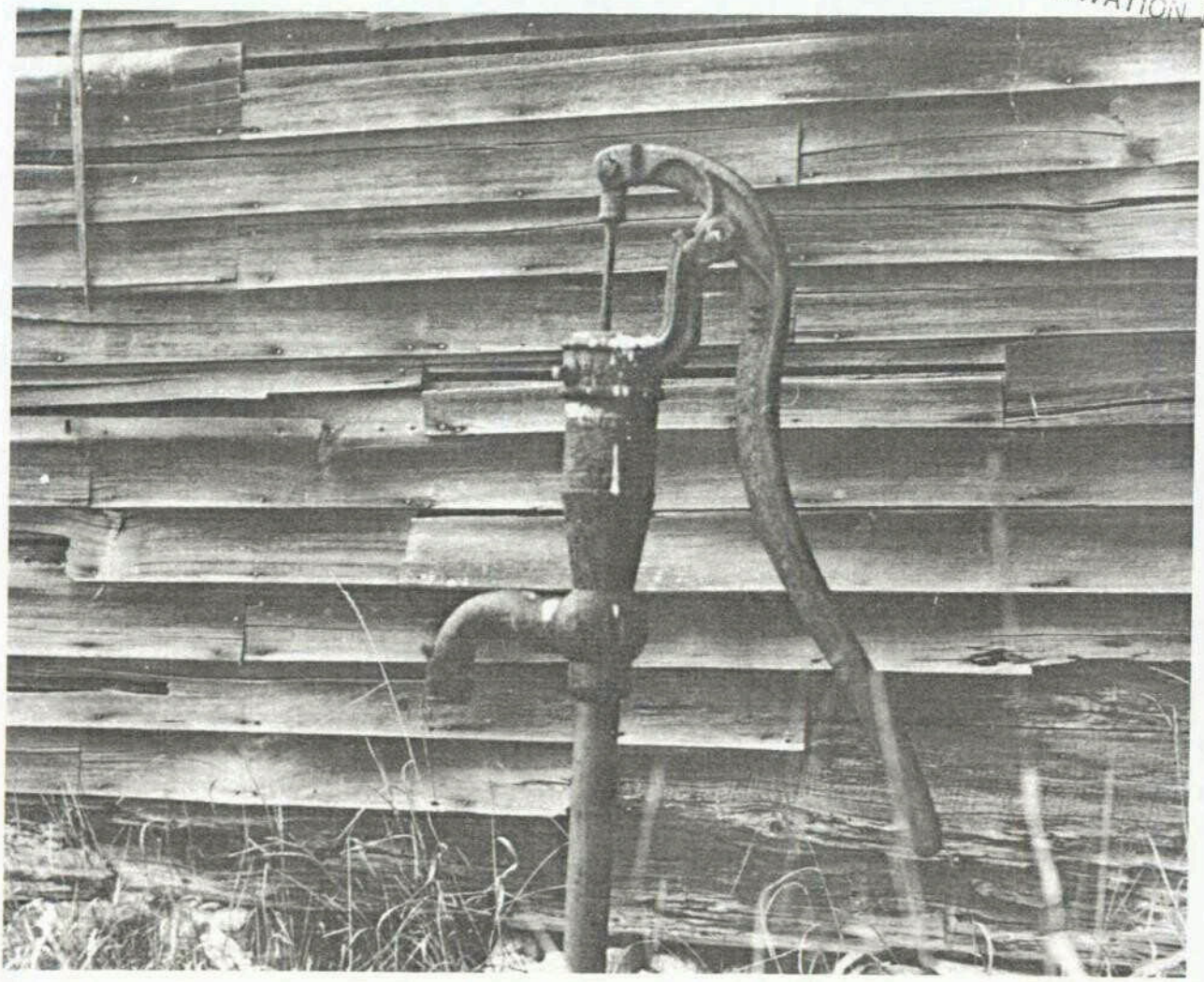
HIGH AND DRY: DROUGHT IN COLORADO



TECHNICAL ASSISTANCE PROJECT
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HIGH AND DRY:
DROUGHT IN COLORADO

A Case Study of Colorado
Drought Response
1977-1978

By
Chris Gray

A Final Report Prepared Under
the Auspices of
the Office of the Governor
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PREFACE

