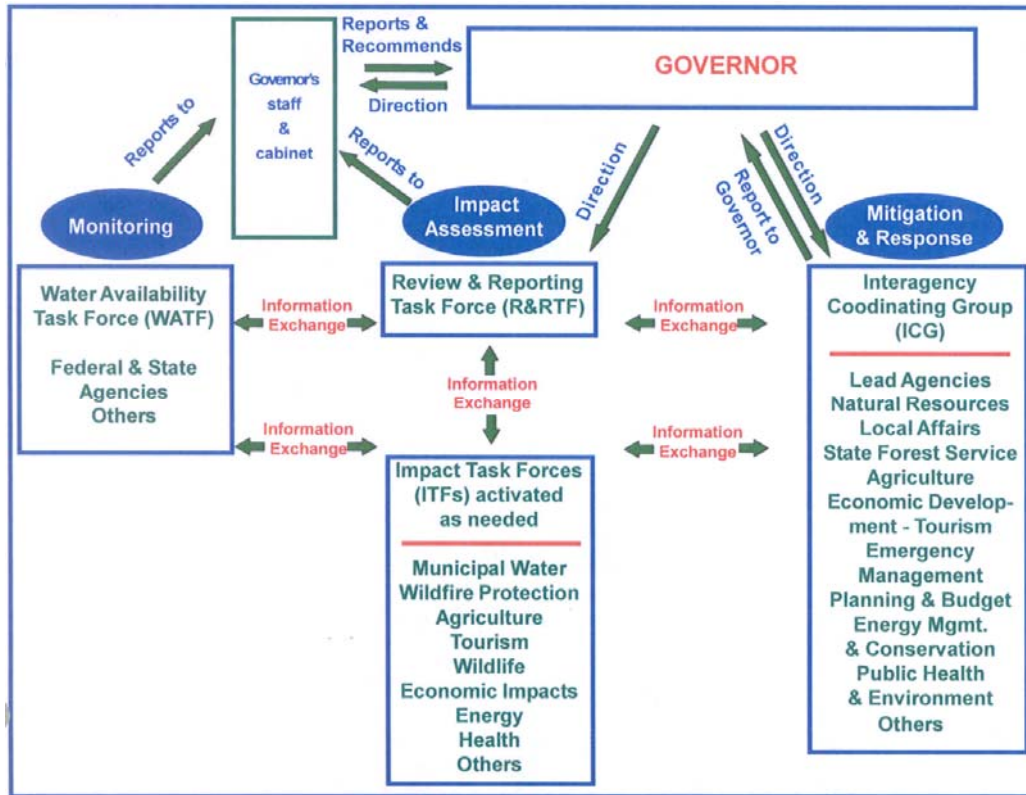
Pre-disaster management policies, programs, and capabilities

State laws and regulations that provide authority to various agencies for pre-disaster planning are included in the existing Hazard Mitigation Plan⁵³. Programs and the authorizing statutes that are specific to pre-drought planning were included in the Drought Plan⁵⁴; these are summarized in the table below.

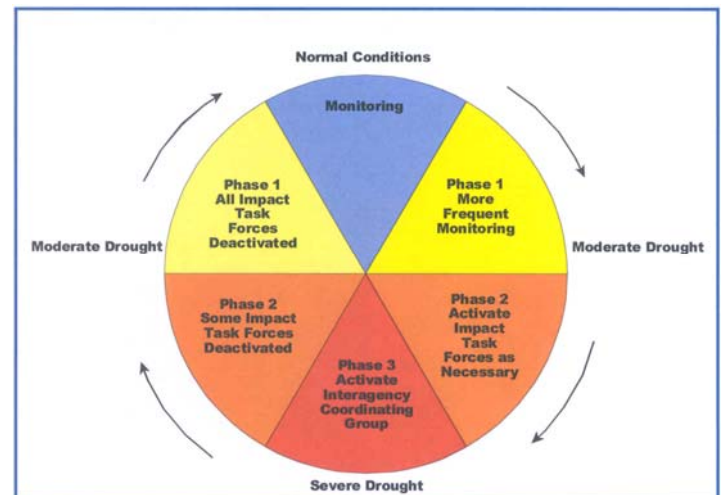
Customers	Program Title	Description	Statute	Agencies
General Public, State/Local Governments/Private Business	State Emergency Operation Plan/Drought Mitigation & Response Plan Annex	When activated by Governor, has the force and effect of law. Covers monitoring and response to drought events and public information.	CRS-24-32-2105	CWCB/CDEM. Office of the Governor
General Public, State/Local Governments/Private Business, others	Climatology	Provides funding for the Office of the State Climatologist at CSU who in turn produces climatological information for monitoring droughts/drought climatological research.	---	CSU, CDEM, DNR
Agricultural Community	Colorado Agricultural Extension Service, public information technical assistance	Provides for dissemination of drought-related information.	CRS-22-34-101	CSU, CDEM, Department of Agriculture, State Soil Conservation Board, others
Water Resources Community, Policy Makers at State/Local Government, Federal Agencies	Colorado Water Resources Research Institute	Provides for funding of water resources related research findings including drought and dissemination of research findings and information of a water policy nature.	CRS-23-35-101	CSU, CDEM, DNR
Water Resources Community	Water Resources	Reservoir, stream flow, and water resources data collection and dissemination. Real time satellite stream gauge system, river basin simulation models, production of surface water supply index.	CRS 37-80; CRS-24-1-124; CRS 24-33-104	Division of Water Resources, Natural Resources, NRCS, USGS, other state/federal agencies

The process used by the state for pre-drought monitoring and planning is described in detail under the Monitoring and Assessment sections of the existing Drought Plan⁵⁵. The entire process (drought monitoring, assessment, mitigation, and response) is summarized in the following organization chart⁵⁶. In general, the WATF monitors drought forecasts and climate conditions, and makes drought projections by basin based on snowpack, soil moisture, stream flow, reservoir levels, ground water levels, precipitation, temperatures, the Surface Water Supply Index (SWSI), the Standardized Precipitation Index (SPI), and the Palmer Drought Index (PDI). Chairs of the ITFs comment on any observed or potential impacts within their area of responsibility. The group then recommends what action(s), if any, should be taken; this information is relayed to the Governor. Specialized ITFs are activated as needed to coordinate

the assessment of drought impacts as well as appropriate response and mitigation actions. Note that in April 2002, for the first time, all eight ITFs were activated⁵⁷.



The adjacent figure shows how the drought plan implementation works during a drought cycle⁵⁸. Different task forces and groups are activated as needed, as a drought progresses from moderate to severe. During the 2002 drought, all eight ITFs were activated. There are ITFs for each of the following areas: Municipal Water; Wildfire Protection; Agricultural Industry; Tourism; Wildlife; Economic Impacts; Energy; and Health.



Post-disaster management policies, programs, and capabilities

Post-disaster management activities are described in detail under the Impact Assessment, Response, and Long-Term Drought Monitoring sections of the existing Drought Plan⁵⁹. The process used to implement immediate post-disaster activities is largely described in the above discussion, including the organizational chart and drought cycle figure. Long-term drought mitigation activities are lead by the Drought Mitigation Committee, which is a working committee of the Colorado Natural Hazards Mitigation Council. The Ten Steps to Drought Preparedness in Colorado are outlined in the current Drought Plan⁶⁰; these include the following:

1. Appoint a drought task force.
2. Develop drought policy and define the purpose and objectives of the drought plan.
3. Anticipate and resolve conflicts between different water users.
4. Identify natural, human, and biological resources and financial/legal constraints.
5. Establish mitigation procedures: monitoring, impact assessment, and response.
6. Identify research and institutional needs.
7. Integrate science and policy perspectives.
8. Announce and test drought plan.
9. Teach the general public and the media about drought and water supply.
10. Keep the drought plan up-to-date and evaluate it after droughts.

Programs and the authorizing statutes that are specific to post-disaster planning are included in the current Drought Plan⁶¹; these are summarized in the table below.

Program Title	Category*	Statute
Disaster Emergency Fund	R	C.R.S. §24-32-2106
Emergency Authority (Governor)	R	C.R.S. §24-32-2104
State Emergency Operations Plan/Drought Mitigation & Response Plan Annex	R, M	C.R.S. §24-32-2105
National Guard	R	C.R.S. §28-3-104
State Fire Suppression Fund	R	C.R.S. §24-33.5-1207.6
Natural Hazards Mitigation Council	M	Executive Order B044-89
Fire Bans	R	C.R.S. §23-30-308
Emergency Preparedness Program	R	C.R.S. §24-32-21
Water Conservation Program	M	C.R.S. §37-60-124
Wildlife Cash Fund	R, M	C.R.S. §33-1-112
CWCB Loan Program	M	C.R.S. §37-60-121

* Categories: Mitigation (M), Response (R)

In addition to the above programs, there are also two recent changes to state statutes that provide additional post disaster drought response opportunities:

- Release of DOW reservoir water for municipal and domestic use (C.R.S. §37-88-109(2))
- Emergency Substitute Water Supply Plan for public health & safety ((C.R.S. §37-92-308(7))

Several recommendations for potential structural and non-structural drought mitigation projects are presented in the recent Drought & Water Supply Assessment, in Chapter 15⁶².

Recommended structural projects include upgrading dams to allow them to safely store more

water; dredging existing reservoirs, installing water meters; lining ditches; installing/deepening wells; implementing aquifer storage recovery/conjunctive use programs/aquifer recharge; building new surface and ground water storage facilities; and others. Non-structural projects include education; water conservation; master planning; drought and conservation planning; use of cooperative agreements; and financing for large-scale projects.

Evaluation of state policies related to development in drought-prone areas

Several objectives and actions related to minimizing development in disaster-prone areas in general are included in the current Hazard Mitigation Plan⁶³. For example, for the NHMP Goal: “Reduce the loss of life and personal injuries from natural hazard events”, one of the objectives listed is to “assist communities interested in adopting or revising building codes, design standards, and land development regulations” in order to “encourage development in less hazardous areas”. However, as noted previously, all areas of the state are drought-prone. Therefore, state policies related to development in drought-prone areas do not appear to be practical.

State funding capabilities for drought mitigation projects

The types of state-funded projects available for drought mitigation are included in the previous table, and include disaster emergency funds, water conservation funding, wildlife cash funds, wastewater treatment plant and drinking water treatment plant construction funds. In addition, funding options are discussed in the current Hazard Mitigations Plan⁶⁴. This section includes information on state matching funds for federal programs (such as FEMA’s); the State Disaster Emergency Fund; grant programs of the Water Conservation Board, Division of Water Resources, Division of Emergency Management, Soil Conservation Service, and State Forest Service; and education and outreach program funds. The Hazard Mitigation Plan also discusses the types of mitigation grant programs managed by the Mitigation Staff of the Colorado Division of Emergency Management that are available⁶⁵.

Additional information on state funding capabilities may be found in the 2003 Drought Impact and Mitigation Report⁶⁶. This report included an updated list of drought and fire recovery funds available in Colorado. This information is reproduced in the section on Funding Sources in the Mitigation Strategy section in a later section of this report.

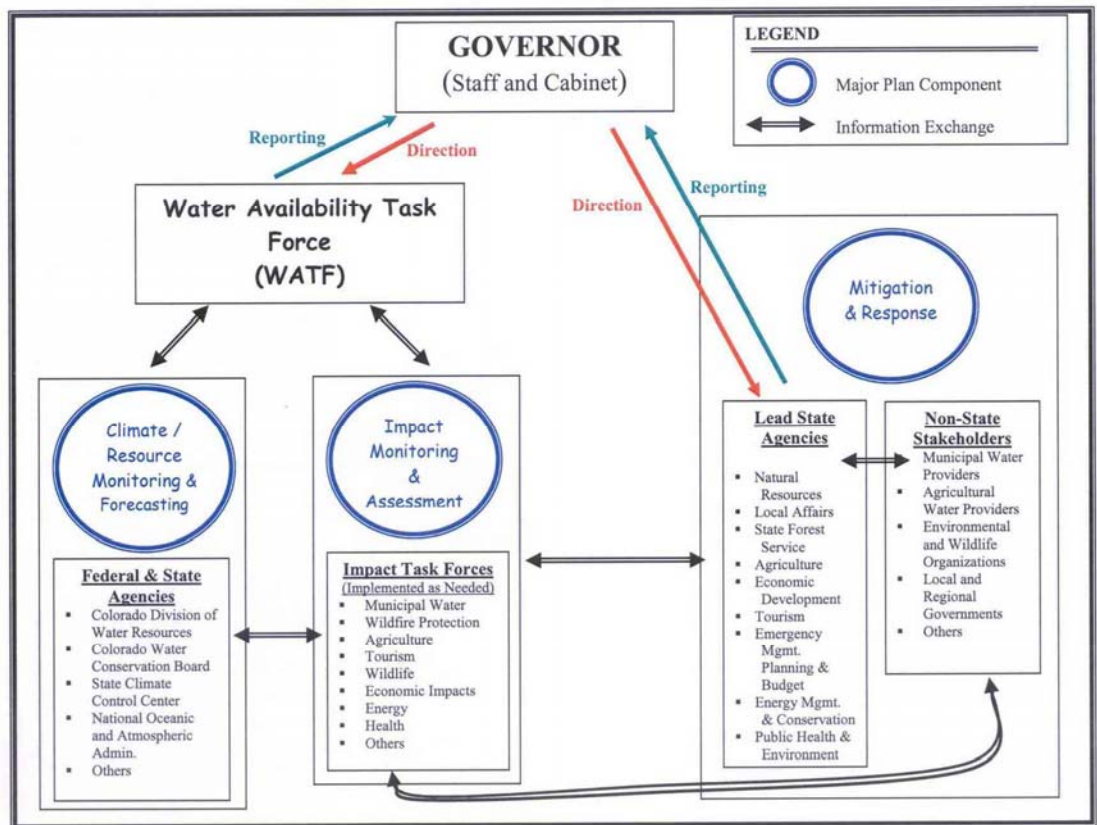
Changes in drought management capabilities since last approval

The roles of the various state agencies were summarized in the 2004 Hazard Mitigation Plan⁶⁷ and roles of the task forces are discussed in the current Drought Plan⁶⁸. As part of this plan update, the ITF chairs, CWCB and DWR staff were asked to update these pages as necessary. Comments received included the following:

- The list of members on the WATF should be expanded to include the Colorado Department of Agriculture and Colorado State University.

- The Agricultural Industry Task Force membership includes Extension Services, specifically Colorado State University (rather than “state and federal extension services”, as it is listed in the current Drought Plan).
- The Wildlife Task Force membership also includes The Nature Conservancy, Colorado Wildlife Federation, Colorado Water Conservation Board – Instream Flow Section, and the National Resources Conservation Service, in addition to those already shown.
- The Municipal Task Force seems to be appropriately staffed and structured as identified in the current Drought Plan.
- There have not been changes to the Colorado Department of Agriculture’s role since 2000.
- The role of the Farm Services Agency (FSA/USDA) relative to granting permission to hay and graze Conservation Reserve Program (CRP) lands was clarified (though no actual policies have changed) The State Committee can grant limited haying and grazing if the state or the area of the state is in a “D-3” or “D-4” drought stage. A CRP landowner may request managed haying and grazing be added to his/her CRP contract. NRCS writes the plan to fit within the farmer/rancher’s conservation plan, and the FSA County Committee can approve the amendment to the contract. If the plan is approved, the contract holder takes a 25% reduction in the CRP payment. However, the Committee cannot extend haying and grazing regardless of the drought stage. Authority to grant haying and grazing in D-1 or D-2 stages remains with the FSA administrator as does the authority to grant extensions of haying and grazing.
- The discussion in the Natural Hazard Mitigation Plan re the Division of Water Resources should be updated to also include a discussion of the Water Supply Branch, which administers water rights, monitors river flows, and provides water supply information to the public. The following language was suggested: “As a function of administering water rights throughout the state, the Water Supply Branch collects reservoir storage and river flow data. A network of real-time river flow data collection systems and river basin simulation models provide data to the Division of Water Resources to monitor for both flood and drought conditions. The Water Supply Branch prepares the monthly surface water supply index for all of the primary water basins within the state. The index values are based upon snowpack, stream flows, reservoir storage, and precipitation. The index is used primarily to gage the water supply for drought planning purposes. The Water Supply Branch participates as Co-Chair of the State Water Availability Task Force.”
- Identifying the appropriate role of the State Water Availability Task Force in the state’s efforts to monitor, evaluate, and adapt to potential impacts from climate change effects to water supplies.

In addition, one member of the ITF suggested that the actual coordination among the various task forces, agencies, and other stakeholders in the past might be better represented by the following figure. It was noted that during the 2002 drought, the process was streamlined and the roles consolidated.



Most state agencies directly reported their efforts to the WATF and conducted mitigation through existing state channels; the Interagency Coordinating Group (ICG) did not seem to have a formal role in the communications. In addition, several groups in addition to the state agencies listed as members of the ICG participated in response and mitigation, including Trout Unlimited, The Nature Conservancy, federal agencies, local agencies, and other groups. Drought response and mitigation extended far beyond the state. Also, the ITF chairs recommended an improved website and improved information dispersal.

One entity noted that the agricultural sector needs early drought designation, but tourism and other sectors seem to want to delay designation. It is important to get early impact data on agricultural impacts so that agricultural drought disasters can be processed early. The FSA and County Emergency Boards are responsible for developing and aggregating the impact data and bringing it forward to the Agriculture Task Force. The Weekly Crop Progress reports are also important tools for the Task Force to use in staying abreast of agriculture conditions.

Other new statutory mechanisms for drought management were summarized in the recent Drought & Water Supply Assessment; these tools are summarized in the table below:

1. C.R.S. § 24-32-2105.5
Encourages the Water Availability Task Force to continue to monitor drought conditions to recommend legislation addressing drought emergencies.
2. C.R.S. § 37-60-123.5
Appropriates funds to the CWCB for use in making loans and grants to agricultural organizations for emergency drought-related water augmentation purposes.
3. C.R.S. § 37-60-106(1)(c) & (d)
Authorizes the CWCB to formulate plans for "bringing about the greater utilization of the waters of the state" and to "gather data and information" to the same ends.
4. C.R.S. § 37-60-124
Establishes the Office of Water Conservation, which oversees a program to generate water efficiency information and which administers grants for municipal water efficiency demonstration projects.
5. C.R.S. § 37-60-115
Authorizes the CWCB to study water resources toward a "unified and harmonious development of all waters for beneficial use in Colorado to the fullest extent possible under the law," including studies regarding inter-basin transfers.
6. C.R.S. § 37-98-102
Creates a water resources review committee to monitor the conservation and development of water resources in Colorado.
7. C.R.S. § 37-92-309
This section, adopted during the last legislative session, gives the State Engineer authority to approve temporary, "interruptible water supply agreements" between water users, providing for the temporary transfer of historic consumptive use credit to another type and/or place of use, without requiring adjudication of a change of water rights. Such agreements are subject to approval by the State Engineer upon a finding of non-injury to other water users and non-interference with inter-state compact requirements, and will only be approved for operation during a calendar year in which a drought or other emergency has been declared by the Governor, and the first full calendar after the declared emergency terminates.
8. C.R.S. § 37-83-104
Allowing water users to release stored water to the stream, or to a ditch, and in exchange, to divert an equal amount of water from a point higher upstream, without adjudicating an exchange. Such exchanges are subject to the "no injury rule," and a water user undertaking such an exchange may be required by the State Engineer to release additional water from storage to make up for delivery losses.
9. C.R.S. § 37-83-105
Allowing persons taking water from the same stream or ditch to exchange or loan water to one another, for a limited time, for the purpose of saving crops, or using water in a more economical manner, without requiring an adjudication of a change of water rights. As discussed above, this section was recently amended to allow temporary loans of water to the CWCB for instream flow purposes.
10. C.R.S. § 37-83-106
Allowing water conservancy and conservation districts to enter into cooperative agreements with other political subdivisions for the lease or exchange of water outside district boundaries.

Colorado Revised Statutes, §37-60-126 defines the requirements that cover water conservation and drought mitigation planning. This law requires that a covered entity that seeks financial assistance from either the CWCB or the Colorado Water Resources and Power Development Authority on or after July 1, 2006 to first submit to the CWCB a new or revised water conservation plan for the board's approval prior to the release of new loan proceeds. The minimum plan elements that shall be considered are listed in §37-60-126(4). In 2004, the legislature adopted C.R.S. §37-60-126.5, which regulates drought mitigation planning, programs, and the relationship to state assistance.