During the winter season of 1976-1977 it became increasingly clear that Colorado and much of the western United States was entering into a period of drought. The reality of drought was visible simply in the fact that snowpack and moisture levels rested at record low levels throughout the the season. In response to that reality, and the potential of future devastation, Governor Richard Lamm, in concert with other leaders in the West and highlevel Colorado State administrators and legislators, developed a comprehensive drought response and recovery strategy. This case study chronicles the development and implementation of the drought response and recovery activities as they eventually manifested in Colorado.

Additionally, this report fulfills two mandates. First, it meets the final report requirement stipulated in the grant from the Economic Development Administration to Office of the Governor which accounted for over 60 percent of the funding of the Colorado drought coordination project. Secondly, it meets the requirement of the now disbanded Colorado Drought Council which allocated $5,000 for the "documentation of the Colorado drought experience"--a phrase which serves as a good description of what this report is meant to be.

The case study is a compilation of data extracted from numerous interviews and information contained in hundreds--maybe thousands--of memoranda, reports, and daily correspondence which were produced before, during and after the establishment of the drought project in Colorado. George Lamb, the former State Drought Coordinator, and Colleen Murphy, the former Assistant State Drought Coordinator, spent many hours in interviews with the author. Their willingness to involve themselves in the details of "drought experiences" which had long since passed--and their patience in doing so--constitute major contributions to this report and merit the author's acknowledgement and sincere expression of gratitude. Additional thanks are due to Ms. Murphy for her painstaking editing of this report as well as for her willingness to serve as the catalyst in the process which has finally resulted in the report's completion.

Numerous other individuals contributed substantively to the development of this report. Foremost among them is Dr. Philip Burgess and Dr. Craig Liske, both of the Western Governor's Policy Office. Dr. Burgess made some key preliminary contributions to the structure, organization, and content of the report while Dr. Liske made many substantive suggestions and offered many pieces of valuable criticism during the latter stages of the report writing process. The involvement of both men in the project certainly enhanced the final product and, therefore, are much appreciated. Additionally, the efforts of Governor Lamm's Executive Assistant, Jim Monaghan, in guiding the draft versions of this report through its various screening processes were vital to its existence and are thus acknowledged.

Prior to the publication of the final version of this report a draft was distributed for comment to the agencies in Colorado State government which had played roles in the drought project. Many agency personnel spent significant

amounts of time reading and commenting on the report. They are: Ron Zeleny of the Colorado State Forest Service; Dr. Tom McKee, the Colorado State Climatologist; Jack Truby of the Colorado Division of Disaster Emergency Services; Glenn Kissinger of the Colorado Division of Commerce and Development, and Don Koch of the Colorado Division of Planning. Their thoughts and comments most of which have been incorporated into this final version of the report are gratefully acknowledged as are the comments of Maryjo Downey, Executive Director of the East Central Council of Governments and a regional program coordinator during the project. Draft copies of the draft reports were also distributed to: Senator Fred Anderson, Senator Tilman Bishop, former Senator Christian Wunsch, Representative Robert Burford, Representative Forrest Burns, and former Representative Paul Swalm. Their interest, time and comments to the report are gratefully acknowledged as are the efforts of many other State government officials, too numerous to name here, who took the time to either read the report or distribute it for review to the appropriate personnel within their departments or divisions.

Additional thanks go to Louise Dice of the Western Governor's Policy Office who designed, laid out, edited and typed most of the tables and charts which appear in the report and Phoebe Lawrence who typed the entire final draft. Thanks to Ginny Cox, Mary Hermosillo, and Janet Bronstein who typed most of the rough draft. Thanks to the employees of the Division of Local Government who gave up their conference room for a few months for the preparation of this report. And, finally, thanks to the innumerable State, local and federal personnel who had been involved in the drought project and were willing, months after the fact to submit to telephone interviews at various odd hours during their autumn work days with an anonymous researcher asking questions about their activities in a project which had ended months before.