In response to the 2002 drought, the Colorado Department of Agriculture, worked with federal agencies on passage of the Farm Bill and CRP grazing. The passage of HB02S-1010 allows qualified livestock producers to defer taxes on livestock sold due to drought. Qualified livestock producers selling more breeding livestock than normal due to drought, flood, or other weather-related conditions and electing to use Internal Revenue Code 1033(e) have four years to replace the livestock without reporting the gains. Also, the IRS may extend the replacement period if the weather-related conditions continue for more than three years⁶⁹.

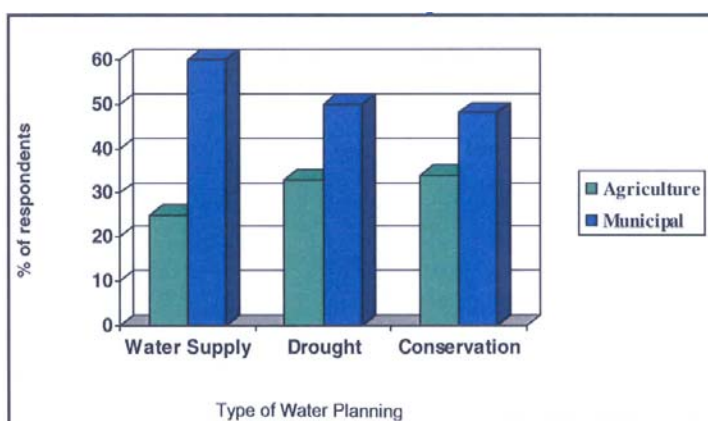
LOCAL CAPABILITY ASSESSMENT

The Hazard Mitigation Plan must include a general description and analysis of the effectiveness of local mitigation policies, programs, and capabilities.

General description of local mitigation policies, programs, capabilities

Information was provided in the Drought Plan documenting which entities had Drought Response Plans, Water Conservation Plans, Water Conservation Ordinances, Master Water Supply Plans, and Drought Hydrology Studies in place as of February 2000⁷⁰. For example, in 2000, only 24% of the municipal entities responding had a Drought Response Plan; 79% had a Water Conservation Plan. For agricultural entities, only 8.5% had a Drought Response Plan while 26% had a Water Conservation Plan.

New information was included in the recent DWSA, in a chapter titled, “Current Status of Water Management Planning and Implementation”⁷¹. The level of planning seems to have increased, especially for drought planning (see adjacent figure).



It is recommended that the CWCB strongly encourage the completion of local drought planning efforts during the next planning cycle. It is also recommended that the 2000 survey data described above be updated with a new survey in 2007, with new, expanded questions.

The following table is reproduced from information contained in the recent DWSA⁷². It shows the percentage of respondents who use various drought management tools in Colorado.

Drought Management Tool	% of agricultural respondents who use	% of municipal respondents who use
Water Conservation Programs	55%	75%
Public Education & Involvement Programs	27%	75%
Operations/Cooperative Agreements	42%	46%
Lawn & Garden Water Restrictions	18%	76%
Pump Groundwater	22%	50%
Fines for Water Users	13%	62%
Controls on New Construction	29%	38%
Substitute Supply Plans	20%	35%
Landscaping Controls/Xeriscape	15%	40%
Dual Water System for Irrigation	27%	29%
Emergency Water Supply Agreements	17%	30%
Interruptible Water Supply Agreements	17%	25%
Aquifer Storage & Recovery/Conjunctive Use	21%	16%
Water Banking	14%	12%

Assessment of effectiveness of local policies, programs, capabilities

Chapter 7, “Tools for Managing Drought at a Local Level”, of the DWSA presented the tools available to local communities to prepare for and manage the effects of drought. The chapter includes information

on which tools are applicable to long-term mitigation or short-term drought response, and which can be effectively used to achieve different demand/supply outcomes. The following table summarizes this information for local scale drought management tools.

As can be seen in the table, different tools are effective for different planning horizons and impact management goals. There are numerous tools that have been identified to enable local entities to put together an effective program.

Local Scale Drought Management Tools					
Tool	Planning Horizon		Management Impact		
	Short-Term Response	Long-Term Mitigation	Reduce Demand	Increase Supply	Other
Public Policy and Assessment					
Prepare and regularly update comprehensive water management plan with drought component		✓			✓
Establish drought response principles, objectives, and priorities		✓	✓	✓	✓
Establish authority for declaring a drought emergency		✓	✓	✓	✓
Develop triggers for drought-related actions (establishing thresholds for mild, medium & severe droughts)		✓	✓	✓	✓
Prepare ordinances on drought measures		✓	✓	✓	✓
Evaluate impacts of drought on different groups, economic segments, and environmental receptors		✓			✓
Emergency Response					
Declare a drought emergency	✓		✓	✓	✓
Establish water hauling programs	✓			✓	✓
Extend boat ramps and docks	✓	✓			✓
Restrict/prohibit new taps	✓		✓		
Identify state and federal assistance	✓	✓			✓
Public Education and Relations					
Prepare position papers for the public, media and elected officials describing public drought policies		✓			✓
Establish a public advisory committee		✓			✓
Organize drought information meetings and workshops for public and media	✓	✓			✓
Create informational materials and establish a drought information center		✓			✓
Water Rights Management					
Review water rights for modifications/flexibility during drought		✓		✓	
Dry year leasing of water rights	✓			✓	
Water banks established for the sale, transfer, and exchange of water	✓			✓	
Interruptible water supply agreements	✓			✓	
Water Supply Augmentation					
Rehabilitate reservoirs to operate at design capacity		✓		✓	
Inventory and review reservoir operation plans		✓		✓	✓
Aquifer storage and recovery; conjunctive use		✓		✓	
Weather modification (cloud seeding)	✓	✓		✓	
New water storage facilities		✓		✓	
Monitoring and Evaluation					
Monitor water supply components (e.g. snow pack, stream flow, etc.)	✓	✓			✓
Monitor water quality	✓	✓			✓
Track public perception and effectiveness of drought measures	✓	✓			✓
Improve accuracy of runoff and water supply forecasts		✓			✓
Water Conservation					
Develop, implement and monitor ongoing water conservation program		✓	✓		✓
Implement, upgrade water metering		✓	✓		
Implement, upgrade water loss control systems		✓	✓		
Water-efficient fixtures and appliances		✓	✓		
Low water use landscapes and efficient irrigation		✓	✓		
Improve commercial and industrial efficiencies		✓	✓		
Educational programs	✓	✓	✓		
Rate structures to influence water use	✓	✓	✓		
Water reuse		✓	✓		
Soil management such as soil-moisture monitoring		✓	✓		
Improved tillage practices		✓	✓		
Use drought or salinity tolerant crops		✓	✓		

Additionally, as part of a DWSA survey, respondents identified what they thought were the “best” tools for managing drought⁷³. For municipalities, lawn and garden water restrictions were favored (by 41%), followed by public education/involvement programs (34%), fines for

excessive water usage (30%), and water conservation programs (13%). Among agricultural users, the most effective controls were water conservation programs (27%), cooperative agreements (13%), and public education programs (7%).

MITIGATION ACTIONS

The state mitigation strategy must identify, evaluate, and prioritize cost effective, environmentally sound, and technically feasible mitigation actions and activities the state is considering, and an explanation of how each activity contributes to the overall mitigation strategy. Local input should also be included when available. A new requirement for this update is that the plan must be reviewed and revised to reflect changes in development, progress in statewide mitigation efforts, and changes in priorities. The updated plan must identify the completed, deleted, or deferred actions or activities from the previously approved plan. It must also include any new actions identified since the previous plan.

Identification of actions/activities under state consideration

The existing plan identified, evaluated, and prioritized statewide hazard mitigation goals in the Mitigation Strategy section of Appendix G⁷⁴. Specific actions to implement the goals of the Drought Plan were also identified in Annex VIII; these are reproduced in the adjacent table⁷⁵.

Actions taken to reduce drought impacts by Colorado in previous droughts are listed in Appendix B of the current Drought Plan⁷⁶. Actions identified since the previous plan include ones from both the 2003 DWSA, as well as the 2003

Recommendation	LEAD/ partner agencies	Year
Goal: Improve Water Availability Monitoring		
Secure funding for stream gage improvements.	USGS/CWCB	2001
Augment real time monitoring of ground water data with additional wells statewide.	USGS	2001
Develop a "Colorado Drought Status" strategy that communicates current drought conditions to the public and decision makers.	Drought Task Force/CWCB	2002
Goal: Increase Public Awareness and Education		
Develop an internet site for Colorado drought information.	CWCB/COEM	2001
Update the "About Drought" informational brochure.	CWCB/COEM	2003
Implement a "Drought Awareness Week".	CWCB/COEM	2003
Goal: Augment water supply		
Develop public/private partnerships to augment local water supplies such as using pits from gravel extraction for water storage and recreation.	local govt's/DoLA/CWCB	
Further research of weather modification programs.	CWCB	
Explore feasibility of water supply banking technologies: high altitude floodwater diversion storage; aquifer recharge; snow banking technologies.	CWCB/SEO	
Provide funding for water system improvements to local governments and local water utilities.	DoLA	
Goal: Facilitate watershed and local planning		
Develop risk-based assessments of water systems by basin.	CWCB	2000-01
Conduct workshops on developing local drought plans.	CWCB	2000-01
Encourage "Project Impact" (PI) communities to become "drought resistant communities".	COEM/FEMA/PI Communities	2001
Goal: Reduce water demand / encourage conservation		
Support local development of conservation programs.	CWCB	Ongoing
Establish stronger economic incentives for private investment in water conservation.	DNR	
Develop additional computer-aided decision support systems for river basins to facilitate water conservation decision-making (modeled after the Colorado River Decision Support System).	SEO/CSU	
Goal: Impact reduction		
Conduct workshops on crop survival during drought.	Coop extension/Dept of Ag.	Ongoing
Conduct workshops on livestock management during drought.	Coop extension/Dept of Ag.	Ongoing
Resolve emerging water use conflicts.	SEO/DNR	Ongoing

Drought Mitigation & Impact Report. Several recommendations were made as part of the 2003

DWSA⁷⁷. These were identified in the final chapter of the assessment, and included input from Colorado's water users statewide. The focus of this portion of the Hazard Mitigation Strategy is to be actions and activities under consideration by the state. The tasks identified by the DWSA for state implementation included several tasks for CWCB. Those that were directly related to drought mitigation efforts are reproduced below:

- Examine the need for new or revised state water policy related to how CWCB provides public information and education, technical assistance, and infrastructure support from the Office of Water Conservation and other CWCB sections with regard to identified water user needs.
- Examine and improve role and relationship of public information and education efforts by the CWCB with the DNR, SEO, and the Governor's Office.
- Evaluate, improve, and coordinate the role and relationship of the CWCB public information and education efforts with those being conducted by local water authorities, utilities, users, and suppliers.
- Evaluate, and where appropriate, engage alternative funding sources and mechanisms to provide resources for programs water users identified as being needed on a statewide, regional, and local basis.
- Revise and update the CWCB Long-Range and Strategic Plans to ensure performance of the identified implementation tasks and activities.
- Examine the CWCB internal budgets and organizational structure to determine how to best achieve the desired objectives and perform the identified tasks, and to identify resource needs, if any exist.
- Continue development and the appropriate allocation of resources to the Office of Water Conservation and Drought Planning in providing technical assistance to covered entities, evaluating submitted water conservation and drought plans, administering fund programs, and disseminating information to the public.
- Evaluate funding options for education, construction and maintenance, technical assistance in conjunction with sustaining and expanding the construction fund.
- Provide appropriate resources to continue to develop and administer opinion surveys of Colorado water users relative to important water issues, and to create a temporal database related to drought and water supply impacts, limitations, planning needs, and projects.

Both the actions listed above from the current Drought Plan as well as the drought-related recommendations of the DWSA are summarized in the table below. Consistent with the FEMA requirements, those actions that have been completed, deleted, deferred, or are ongoing are identified. In addition, new actions that could come about as a result of recommendations in this study are included; page references from this report are given so that the origination of the various recommendations could be found.

*Updated Information Provided In Support of the
2002 Colorado Drought Mitigation and Response Plan
page 33*

Recommended Action	Goal (p. 21)	Who (lead)	Page	New Action?	Previously Identified (in last plan)			
					Completed	Ongoing	Deferred	Deleted
Funding: stream gage improvements	1	USGS	31		2001	X		
Additional groundwater monitoring wells	1	USGS	31		2001	X		
Colorado Drought Status strategy		WATF	31		2002			
Drought info website	2	CWCB	31		2001	X		
"About Drought" brochure	2	CWCB	31		2003			
"Drought Awareness Week"	2	CWCB	31		2003			
Public/private partnerships to augment local water supplies	3	Local gov'ts.	31			X		
Weather modification research	6	CWCB	31			X		
Explore technologies for water supply banking, floodwater diversion storage, aquifer recharge, snow banking	3	CWCB	31			X		
Fund water system improvements	6	DOLA	31			X		
Risk-based water system assessments		CWCB	31		2000-2001	X		
Workshops for local drought plans	2,5	CWCB	31, 44		2000-2001	X (2007)		
Encourage "drought resistant" communities	2	DEM	31		2001			
Support development of local water conservation program	5	CWCB	31			X		
Economic incentives for private investment in conservation	5	DNR	31			X		
Additional DSS support	1	SEO	31			X		
Workshops: crop survival during drought	2	Coop Ext.	31			X		
Workshops: livestock mgmt. during drought	2	Coop Ext.	31			X		
Resolve emerging water use conflicts	4	SEO	31			X		
Public information/education efforts: new policy needs; coordination with DNR/EDO/Governor's Office, locals; evaluate alternative funding sources	2	CWCB	32	X		X		
Revise CWCB long-range & strategic plans	all	CWCB	32	X				
Examine CWCB internal budgets/organization to identify resource needs	all	CWCB	32	X		X		
Evaluate funding options for education, construction & maintenance, tech. assistance & for sustaining & expanding the construction fund	2,4,5	CECB	32	X	2006 (SB07-008)	X		
Resources to OWCDP for technical assistance, evaluating of drought plans, administering fund programs, and public education	2,4,5	CWCB	32	X		X		
Resources to continue surveys of water users re: drought related items	5,6	CWCB	28,32,49	X		X		
Make completion of local drought plans a priority; include vulnerability & risk assessments; incorporate info into next update	6	CWCB	10, 21, 29, 43	X		X		
Review and identify other possible drought mitigation activities that could be taken to protect state-owned facilities from drought impacts	6	CWCB	20	X				
Re-survey state agencies re: state-owned facilities that are susceptible to drought impacts, including questions on: lists of facilities, asset value (& potential dollar losses), level of vulnerability; recommendations for drought preparedness/ prevention strategies/ project proposals/ mitigation opportunities	6	CWCB	18, 20	X				
Develop technical drought planning toolbox	6	CWCB	44	X		X (2007)		
Develop data base to track key information in local drought plans	5,6,7	CWCB	44 - 45	X		X (2007)		
Develop process to link local plans to state plan	7	CWCB	45	X		X		
Statewide Climate Change Initiative	8	CWCB	9,44,49	X				
Funding: Climate Monitoring Stations	8	CWCB	9, 48					
Comprehensive Update 2002 State Drought Plan	6	CWCB	49		2002	X		
Develop plan monitoring process	all	CWCB	48	X		X		
Host Statewide Drought Conference	all	CWCB	43	X		Planned by 2009		

As noted previously, all eight of the ITFs were activated by the Governor during the 2002 drought. One outcome was a report prepared in 2003 (2003 Drought Impact and Mitigation Report). It identified impacts from the drought, as well as actions or mitigation measures that would be or already had been taken to address the drought impacts of the ongoing drought. The report also identified state and federal agencies and entities that are associated with actions and mitigation measures, as well as implementation status and related costs if available. Each of the eight ITFs provided a two or more page summary table listing these actions and activities. The planned actions are summarized below (see the impact and mitigation report for more information).

Agriculture Impact Task Force

Impact	Planned Actions
Crop/livestock losses	USDA Secretarial Disaster Declaration
Reduced forage/water for livestock	Conservation Reserve Program – emergency grazing; list of water haulers to livestock producers; Hay Hotline
Tax implications of herd reductions	Workshop re: tax implementation and information re: available drought assistance
Water supply reduction/watershed restoration	Thin/remove trees
State/federal aid; legislation	Monitor legislation for benefits to agriculture; communicate with legislature re: drought impacts
Lack of water storage	Assess legislation to provide for more stored water and to support temporary transfers of agricultural water to cities during drought

Energy Impact Task Force

Impact	Planned Actions
Loss of energy production	Review suppliers for ability to maintain supply; monitor snowpack/runoff; predict hydroelectric generation reductions; update contingency plans/improve communications; ensure adequate cooling water for plants

Health Impact Task Force

Impact	Planned Actions
Public water system operational problems	Update list; provide impacted systems with technical/financial assistance information; update information on available funding sources for drought mitigation; develop technical/financial assistance plan for each system with problems based on prioritized needs
Risks associated with operational problems	Work with impacted systems to develop “bottled water” advisories; approve new water supply sources
Instream water quality problems	Identify potential problems in key segments; assess low-flow-related fish kill impacts
Risks associated with body contact uses	Increase public awareness/education
Interrelated wastewater/drinking water treatment concerns	Identify potential problems caused by upstream wastewater discharges on downstream drinking water plants
Risks associated with intersystem impacts	Work with impacted systems to develop “bottled water” advisories

Municipal Water Impact Task Force

Impact	Planned Actions
Insufficient water supply for system	Identify systems with needs; potential funding sources; encourage water conservation planning/education; create incentives for those with less reliable sources to connect/consolidate with others with more reliable sources; support additional storage reservoirs
Insufficient water system revenue due to reduced water sales	Identify ways to generate additional revenue to offset revenue losses; technical assistance
Mechanical and process failures related to reduced water supplies, higher contaminant levels and high temperatures	Outreach to identify and assist needy systems; continued funding of emergency and long-term mitigation and infrastructure projects; assess President's Healthy Forests Initiative to mitigate wildfire impacts on water quality/supply

Tourism Impact Task Force

Impact	Planned Actions
Economic loss to recreation and tourism industries	Develop Local Community Mitigation and Response Plans; public outreach and education
Rafting industry impacts	Public education/outreach, maintain river flows wherever possible; keep river corridors open for commercial outfitters
Golf industry impacts	Water conservation; public outreach/education
Ski industry impacts	Public outreach/education
State Parks impacts	Public outreach/education; lengthen boat ramps; fire bans
Local parks & recreation area impacts	Limit field access/practice hours in spring; close fields during periods of extreme duress; public outreach education; water conservation; BMPs
Campground industry	Public outreach/education; fire bans
Fishing/hunting impacts	Public outreach/education; offset hatchery/fishery locations to provide best stocking coverage during drought events; monitor instream flows and reservoir levels for fish kill potential
Lodging industry	Planning sessions with member properties; water conservation; public education/outreach
Food service industry	Public outreach/education; reduced water usage

Wildfire Impact Task Force

Impact	Planned Actions
Increased potential for wildfires in wildland interface areas	Technical/cost-sharing assistance for county Fire Management Plans; provide for wildland-urban interface management needs and fuels mitigation cost-sharing program; mechanism for state contributions to Emergency Fire Fund; statewide wildfire risk assessment; update roles in Colorado interagency Cooperative Fire Protection Agreement; expanded state support to zone dispatch center and extended attack; coordinate funding efforts for various programs; public education/outreach

Wildlife Impact Task Force

Impact	Planned Actions
Low streamflow, low reservoir, and sediment impact on fish	Identify critical reaches, monitor, implement emergency habitat improvements; communication network; emergency instream flow protection, drought emergency closures, fishing restrictions, fish salvage operations
Decrease in recreational angling	Public education/information activities
Reduced hatchery production	Monitor hatchery water levels/stocking conditions; modify production levels and stocking procedures
Reduction in quality habitat for wildlife	Identify priority areas; monitor impacts on T&E species; implement emergency habitat improvements
Increases in predator/human/livestock interaction	Identify/assess impacts; public education
Increased impacts to big game including game damage and habitat reduction from drought stressed lands	Evaluate compensating private landowners; reduce herd sizes via drought mitigation hunting licenses
Changes in migratory bird patterns and waterfowl production rates	Monitor/identify impacts; develop emergency habitat improvements

Evaluation of actions/activities

The Colorado Division of Emergency Management's annual review process and triennial update process is described in the Hazard Mitigation Plan, Appendix G⁷⁸. DEM used the STAPLE/E criteria suggested by FEMA to help ensure that the most equitable and feasible actions would be undertaken based on capability. The results were tempered by the following two guidelines: Top priority for the state was public safety, and alternatives considered impacts on the state as a whole. This process resulted in the actions recommended in Appendix G under the mitigation strategy.