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EXECUTIVE SUMMARY AND RECOMMENDATIONS

During the winter of 1976-77, it became increasingly clear that Colorado was in the throes of severe drought. Upon this realization, Governor, Richard D. Lamm, in tandem with various high-level State administrators and legislators, designed and implemented a drought response mechanism which would utilize the combined resources of the federal, State, and local governmental entities within the State of Colorado.

The two major purposes of this report are:

- to document the most significant aspects of the development and management of Colorado's Statewide drought response mechanism; and
- to offer recommendations for the development and management of future drought response mechanisms.

1.0 BACKGROUND

1.1 Physical Impacts of the Drought in Colorado

- Precipitation levels for the 1976-77 winter season (October through March) indicated the driest winter since 1931.
- Record low flows were recorded at two-thirds of the checkpoints on major Colorado rivers during the 1977 water year (October 1976 through September 1977).

1.2 Economic Impacts of the Drought in Colorado

- Revenue losses to Colorado ski resort communities were estimated at $78.6 million in 1977.
- Short water supplies forced agricultralists to incur higher crop production costs aggravating a trend of declining net annual farm incomes.
- Short water supplies forced numerous municipalities to impose water use restrictions. Denver water consumption dropped about 20 percent during the summer of 1977 as a result of restrictions.

1.3 Federal Aid

- Over $110 million in federal drought aid was dispensed to agriculturalists and municipalities in Colorado.

- Increased concern and awareness of faulty municipal water systems resulted in over 60 Colorado communities receiving $44 million in federal drought aid.

2.0 DROUGHT POLICY DEVELOPMENT AND MANAGEMENT

2.1 Western Regional Response

- The Western Regional Drought Action Task Force (WRDATF), a coalition of 21 Western and Midwestern governors chaired by Governor Lamm, prompted Congress and the Carter administration to undertake the timely passage of an $844 million drought assistance package in the spring of 1977.

- WRDATF served as an information coordination and dissemination point designed to facilitate the management of individual states' drought projects.

- WRDATF featured a built-in "sunset" provision, causing it to phase out of operation by March 1978.

2.2 Colorado Drought Policy Development and Management

- Early drought policy was characterized by Governor Lamm's decision to appoint a Drought Council composed mainly of state agency administrators and scientists. The Drought Council served in a strictly advisory capacity to the Governor. Key policy decisions included calling for the use of weather modification to augment winter snowpack (which led to the passage of a $251,000 weather modification bill by the Colorado Legislature on February 1, 1977) and developing a localized drought management plan which would utilize drought coordinators in each of the State's 13 planning and management districts. The management plan included the appointment and placement of a State Drought Coordinator in the Governor's Office.

- The Governor sent a request for $533,491 to the State Legislature for the implementation of the State drought management plan. Legislative resistance to the plan (focused primarily on the organizational concept of utilizing drought coordinators in each of the 13 planning and management districts) resulted in a two-month delay in action.

- The two bills which finally emerged from the Legislature were signed into law by the Governor on June 10, 1977. HB 1722 appropriated $300,000 for weather modification operations to be initiated the following winter and $50,000 for program evaluation.

- The second bill, HB 1723, appropriated approximately $46,000 to the Governor's Office for allocation to the Office of the State Drought Coordinator. HB 1723 also appropriated approximately $104,000 to a new Drought Council whose membership was legislatively reconstituted to render it a partisan body consisting largely of individuals representing the legislative and executive branches of State government. An "executive committee," whose majority was comprised of legislators, controlled Drought Council expenditures.

- In revamping the Drought Council, the Legislature transformed it from strictly an advisory body to one that held tangible administrative and implementive powers over drought policy.

3.0 COLORADO DROUGHT PROGRAM MANAGEMENT

3.1 Regional Drought Management Structures: Concept, Implementation, and Operations

- The regional drought management concept was developed in the interests of tailoring drought management to local needs. The substate regional structure was utilized for drought management in the interest of striking a balance between agricultural and municipal needs.