The evolution of the above tasks recommended for CWCB was discussed in the DWSA⁷⁹. These findings were based, in part, on input from local water users. The major objective that was identified for the state to address with respect to Colorado's water users needs was to improve water availability and reliability statewide. Three major areas of practice to meet this need were identified:

- Improve public understanding/knowledge of state's water and water resource issues
- Support infrastructure needs of water users
- Support technical assistance needs of water users

These areas of practice are consistent with several of the adopted goals of the Drought Plan (increase public awareness and education; augment water supply; and facilitate watershed and local planning). All of the recommendations for CWCB supported one or more of these areas of practice.

The above recommendations of the ITFs were developed and evaluated according to the process already described above, and are also consistent with the Hazard Mitigation Plan.

The ITFs will continue to implement their recommendations, as needed, in response to future drought conditions.

Prioritization of actions/activities

The existing Drought Plan discusses the prioritization of state level actions for mitigating the effects of long-term droughts in terms of early, middle, and later phases⁸⁰. These “triggers” for various state level actions are described in more detail in the existing plan.

Note that under the state’s new guidelines for providing financial assistance to develop drought mitigation plans (discussed later in this report on page 45); one of the application evaluation criteria is the rate of expected growth in water service demands, based on expected change of population into the future or other acceptable methods. Through the use of this criterion, the plans will be reviewed and funding decisions will be prioritized to reflect changes in development.

Identification on how activities contribute to overall state mitigation strategy

How the identified activities and actions contribute to the overall state mitigation strategy was already discussed above in the “Evaluation of actions/activities” section.

Mitigation strategy linked to local plans

FEMA recommends that the mitigation actions identified should be linked to local plans, where specific local actions and projects are identified; however, the absence of information on this piece will not cause FEMA to disapprove the plan. As already recommended above, completion of local drought plans should be a priority for the next planning cycle. As these plans are completed and/or updated, local actions and projects that are identified should be compared to the state’s drought mitigation strategy, and any changes that are needed should be made to ensure consistency between state and local strategies.

FUNDING SOURCES

The state mitigation strategy is to include an identification of current and potential sources of federal, state, local, or private funding to implement mitigation activities.

Current sources

An overall description of current funding sources available for mitigation projects is found in the executive summary and in Appendix G of the state’s current Hazard Mitigation Plan⁸¹. The use of the various disaster declarations to access funding is further described in the 2002 Drought Plan⁸². Appendix A of the Drought Plan includes an extensive listing of both state and federal drought assistance and related programs⁸³. A listing of drought funds available in Colorado was included in the 2002 Drought Impact and Mitigation Report⁸⁴; this information has been updated in the table below⁸⁵:

DROUGHT AND FIRE RECOVERY LOAN FUNDS AVAILABLE IN COLORADO

PROGRAM	LOAN FUNDS AVAILABLE	USES/REQUIREMENTS	AGENCY & CONTACT
CWCB Construction Fund & Severance Tax Trust Fund	-No limit -Loans typically range from \$50,000 to \$5,000,000 Loans can be made up to \$10,000,000 without legislative authorization within the CWCB process	Raw water projects (dams, pipelines, ditches, wells, new projects or restorations) -Available to any organization (municipalities, agriculture, ditch companies, homeowners assn., special districts, etc.) -Must receive CWC Board and Legislative approval if > \$10M; CWCB Board approval if <\$10M	Colorado Water Conservation Board, Mike Serlette, 303-866-3426
Water Pollution Control Revolving Fund (WPCRF)	-Fire-related NPS projects can be given priority status -Direct loans under \$1,000,000 available with Board approval -\$10K grants available for planning (fire-related O.K.)	Low-interest loans for public waste water treatment system needs and watershed nonpoint source (NPS) control projects -Available to governmental agencies -Emergency projects can be identified at any time throughout the year -Loan funds require board review, study grants available immediately	Colorado Water Quality Control Division, Debbie Stenson, 303-692-3554
Drinking Water Revolving Fund (DWRF)	-Fire-related NPS projects can be given priority status -Direct loans under \$1,000,000 available with Board approval -\$10K grants available for planning (fire-related O.K.)	Low-interest loans for drinking water treatment system needs -Available to governmental agencies -Emergency projects can be identified at any time throughout the year -Loan funds require board review, study grants available immediately	Colorado Water Quality Control Division, Donna Davis, 303-692-3562
USDA Rural Development 502 Direct Housing Loan Program	-Loans limited by individual county mortgage limits -Most counties have loan limit of \$108,317	Available for wells and water connections – Applicants must be very low income, owner/occupant, unable to obtain conventional credit, and in rural communities and areas	8 Rural Development offices in Colorado, initial contact Denise Coit, 720-544-2920- for referral to local office
Natural Resources Conservation Service – Emergency Watershed Protection Program	-Funding available through the Simplified Acquisition Procedures (SAP) ranges from \$25K to \$100K -Funded through contracts between project sponsors and the NRCS. There are no grants. The NRCS pays 75% of the costs.	Installing/repairing conservation measures to control flooding and prevent soil erosion. Generally, more than one individual should benefit from the project. Public or private landowners or others who have a legal interest or responsibility for the values threatened by the watershed emergency	NRCS – The NRCS State Program Manager is John Andrews, phone 720-544-2834. Initial contacts should be made with NRCS county offices when an emergency exists. The county office contacts can be found at www.co.nrcs.usda.gov
Nonpoint Source Pollution (NPS) Grants	Typical awards range from \$30K to \$150K	-Applicants can include governmental and non-governmental organizations -Applicants generally evaluated through a stakeholder process, but this can be waived -40% non-federal match required Funds available immediately for fire-damaged watersheds impacting drinking water supplies	Colorado Water Quality Control Division, Bonnie Pate, Non-Point Source Coordinator, 303-692-3557
Agricultural Emergency Drought Response Fund	\$1 million fund for loans and grants	-For emergency drought-related water augmentation purposes -Limited to agricultural organizations	Colorado Water Conservation Board, Mike Serlette, 303-866-3426

PROGRAM	LOAN FUNDS AVAILABLE	USES/REQUIREMENTS	AGENCY & CONTACT
EDA Economic Adjustment Program	Economic adjustment grants can range from \$25,000 up to \$2,000,000, depending on the circumstances	-Job losses from natural disasters	U.S. Economic Development Administration, John Zender, 303-844-4902
Energy Impact Assistance Fund	-Maximum grant \$300,000 (guideline) -Loans available for sewer and treated water projects	-State and local governments and nonprofit organizations.	8 Colorado Department of Local Affairs field offices in Colorado, initial contact, Barry Cress, 303-866-2352 for referral to field office
Community Development Block Grants	Maximum award \$250,000 (guideline)	-Public facility and infrastructure needs -Eligible recipients include CDBG "non-entitlement" municipality or county; districts and private systems are eligible sup-recipients. Applicants must provide local cash participation, quality with low/moderate incomes, pay Davis-Bacon wages, and comply with NEPA	8 Colorado Department of Local Affairs field offices in Colorado, initial contact, Barry Cress, 303-866-2352 for referral to field office
USDA Rural Development Home Improvement and Repair Loans and Grants (504 Program)	-\$20,000 maximum loan -\$7,500 maximum grant (must be elderly owner/occupant age 62+)	For home rehabilitation, including wells and water connections. Applicants must be very low income, owner/occupant, unable to obtain conventional credit, and in rural communities and areas	8 Rural Development offices in Colorado, initial contact Denise Coit, 720-544-2920- for referral to local office

Potential sources

Other potential sources of funding have been identified, and have been included in the information presented in sections above. For example, the Municipal Water Impact Task Force is looking into the possibility of accessing funding under the President's Healthy Forest Initiative to mitigate impacts on water quality and water supply. The Wildfire Impact Task Force recommended establishing a new mechanism for the state to contribute to the Emergency Fire Fund. The Agricultural Impact Task Force is monitoring all proposed state and federal drought-related legislation for benefits to agriculture. C.R.S. 37-60-126.5 makes new money available for drought planning, from the severance tax trust fund. The Wildlife Impact Task Force recommended additional license sales for the 2002 big game season, due to the lack of winter forage because of the ongoing drought. These sales resulted in additional revenue of \$0.8 million in 2002 to CDOW, which helped offset the \$1.8 million in losses in fishing license sales that year.

Sources of mitigation funding used to implement activities since previous plan

Several sources of mitigation funding used to implement activities recommended by the ITFs during the 2002 drought were identified in the 2003 Drought Impact and Mitigation Report⁸⁶. For example, municipal water supply systems accessed a variety of funding sources available for use by public water systems (see table below). The Golf Associations of Colorado and Colorado State University funded two economic impact studies to quantify 2002 drought impacts to the golf industry. In the area of wildfire mitigation, \$1million was provided through Competitive Federal Grant Funds for fuels mitigation and wildland-urban interface management cost-sharing programs; \$21 million federal funding was spent on coordinated fuels reduction projects on federal lands, and \$3.5 million federal dollars were matched by local and state budgets for fuels

reduction on non-federal lands. The Governor's Emergency Fund, via an Executive Order, was used to supplement the Emergency Fire Fund in 2002. CDOW shifted existing funds to accomplish drought-required actions, thus delaying or eliminating other agency projects. Other entities indicated they absorbed the costs of implementing the ITF recommendations under their current budgets.

The following table shows funding assistance that was provided for municipal water needs through state programs in 2002.