- Implementation of the regional drought management plan occurred in two phases: a pre-funding phase (roughly May 1977 through July 1977) during which the State encouraged the regions to commence informal drought mitigation activities despite the lack of funding; and an operational phase (beginning July 18, 1977, when the Governor's Office received a $254,000 EDA grant to fund regional drought management projects, through June 1978) during which the regions undertook the formal implementation of drought mitigation programs as mandated by contracts with the State.

- The State/regional contracts mandated three general spheres of regional activity: providing technical assistance to applicants for federal relief; monitoring and reporting to the State regarding targeted concerns; and reviewing and implementing local policy in drought-related areas of concern.

- Regional drought management structures were designed to mirror that of the State, using a drought coordinator and a policy advisory committee (called technical advisory committees in the regions). In practice, regional drought coordinators were appointed in all but one region. Differences in the activity level, make-up, and power of regional technical advisory committees accounted for some of the variability in the intensity of the regional drought response programs.

3.2 State Drought Management: An Overview of the Roles and Functions of the Office of the State Drought Coordinator (OSDC)

- The OSDC provided policy guidance to the Governor and the State Drought Council.
- The OSDC administered the planning and implementation of State and substate-level drought mitigation programs.
- The OSDC monitored the operations of State, federal, and substate-level drought mitigation and relief programs.
- The OSDC established linkages and performed appropriate information-networking among State, federal, and substate drought management entities.

3.3 The Essential Elements of Drought Program Activity

- Eight program areas were devised by State administrators to provide the basic guidelines within which drought mitigation activities would occur. The program areas were devised to facilitate an optimum mix of State and regional drought management capabilities. Task forces were developed at the State level to administer program operations within each program area. Regional drought management structures were relied upon to administer and carry out functional activities as appropriate at the substate levels. Brief descriptions of each of the eight program areas follow:
- The "public awareness" program area encompassed activities aimed at the dissemination of information pertinent to drought conditions, federal assistance programs, and water conservation.
- The "agricultural credit" program area was developed to assess agricultural credit needs and credit availability to assist farmers and ranchers in obtaining credit and/or federal assistance.
- The "agricultural conservation" program area included activities designed to promote efficient on-farm soil and water use techniques.
- The "water supply and demand" program area focused on the identification and the projection of probable water shortages.
- The "municipal water availability and quality" program area encompassed activities aimed at determining the state of repair of municipal water systems.
- The "fire suppression" program area was developed to augment State and local capacities to address the increased drought-induced potential of fire in municipal, rural, and forested areas.

- The "weather modification" program area included State projects designed to augment winter snowpack levels.

- The "social and economic modeling" program area was a project designed to simulate certain fiscal impacts of drought on the Colorado economy.

- The activities undertaken within each of the program areas may be roughly categorized as follows:

  (a) needs assessment activities (using surveys);

  (b) information dissemination (using media promotion and workshops);

  (c) delivery of services (such as assisting individuals and communities in obtaining federal assistance); and

  (d) the development of simulation and forecasting tools or the performance of water studies.[1]

4.0 EVALUATIONS AND RECOMMENDATIONS

4.1 Physical and Economic Data Needs

- Pronounced shortages of timely and accurate data critical to crisis and near-crisis decisionmaking of drought managers and their clientele affected the development and timing of certain drought mitigation activities. Some recommendations to rectify the data problem are:

  (a) develop physical data (i.e., snowfall, rainfall, streamflow, etc.) monitoring systems which feature rapid one- or two-day turnaround;

  (b) develop basinwide input/output models to provide individual water users with comprehensive information pertaining to the timing and amount of water each may expect to receive over a given period of time;

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[1] Summary matrices which show the activities undertaken within each of the eight program areas are provided on pages 51, 56, 60, 63, 67, 71, 76 and 79 in the text of the report.

(c) develop computerized economic data banks and simulation models to aid in answering the "where" and "how much" questions pertaining to the fiscal impacts of drought.