Recipient	Project Description	Amount/Type	State Agency
Aguilar, Town of	Water study	\$20,000 loan	DoLA
Akron, Town of	Drill 2 wells and build a raw water transmission line.	\$349,799 loan	CWCB
Alma, Town of	Drill two additional water wells	\$210,000 grant \$13,500 grant	DoLA DPHE
Beulah and Pine Drive Water Districts	Engineering study, storage tank, transmission line for system interconnect, pump station.	\$100,000 grant & \$60,000 loan	DOLA
Bayfield, Town of	Water treatment improvements	\$470,000 grant & \$233,000 loan \$50,000 grant	DoLA DPHE
Big Elk Meadows Water Association	Water storage	\$15,600 grant	DPHE
Central Weld County Water District	Build Dry Creek Reservoir	\$3,937,500 loan	CWCB
Coal Creek, Town of	Purchase water rights	\$67,500 loan	CWCB
Crestone, Town of	Drill a new fire well	\$20,000 grant	DoLA
Durango, City of	Water treatment improvements	\$300,000 grant & \$200,000 loan	DoLA
East Dillon Water and Sanitation District	Purchase water rights	\$2,550,000 loan	CWCB
Edgemont Ranch Metro District	Water storage	\$5,000 grant	DPHE
Fredrick, Town of	Rehabilitate Milavec Lake	\$1,000,000 loan	CWCB
Freeman Creek Pipeline Association	Treatment plant and water intake replacement	\$25,000 grant	DPHE
Kremmling, Town of	Develop an alternate water source	\$300,000 grant \$1,000,000 loan	DoLA CWCB
Little Thompson Water District	Build Dry Creek Reservoir	\$3,937,500 loan	CWCB
Monument, Town of	Rehabilitate Monument Dam	\$2,443,000 loan	CWCB
Paonia, Town of	Purchase water rights	\$1,000,000 loan	CWCB
Parker Water and Sanitation District	Reuter Hess Reservoir	\$15,000,000 loan	CWCB
Pinewood Springs Water District	Engineering study, filtration system improvements	\$16,800 loan	DPHE
Poudre Tech Metro District	Reservoir Construction	\$2,180,000 loan	CWCB
Red Rock Valley Water District	Drill an additional water well	\$70,000 grant \$2,500 grant	DoLA DPHE
Sugar City, Town of	Water study	\$10,000 grant	DoLA
Weld County (Chambers subdivision)	Connecting subdivision to City of Brighton's water and wastewater systems	\$300,000 grant & \$100,000 loan	DoLA
Windsor, Town of	Rehabilitate Kern Reservoir	\$3,620,000 loan	CWCB

In addition, the Colorado Department of Local Affairs (DOLA) identified several additional drought-related grants issued during the past three years; these are shown in the following table:

Recipient	Project Description	Amount/Type	State Agency
Buffalo Creek Water District	Increase reservoir capacity. Replace water main due to leakage from reservoir to customers.	\$310,000 grant \$310,000 loan	DOLA
Town of Crestone	Water engineering study to address fire protection and water availability issues.	\$14,000 grant	DOLA
Town of Fowler	Water engineering study to address water availability, water quality and other system improvements.	\$12,000 grant	DOLA
Town of New Castle	Construct water supply facility from a secondary water source to existing water treatment facility in order to alleviate pressures from drought, water rights administration and water quality issues. Construct diversion structure and pump station on Colorado River.	\$300,000 grant	DOLA
Town of Seibert	Water engineering study to address water shortages; identify potential new water sources in the area.	\$15,000 grant	DOLA
Town of Stratton	Water well purchase due to water shortage.	\$185,000 grant	DOLA

In 2003, USDA made available for distribution approximately 15 million pounds of nonfat dry milk from the milk commodity support program, which was no longer fit for human consumption, as a high grade livestock feed supplement. In 2006, USDA granted the Colorado Department of Agriculture about \$1.28 million to distribute to livestock producers in 28 eastern Colorado counties to help alleviate financial stress due to drought. The department worked with county offices of Cooperative Extension and the Farm Services Administration, along with press releases, to let producers know of the opportunity to apply for grants. While this is thought to be a one-time opportunity, USDA may, in the future, utilize state departments of agriculture to help distribute cash grants in the event of drought or other weather events.

COORDINATION OF LOCAL MITIGATION PLANNING

LOCAL FUNDING AND TECHNICAL ASSISTANCE

This section must include a description of the state process to support, through funding and technical assistance, the development of local mitigation plans. A new requirement is that the updated plan must describe the funding and technical assistance the state has provided in the past 3 years to assist local jurisdictions in completing approvable mitigation plans.

Description of state process that supports development of local plans

The overall state process to encourage and support the development of local plans is discussed in Appendix G of the Hazard Mitigation Plan⁸⁷. Timing and funding mechanisms are also discussed. The process describing the state's outreach to local government to assist with drought planning is described in the current Drought Plan, under the "Local Government Outreach and

Feedback” section⁸⁸. Appendix D of the current Drought Plan identifies which local governments had Drought Response Plans in place as of February 2000⁸⁹. (This list was updated in 2004 in the Drought and Water Supply Assessment⁹⁰.) In addition, Appendix F of the current Drought Plan identifies regional and field contacts for assistance⁹¹. Appendix G lists drought internet resources that can be used by local entities for further information⁹².

There is not currently a requirement for local entities to adopt a drought mitigation plan. However, CWCB strongly supports the development of local drought mitigation plans. The CWCB website contains educational information on the benefits of such plans and why local entities develop drought planning strategies. State staff continuously meets with local utilities and water suppliers, to provide drought management information at a grassroots level. CWCB is also planning to host a statewide drought conference in the next two years.

In 2003, CWCB also published a report titled, “Technical Assistance to Covered Entities: Review of Conservation Planning Policies and Practices” (R. Pinkham, prepared for the CWCB, May 2003).

The role of the Mitigation staff within the Colorado Division of Emergency Management is described in Appendix K of the current Hazard Mitigation Plan⁹³. Mitigation staff is responsible to provide technical assistance and training to local governments to assist them in developing local mitigation plans and project applications. The Mitigation staff also is responsible to review and submit all local mitigation plans.

Funding/technical assistance provided in the past three years

Financial assistance was initially made available in 2004 under the Drought Mitigation Planning Grant Program (authorized by §37-60-126.5 C.R.S.), available to local and state governmental entities to assist them in developing drought mitigation plans. In 2007, with the passage of SB07-008, the state’s Water Efficiency Grant Program, (authorized by §37-60-126 C.R.S.) provided additional monies through 2012 to support water providers’ efforts to plan and implement drought mitigation strategies. Covered entities, which are mandated to develop water conservation plans, are also strongly encouraged to develop drought mitigation plans. Covered entities include any municipality, agency, utility, public or private, with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers with a total annual demand of 2,000 acre-feet or more. This group of water providers accounts for the majority of the municipal water supply in Colorado. Currently the Water Efficiency Grant Program Fund has approximately \$1.5 million available for drought and water conservation mitigation planning, with another \$800K committed in 2008. Additional monies may become available in 2009 and 2010 for a potential total in the Fund of \$3 million.

In 2004, the Colorado General Assembly passed House Bill 04-1365, which expanded the mission and duties of the Office of Water Conservation and Drought Planning to reflect the state’s involvement in drought mitigation planning and the need to provide more information relating to drought to water users and the public. The Office maintains a clearinghouse of drought information and disseminates information to the public; provides technical assistance

and evaluates and approves drought mitigation plans; and provides financial assistance for drought mitigation plans through various grant programs. Further information on available technical and financial assistance, including the Water Efficiency Grant Program, can also be found on the CWCB website.

As of July 1, 2007, approximately \$250,000 will be made available to CWCB to develop additional drought planning tools. These will include tools for identifying triggers for systems to use before and during droughts; strategies for demand reduction; and hosting workshops statewide. It may also be used to implement parts of a Colorado Climate Change Initiative aimed at identifying potential impacts to state water supplies in the context of a changing climate and adapting to resulting potential water supply shortages.

Since 2000, the Agriculture ITF has attempted to quantify the economic impact on agricultural sectors; provided public education on the impact of drought on agriculture and served as media spokespeople; provided landowner education on drought response; developed a website of drought-related information for producers; offered decision tools to agricultural producers making economic choices; and responded to risk management agency needs for field verification letters.

LOCAL PLAN INTEGRATION

The plan must include a description of the state process and timeframe by which the local plans will be reviewed, coordinated, and linked to the State Mitigation Plan.

Process and timeframe to review local plans

In May 2005, the CWCB adopted guidelines that address the process and timeline for review of local plans. These “Guidelines for the Office to Review and Evaluate Drought Mitigation Plans Submitted by Covered Entities and Other State or Local Governmental Entities” are available on the CWCB website. Upon receipt of a completed local Drought Mitigation Plan, the Office is to review and either approve, conditionally approve, or not approve the plan within 90 days by providing written notice to the submitting entity. Procedural guidelines for contesting plan disapproval are also included. Plan content requirements include: 1) information on plan adoption (including public involvement); 2) a schedule for plan implementation; 3) a discussion of why or why not six elements were included in the local program (drought task force, vulnerability assessment, drought policies, emergency response needs/actions/programs, public education and awareness program, and a link between drought mitigation with water supply and water conservation planning); and 4) public review procedures.

Process and timeframe to coordinate and link local plans to State Mitigation Plan

Local drought plans will first be reviewed and approved by CWCB using the above guidelines. CWCB staff hopes to develop within the next three years a database to track key information in local plans, including items such as basic entity information, vulnerabilities identified in the local plans; and drought mitigation measures that each entity employs. One of the drought

planning tools that CWCB will be developing (see above) will be a process to link the local plans to the overall State Drought Plan.

PRIORITIZING LOCAL ASSISTANCE

The state mitigation strategy is to include criteria for prioritizing communities and local jurisdictions that would receive planning and project grants under available funding programs. FEMA also recommends that it include consideration for communities with the highest risks, repetitive loss properties, and most intense development pressures; however, the absence of information on this piece will not cause FEMA to disapprove the plan. For non-planning grants, there must be a criterion for prioritizing grants such that benefits are maximized according to a cost-benefit review of proposed projects and their associated costs.

Description of criteria for prioritizing planning and project grants

The criteria and process used to prioritize funding assistance requests are described in the Hazard Mitigation Grant Program (HMGP) Administration Plan⁹⁴. When a Notice of Interest (for receipt of financial assistance) is submitted to the state, it must meet certain minimum criteria. These include whether the project: complies with the state's hazard mitigation strategies; meets funding eligibility requirements; is an independent solution to the problem; does not duplicate other funding sources, has a beneficial impact on the declared area, and is cost-effective and environmentally sound⁹⁵. (The two-page table above identifying drought recovery funds available in Colorado includes some of the eligibility requirements for individual aid programs.) When projects are competing for limited funding, projects are scored and ranked. Under the direction of the State Hazard Mitigation Officer and the Governor's Authorized Representative, a subcommittee of the State Hazard Mitigation Team convenes to score and rank the projects. The ranking is to be based on criteria derived from 44 CFR 206.434(b), and may or may not be specific to the disaster. Further information on the state prioritization process can be found in Appendix J of the current Hazard Mitigation Plan⁹⁶.