4.2 Future Drought Management in Colorado

- A basic ingredient in "drought-proofing" Colorado is contingency planning which can facilitate and expedite crisis decisionmaking. The following are recommended organizational elements to be considered in a drought contingency planning effort:

  (a) facilitate state agency resource reallocation to drought activity through the identification of agency resources, the delineation of agency roles and functions, and the recognition of "action threshholds" at which specific conditions trigger specific actions;

  (b) maintain the decentralized management concept with a central State drought coordination office closely tied to the Governor;

  (c) install substate management organizations only in regions where the citizenry perceives a need for drought mitigation activities.

  (d) take a flexible approach in choosing the most suitable substate organization to manage the drought in each region; statewide uniformity is not necessary.

  (e) promote agricultural, municipal, and domestic water conservation practices now to ease drought impacts later.

STATE OF COLORADO

DROUGHT ACTION MILESTONE CHRONOLOGY

Date (1977)	Event
Jan. 19	Governor Lamm meets with his Cabinet to discuss drought situation.
Jan. 22	The Governor's Science Advisory Council and State experts in climatology, water resource management, meteorology, weather modification, and other drought-related disciplines convene to brief the Governor on the scope and magnitude of the drought in Colorado and the Western states.
Jan. 25	Governor Lamm calls together public and private sector leaders across the State to act as a "Drought Council" to advise and develop policy for the State's drought mitigation efforts.
Feb. 1	The Weather Modification Bill (HB 1160) is signed into law by the Governor, appropriating $251,200 for a winter snowpack augmentation program and $30,000 for a program evaluation.
Feb. 1	The first meeting of the State Drought Council is held in Denver.
Feb. 10	March 1977 is proclaimed "Conserve Water! Month" in Colorado.
Feb. 15	The second meeting of the State Drought Council is held in Denver. Key discussion topics include a proposal to create drought management mechanisms in the State's 13 planning and management districts and proposed public awareness activities.
Feb. 20	Eighteen states convene at the Governor's mansion in Denver to meet with Interior Secretary Andrus to discuss the Western drought and related issues.
Feb. 22	President Carter appoints a Federal Drought Coordinator to work out of the White House.
Feb. 27	Chaired by Colorado, the Western Governors convene in Washington (in conjunction with the winter meeting of the National Governors' Conference) to discuss individual states' drought-related needs. The Governors agree to establish the Western Regional Drought Action Task Force (WRDATF).
March 1	George Lamb, Director of Administrative Services, State Department of Agriculture, is appointed State Drought Coordinator for Colorado.
March 8	The third meeting of the State Drought Council is held in Denver. Key discussion items include public awareness activities, State

organization structure vis-a-vis the drought, and the proposed State drought budget.

March 23 President Carter sends a message to Congress requesting $844 million in drought-related loans and grants for drought mitigation.

March 31 The Governor transmits a Drought Assessment and Mitigation Program to the 51st General Assembly and proclaims the remainder of 1977 as "Conserve Water! Year."

April 12 State Drought Coordinator introduces a Drought Task Force Program, announcing eight task forces to work in critical areas of drought mitigation.

April 25 A Memorandum of Agreement (MOA) is signed by the Secretaries of Agriculture, Commerce, Interior, and the administrator of SBA establishing an "Interagency Drought Emergency Coordinating Committee" and a common procedure for the designation of Emergency Drought Impact Areas to eliminate the need for individual requests to each agency for drought assistance.

May 4 President Carter signs supplemental appropriation bills which comprise much of the federal "Drought Package."

May 11 The Office of the State Drought Coordinator hosts a Drought Relief Symposium in Denver. Federal representatives from appropriate assistance agencies meet with the State's Planning and Management Regions' Executive Directors and with representatives of various State agencies.

May 18 All counties in Colorado are designated as Drought Impact Areas by the Interagency Drought Emergency Coordinating Committee.

May 23 The remaining components of the "Drought Package," providing for short term water supply assistance to communities of over 10,000 population, are signed by the President.

June 1 The fourth meeting of the State Drought Council is held in Denver. Key agenda items include HB 1723's reconstitution of the Drought Council; the disbandment of the present Council; and reports from the drought mitigation task forces on fire suppression and agricultural conservation.

June 10 Colorado HB 1723 is signed into law by the Governor, appropriating approximately $46,000 to the Office of the State Drought Coordinator; mandating the membership of the Drought Council; and appropriating approximately $104,000 for drought-related program expenditures authorized by the Executive Committee of the Drought Council.

The Weather Modification bill (HB 1722) is also signed into law. The bill appropriates $300,000 for snowpack augmentation during the following winter and $50,000 for program evaluation.

July 18 The Governor is notified that EDA has approved a technical assistance grant of approximately $254,000 for personnel and operating costs for drought mitigation programs in the 13 planning and management districts in the State.

July 27 The first meeting of the new Drought Council (as established by HB 1723) is held in the State Capitol in Denver. The purpose of this first meeting is orientation rather than decision-making, and the Council reviews the status of the drought across the State and ongoing drought mitigation programs.

Aug. 12 Managers of the regional drought coordination projects meet in Denver to discuss overall program objectives and to formalize contractual arrangements with the State.

Aug. 12 Regions agree to perform municipal water system surveys as part of the formal MOA/contractual agreement process with the State.

Aug. 8-13 Colorado Extension Service sponsors a series of "Coping with Drought" workshops on the Western Slope. Agricultural experts cover topics such as range management, nutrition, economics, and climatology for the benefit of area livestock producers.

Aug. 15 The second regular session of the Drought Council is held in Denver. The Executive Committee approves a $30,000 grant from council funds for an economic modeling project under the direction of the University of Colorado. The project will study economic impacts under various drought scenarios.

Aug. 17 Governor Lamm and State Drought Coordinator George Lamb meet with Denver-based federal agency heads to review the agencies' drought relief activities.

Aug. 30 The first meeting of a regional drought technical advisory committee is held in Limon.

Sept. 13 The Drought Council holds its third regular session in Denver. The council formulates a policy assumption of drought severity and duration. In other action, the council decides to urge the Congressional Delegation to support legislation aimed at easing the high cost of buying back livestock after forced sale.

Sept. 30 Appropriations and authority for the various federal emergency drought relief programs expire.

Oct. 5 FmHA announces that the deadline for receiving applications for emergency drought loans to individuals has been extended to December 2, 1977, in all Colorado counties.

Oct. 12 BuREC approves a request from CWCB for an additional $600,000 for the State's Weather Modification Program, bringing total funding for FY 78 to $950,000 for the winter cloud-seeding program.

Oct. 14 OSDC requests that regional drought coordinators survey local bankers to obtain their views regarding the seriousness and extent of the farm credit problem and to obtain their recommendations for action to remedy the problem.

Oct. 21 OSDC staff meets with representatives of Colorado State Forest Service, Division of Disaster Emergency Services, and Local Affairs to exchange information about fire protection services needs in the State and to explain the fire protection capability assessments to be undertaken by the regional projects.

Oct. 26 The State Climatologist releases the climate report for the 1977 Water Year. The report on precipitation and temperature from October 1, 1976, to September 30, 1977, shows precipitation west of the Divide was "far below average" and generally below average in the San Luis Valley and the north and north-central portions of the State. For western Colorado, the winter of 1977 was the driest since the turn of the century.

Oct. 27 The State Engineer releases a preliminary report on streamflow for the 1977 Water Year. According to the report, record low flows were recorded at 2/3 of the checkpoints on major Colorado rivers.

Oct. 28 Governor Lamm and other State officials meet with State and regional heads of federal agencies to review Colorado's 1977 drought mitigation programs and funding status. Nearly $68 million in federal drought assistance was obligated in Colorado as of September 30, 1977.

Nov. 7 OSDC requests all regional drought coordinators to perform a fire protection needs assessment survey.

Nov. 17 The Colorado Department of Natural Resources (DNR) informs the OSDC that hearings on the State's Weather Modification Program have been completed and permits are granted to two cloud-seeding firms by DNR.

Nov. 21 The fourth regular session of the Drought Council is held in Denver. Key issues discussed include a water conservation/education program proposed by the Colorado Water Congress and the need for a State groundwater study. The Executive Committee approves a $4,000 grant to CSU to study drought impact in the State using remote-sensing technology.