As noted above, in May 2005 the CWCB adopted guidelines for reviewing and approving local drought mitigation plans submitted to the CWCB. Section 9a of these guidelines called for the development of a set of additional guidelines associated with the prioritization and distribution of grant monies for assisting covered entities and other state or local governmental entities in their drought mitigation planning activities. These new guidelines were approved by the CWCB Members on January 23, 2007.

The new guidelines contain a table showing the application evaluation criteria that will be used to rank applications. This table is shown on page 47. The criteria in the table are based on the following three major evaluation criteria:

1. How likely is the applicant to develop and implement a Drought Mitigation Plan that **meets the intent of the Board** and the Program by increasing meaningful water awareness and response in a drought emergency in the State of Colorado?
2. Does the applicant organization have the **capability to accomplish** the proposed work?

3. What **other considerations** does the applicant have that may influence the Board's decision to award funds?

Other considerations that will be weighed by the Application Committee and/or the Board in awarding grants will include:

1. Adequacy, reliability, and stability of current and future water supplies;
2. Demonstrated financial need;
3. The entity's location with respect to areas of current and future water needs as identified by the Statewide Water Supply Initiative (SWSI); and
4. The amount of CWCB grant funds available.

The "Intent of the Board" is defined as follows: It is the explicit intent of the Board to work with water users and local entities to increase drought planning in the state by: 1) increasing the number of covered entities and state or local governmental entities with CWCB approved drought mitigation plans; 2) improving the nature and breadth of drought mitigation practices at the local level; and 3) increasing the amount of technical assistance that the CWCB provides to local entities. With these objectives in mind, the Board intends to administer the Grant program for purposes of providing assistance to the following: 1) covered entities or state or local entities that desire to improve, update, and/or create Drought Mitigation Plans; 2) entities, given expected growth trends, which either require or desire Drought Mitigation Plans; and 3) entities which sustained severe adverse impacts during the recent 2000-2003 drought.

The SWSI prioritized projects for both structural and nonstructural projects to provide additional water supplies to help mitigate the effects of drought. Projects are recommended by basin county or subbasins; a table summarizing these projects can be found in the Executive Summary of the SWSI Report. Criteria used to prioritize these projects are described in detail in the SWSI Report.

**Guidelines for Financial Assistance to Develop Drought Mitigation Plans
Application Evaluation Criteria**

Criteria	Description	Weighting Factor
Meeting the Intent of the Board		Total 60
Existing Per Capita Water Use	Applicant will report the per capita daily water use annualized for each of the last five water years based on total water demand and/or retail sales divided by population served, or similar.	15
Rate of Expected Growth in Service Demand	Rate of expected growth in service demands, reported as total retail water demand, under current conditions. Can be based on expected change of population into the future or some other acceptable method.	15
Expected Goals for Drought Mitigation	Goals are based on estimates made by the applicant and the applicant's knowledge of the applicant's water system, past drought mitigation & response efforts, and future water needs.	15
2000-2003 Drought Impacts	Short term and long term impacts experienced resulting from the 2000-2003 drought including those social and economic impacts by service sector as applicable and feasible.	15
Organizational Capability		Total 20
Level of staffing (volunteered or paid, in-house or out sourced) committed to the effort	Based on availability of staff and the availability of other resources used to support staff	5
Capabilities of the Staff or Staff resources	Based on resumes of staff, resources available to staff (e.g., consultants, advisors, etc.)	5
Level of organizational communication with the public and public involvement	Based on the identification of those public processes that have been, or will be included in the development of a Plan, including public meetings, press releases, news stories, etc.	5
Level of commitment from the governing board/counsel	Based on information included in the application such as the content of the letter from the governing board (or equivalent), local laws, examples of previous governing board actions, etc.	5
Other Considerations		Total 40
Adequacy, Stability, and Reliability of Current and Future Water Supplies	Include description of water supply needs, permitting issues, and other competing needs for local and regional water supply	10
Financial Need		10
Scope of Work	Detailed scope of work taking into consideration that plan element requirements outlined in <i>Guidelines for the Office to Review and Evaluate Drought Mitigation Plans Submitted by Covered Entities and Other State or Local Governmental Entities</i>	10
Location of the Entity with respect to SWSI Recommendations	Board staff will locate the entity relative to areas that have been identified as water short within the SWSI recommendations and findings	10
Total		120

Cost-benefit review of non-planning grants

As noted above, one of the criteria used for eligibility of all projects is whether the project is cost-effective⁹⁷. This applies to projects funded by non-planning grants as well as planning grants.

High risk, repetitive loss, intense development pressure criteria

As noted above, as part of the criteria used to rank projects, points are given for the following:
1) entities that, given expected growth trends, either require or desire Drought Mitigation Plans, and 2) entities which sustained severe adverse impacts during the recent 2000-2003 drought.

PLAN MAINTENANCE PROCESS

MONITORING, EVALUATING, AND UPDATING THE PLAN

The state strategy is to include an established method and schedule for monitoring, evaluating, and updating the plan. A new requirement is to include an analysis of whether the previously approved plan's method and schedule worked, and what elements or processes, if any, were changed.

Method and schedule for monitoring plan

As part of their defined duties, the ITFs are to identify drought-related problems: define and assess societal impacts, severity, loss, and costs; evaluate state and local capacity for response; determine residual needs; and report findings and action plans⁹⁸. This includes several key elements of the drought mitigation and response plan. During the next three-year planning cycle, CWCB staff hopes to further define the process used to identify drought-related problems. It is also recommended that when the current Drought Plan is updated, a more detailed method and schedule for monitoring the entire plan be added.

Method and schedule for evaluating plan

The current drought plan identifies ten steps for drought planning and mitigation in Colorado⁹⁹. The first step is to appoint a drought task force. According to the current Drought Plan, this includes: the Colorado Natural Hazards Mitigation Council, Drought Mitigation Committee, and the State Drought Impact Task Forces¹⁰⁰. Today, the members of the Water Availability Task Force and the Impact Task Forces essentially function as the drought task force referred to in the plan. The second step is to develop drought policy and define the purpose and objectives of the drought plan, which is to be done as a continuous process. The fourth and fifth steps include identifying natural, human, and biological resources, as well as financial and legal constraints; and establishing mitigation procedures including monitoring, impact assessment and response. The state is committed to further refining its processes for accomplishing these steps in its planned update to the State Drought Plan. In addition, any existing drought plan is to be evaluated after droughts¹⁰¹. Consistent with this commitment, the CWCB undertook the Drought and Water Supply Assessment after the recent drought of 2000 – 2003. The goals of this assessment were to determine how prepared Colorado has been for drought, and identify limitations and related measures to better prepare Colorado water users for future droughts. The DWSA was completed in 2004¹⁰², and contained several findings and recommendations (which were already discussed above). A comprehensive follow up to the 2004 DWSA is currently

being conducted by the CWCB and is focused on gathering data on the state of drought planning and preparedness by municipal and industrial water providers throughout the state; this study is scheduled for completion this year.

Method and schedule for updating plan

It is noted that the existing plan is to be kept up to date, as well as evaluated after droughts¹⁰³. According to the existing documents, the plan is to be updated “periodically”. The Drought Plan was last updated in 2002. It is anticipated by CWCB staff that the Drought Plan will undergo another update commencing in 2007-2008. CWCB staff is also responsible for triennial updates to the drought portion of the hazard mitigation plan.

Changes since last plan

The overall process defined above for monitoring, evaluating, and updating the plan appears to be working. However, as a result of this review of the existing drought hazard mitigation plan, CWCB staff has identified a valuable opportunity to incorporate several expanded elements into future drought planning efforts. These include statewide water conservation efforts, formulation of a broad drought vision for the state, and a statewide climate change initiative tied to drought planning efforts and the need for comprehensive water adaptation strategies to deal with potential water shortages.

Since the last plan update, the National Integrated Drought Information System (NIDIS) Act of 2006 was authorized by Congress. NIDIS is a drought early warning system capable of fostering and supporting a research environment that focuses on impact mitigation and improved predictive capabilities. It is designed as a user-based drought information system that assesses potential drought indicators and impacts to provide tools for anticipating, preparing for, and mitigating the effects of drought. Colorado will seek a participatory role in NIDIS as it pertains to efforts in the Colorado River Basin. The state will plan to work with U.S. government agencies, such as Western Water Assessment, the Regional Integrated Sciences and Assessments program in the Rocky Mountain region, to provide scientific knowledge to public and private water providers and stakeholders to anticipate, track, assess, and respond to drought threats at regional and local levels. Many of the goals and objectives of NIDIS coincide squarely with the state recommended actions previously stated on page 33.

Increased awareness and attention to climate change and the associated potential impacts to state water supplies as a result of predicted changes warrants further analysis and proactive adaptive planning strategies. While recognizing the uncertainties inherent in climate prediction, efforts should be made to focus on vulnerabilities and building increased resiliency to climatic extremes such as drought. Vulnerabilities to statewide, regional, and local water supplies due to potential impacts from climate change should be vigorously evaluated to determine appropriate water adaptation measures. The state will seek opportunities to continue and expand funding for data collection networks and activities necessary for monitoring, assessing, and predicting future water supplies. It will look for ways to support improved prediction, modeling, and impact assessment efforts. It will accomplish this by partnering, when feasible, with outside support

institutions, such as the State Climatologist, regional climate centers, agricultural extension services, resource management agencies, and state and local governments. The state will also identify prospects for coordinating and including local governments in their climate change planning efforts.

Internal discussions will be had at appropriate levels of impacted state agencies and recommendations will be presented to the Colorado Water Conservation Board after they are developed. Any new work plan items that are developed as a result of this effort can then be incorporated into the update of the Drought Plan, scheduled to be initiated in 2007-2008.

MONITORING PROGRESS OF MITIGATION ACTIVITIES

The plan must include a system for monitoring implementation of mitigation measures and project closeouts, as well as a system for reviewing progress on achieving goals as well as activities and projects in the mitigation strategy. New requirements include: 1) a description of any modifications to track the start, progress, and completion of mitigation activities; and 2) a discussion of whether mitigation plans were implemented as planned.

How mitigation measures/project closeouts to be monitored

The process used to monitor mitigation project completions and closeouts is described in the HMGP Administration Plan¹⁰⁴. Projects must be completed and reconciled within 3 years of the disaster declaration. For project completions, subgrantees shall submit a letter with all final project documentation and a final inspection report to CDEM requesting closeout. The State Hazard Mitigation Officer, Mitigation staff, and financial officer are responsible to review all paperwork for completion and determine that all eligible work was completed within the performance period. Site visits and inspections are conducted when deemed necessary. Procedures regarding the transmittal of closeout documents to FEMA are also described.

How progress on achieving goals to be monitored

As noted previously, CWCB staff, DWR staff, and the Impact Task Force chairs recommended expanding the existing six drought mitigation goals into the following eight:

1. Improve Water Availability Monitoring
2. Increase Public Awareness and Education
3. Support Substitute Water Supply Plans and Leasing Options to Augment Water Supply
4. Facilitate Watershed and Local Planning
5. Reduce Water Demand/Encourage Conservation
6. Impact Reduction
7. Develop Intergovernmental and Interagency Stakeholder Coordination
8. Evaluate Potential Impacts from Climate Change

All of the proposed actions listed in the table on page 33 supports one or more of these goals. (The second column in the table on page 33 identifies which of these numbered goal(s) the

action supports.) Proposed action in response to changes identified in the “Changes Since Last Plan” section also support one or more of the stated goals. As the progress on these recommended actions is tracked, progress on achieving the above eight goals will also be monitored. If any of the goals are not receiving adequate attention, it will become apparent as the table is periodically updated.

How progress on mitigation activities and projects is reviewed/tracked

CWCB staff will be responsible for reviewing and tracking progress made on all of the activities identified in the table on page 33, as well as progress on any new initiatives identified as a result of the current efforts discussed under the “Changes Since Last Plan” section above. It is recommended that this table be updated at least annually, and new projects/initiatives be added as they are developed.

For FEMA-funded projects, quarterly progress reports are required from subgrantees, which are to reflect project and cost status¹⁰⁵. These reports are reviewed by Mitigation staff and the State Hazard Mitigation Officer, and submitted to FEMA.

Modifications to tracking start, implementation, and completion of mitigation projects

As noted previously, CWCB staff is in the middle of evaluating several new initiatives, as well as expanding efforts in several current programs as the result of discussions regarding this update process and as the result of new state funds that hopefully will soon be available for these efforts. An expanded system for tracking the start, implementation, and completion of these efforts, including mitigation projects, will be developed. The ITF Chairs recommended that the Drought Task Force should prepare an annual report to track mitigation projects, and incorporate this information into CWCB’s annual report (as resources are available and appropriate authorities are approved).

Were mitigation actions implemented as planned?

The table on page 33 shows those actions that have been implemented to date, as well as those that are ongoing. Mitigation actions have been implemented as planned. These efforts have been given high priority due to the impacts of the recent significant drought in Colorado.

List of Endnotes

Abbreviations used in endnotes:

- “Drought Plan”: The Colorado Drought Mitigation and Response Plan, Annex VIII to the State Emergency Operations Plan and Drought Annex to the State All Hazards Mitigation Plan, Colorado Department of Local Affairs, Division of Local Government, Office of Emergency Management, Department of Natural Resources, January 2001.
- “Drought Impact & Mitigation Report”: 2003 Drought Impact and Mitigation Report, Colorado Water Availability Task Force and Impact Task Forces, April 14, 2003.
- “DWSA”: Drought and Water Supply Assessment, Colorado Water Conservation Board, 2004.
- “NHMP”: State of Colorado Natural Hazard Mitigation Plan 2004, Colorado Office of Emergency Management, Updated in 2004 by the Colorado Division of Emergency Management.

¹ 2004 NHMP, p. 3

² 2004 NHMP, p. 3

³ 2004 NHMP, Appendix G, pp. 57-58

⁴ 2004 NHMP, Appendix H, p. 74

⁵ 2004 NHMP, pp. 3-4 and Appendix G, p. 57-58

⁶ Drought Plan, p.6-7

⁷ See 2004 NHMP, pp. 37-39

⁸ i.e., November 1, 2004 – February 19, 2007

⁹ 2004 HNMP, pp. 37-39

¹⁰ 2004 NHMP, pp. 37-39

¹¹ DWSA, p. 7

¹² U.S. Drought Monitor, April 3, 2007 (<http://www.drought.unl.edu/dm.monitor.html>)

¹³ U.S. Drought Monitor, 2006 archives (<http://www.drought.unl.edu/dm.monitor.html>)

¹⁴ U.S. Drought Monitor archives (<http://www.drought.unl.edu/dm.monitor.html>)

¹⁵ Drought Plan, pp. 5-9

¹⁶ DWSA, Ch. 1 “Historical Perspectives on Colorado Drought”, 22 pages

¹⁷ 2004 NHMP, pp. 112 - 180

¹⁸ Drought Plan, p. 8

¹⁹ See 2002 Drought Plan, p. 18

²⁰ Historical Dry and Wet Periods in Colorado, Department of Atmospheric Science at Colorado State University, 1999

²¹ DWSA, Ch. 1, p. 9

²² See DWSA, pp. 18-21

²³ See 2004 NHMP, Appendices B and E

²⁴ 2004 NHMP, Appendix E, p. 36

²⁵ <http://droughtreporter.unl.edu/>

²⁶ i.e., November 1, 2004 – February 19, 2007

²⁷ DWSA, Ch. 3, 15 pages

²⁸ DWSA, Ch. 13, 4 pages

²⁹ DWSA, Ch. 13, p. 3

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- ³⁰ 2004 NHMP, App. B, pp. 7-9.
³¹ 2004 NHMP, p. 12
³² DWSA, Ch 4, 11 pages
³³ 2004 NHMP, Appendix F, pp. 37 - 56
³⁴ 2004 NHMP, App. F, p. 43
³⁵ 2004 NHMP, App. F, p. 43
³⁶ Drought Plan, Appendix B, p. 12
³⁷ Drought Plan, pp. 5-7
³⁸ Drought Plan, Appendix C, p. 28
³⁹ DWSA, Ch. 3, 15 pages
⁴⁰ Drought Impact & Mitigation Report, pp. 5-6, 8-38
⁴¹ Statewide Comprehensive Outdoor Recreation Plan (SCORP), 2003 update, p. 28
⁴² Statewide Comprehensive Outdoor Recreation Plan (SCORP), 2003 update, p. 28
⁴³ Drought Impact & Mitigation Report, pp. 2-3
⁴⁴ Drought Plan, pp 117-180
⁴⁵ 2004 NHMP, Appendix F, pp 39-40
⁴⁶ State Board of Land Commissioners website; Colorado Division of Wildlife website; Department of Natural Resources website (including 2002 Annual Report and 2005 update); Colorado State Forest Service website; Colorado State Parks website; Colorado Water Conservation Board website; and “The Economic Impacts of Hunting, Fishing and Wildlife Watching in Colorado”, BBC Research & Consulting, October 31, 2004, prepared for CDOW
⁴⁷ 2003 Wildlife Task Force Report, Colorado Division of Wildlife
⁴⁸ 2003 Wildlife Task Force Report, Colorado Division of Wildlife, p. 2
⁴⁹ Drought Impact & Mitigation Report, pp. 17-27
⁵⁰ 2004NHMP, p. 4
⁵¹ 2004 NHMP, Appendix G, pp. 61-62
⁵² 2004 NHMP, Appendix G, pp. 59-60
⁵³ 2004 NHMP, pp. 15-17
⁵⁴ Drought Plan, pp. 24-25
⁵⁵ Drought Plan, pp. 10-15
⁵⁶ Drought Plan, p. 10
⁵⁷ DWSA, Chapter 3, p. 2
⁵⁸ Drought Plan, p. 11
⁵⁹ Drought Plan, pp. 12-21
⁶⁰ Drought Plan, Figure 2-9, p. 20
⁶¹ Drought Plan, pp. 25-26
⁶² DWSA, Chapter 15, 10 pages
⁶³ 2004 NHMP, Appendix G, p. 61
⁶⁴ 2004 NHMP, Appendix G, p. 63
⁶⁵ 2004 NHMP, p. 21
⁶⁶ Drought Impact & Mitigation Report, pp. 39-40
⁶⁷ 2004 NHMP, pp.18-25
⁶⁸ Drought Plan 12-15
⁶⁹ Colorado Department of Agriculture Annual Report (July 2001 – June 2002) and 3/26/07 personal communication from Jeffrey Tranel, Colorado State University
⁷⁰ Drought Plan, Appendix D, pp. 29-30
⁷¹ DWSA, Chapter 12, 12 pages
⁷² DWSA, Chapter 12, p. 6
⁷³ DWSA, Chapter 12, p. 7
⁷⁴ 2004 NHMP, Appendix G, pp. 59- 60
⁷⁵ Drought Plan, p. 19
⁷⁶ Drought Plan, Appendix B, p. 27
⁷⁷ DWSA, Chapter 17, pp 8-9

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- ⁷⁸ 2004 NHMP, appendix G, p. 60 and 63-73
⁷⁹ DWAS, Chapter 17, 9 pages
⁸⁰ Drought Plan, p. 21
⁸¹ 2004 NHMP, p. 3 and Appendix G, p. 63
⁸² Drought Plan, pp.8-9
⁸³ Drought Plan, Appendix A, pp 24-26
⁸⁴ Drought Impact & Mitigation Report, pp. 39-40
⁸⁵ April 04, 2007 e-mail from Barry Cress, Colorado Department of Local Affairs
⁸⁶ Drought Impact & Mitigation Report, pp. 8-38
⁸⁷ 2004 NHMP, Appendix G, p. 73
⁸⁸ Drought Plan, p. 21
⁸⁹ Drought Plan, Appendix D
⁹⁰ DWSA, Chapter 12, 12 pages
⁹¹ Drought Plan, Appendix F
⁹² Drought Plan, Appendix G
⁹³ 2004 HNMP, pp. 78-79
⁹⁴ 2004 HNMP, Appendix K, pp. 77-97
⁹⁵ 2004 HNMP, Appendix K, p. 81
⁹⁶ 2004 NHMP, Appendix J, p. 76
⁹⁷ 2004 HNMP, Appendix K, p. 81
⁹⁸ Drought Plan, p. 13
⁹⁹ Drought Plan, p. 20
¹⁰⁰ Drought Plan, p. 18
¹⁰¹ Drought Plan, p. 20
¹⁰² DWSA, 17 chapters plus appendices
¹⁰³ Drought Plan, p. 20
¹⁰⁴ 2004 NHMP, Appendix K, pp. 85-86
¹⁰⁵ 2004 HNMP, Appendix K, p. 89