Nov. 28-29 The Drought Council, Colorado State University, and Colorado Water Conservation Board sponsor workshops in Grand Junction and Denver to review and assess the State and federal response to the drought.

Dec. 1-2 WRDATF and other agencies sponsor a multistate Drought Impacts Conference in Denver.

(1978)

Jan. 5 Governor Lamm opens the 1978 Legislative Session. In his "State of the State" address, the Governor asks the Legislature to take action to protect Colorado's water resources, to increase the State's capacity to deal with its water problems, and to prepare for drought as a cyclical pattern.

Jan. 19-20 Managers of drought coordination projects in the State's 13 planning and management districts meet in Denver to review substate mitigation activities to date and to discuss program plans for the final six months of the EDA-funded projects. Twleve of the 13 districts report continuing drought conditions ranging from moderate to severe.

Jan. 20 The fifth session of the Drought Council is held in Denver. The Council decides unanimously not to disband under the terms of the authorizing legislation (HB 1723). Concerning the continuation mechanism and other issues, the council directs the Executive Committee to meet before January 31 to make necessary authorizations.

Jan. 30 The Executive Committee of the Drought Council meets in Denver to deal with issues which require their attention. The committee recommends that Gov. Lamm issue an Executive Order continuing the council beyond January 31; authorizes a $25,000 grant to the Colorado Water Congress to introduce the Captain Hydro program in the Colorado K-12 education system; authorizes a $40,000 grant to the Colorado Division of Water Resources to perform groundwater inventories on the Western Slope; and authorizes a $4,000 grant to the Colorado Drought Coordination Office to document the Colorado Drought Experience.

Feb. 16 Governor Lamm issues an Executive Order continuing the Drought Council "as an advisory body to the Governor for so long as the concern for drought impact is present. . . ."

March 8 Over half of the regional drought coordinators meet in Pueblo to enhance their abilities to utilize the media in disseminating drought-related information.

March 22 As lead governor of the WRDATF, Governor Lamm writes to Lt. Gov. George Nigh (Oklahoma) to advise him that he is writing to the 21 WRDATF Governors to officially disband the organization.

April 1 — State Drought Coordinator George Lamb announces that he is returning to the Colorado Department of Agriculture to head up the State Department of Agriculture Resources Development Program. Although the announcement marks a reduction in his active involvement in the State Drought Coordination Program, the program itself will continue through June 1978 since the portion of the State east of the Divide continues to experience persistent drought and its effects.

April 3 — Governor Lamm proclaims May 7-13, 1978, as "Conserve Water! Week" in Colorado to emphasize the continuing need for Coloradans to increase water use efficiencies and to create awareness of persistent drought in much of the State.

April 28 — State Drought Coordinator George Lamb advises the Governor that drought conditions for much of the State are worsening: The eastern plains continue dry, expected runoff in the San Luis Valley and mid and lower Arkansas basin is now forecast at 50-80 percent of average, and the South Platte and portions of the Upper Arkansas are now forecast to have below average runoff.

May 4-5 — The OSDC and the Colorado Division of Disaster Emergency Services co-sponsor a two-day disaster preparedness workshop for regional drought management personnel and State agency personnel. The agenda includes a comprehensive rundown of Colorado's susceptibility to natural disaster occurrences, the implementation of proper mitigative procedures, and the availability of State and federal emergency assistance funds.

May 6 — Conserve Water! Week activities commence, including Statewide media broadcasting of water conservation messages taped by Governor Lamm.

June 1 — The Governor's Office hires an independent contractor to begin research for the documentation of the Colorado drought experience.

June 15 — A summer season begins during which seven large and numerous smaller forest fires occur on the Colorado eastern slope before September 20. Colorado's largest forest fire in recorded history occurs in June. All of the fires are in part attributable to the prevailing dry conditions of the preceding year and provide evidence of some of droughts lasting effects.

June 30 — Official closeout date for all regional drought coordination projects (per terms of the State/regional contracts). Significant regional closeout activities include the preparation of final reports by the regional drought coordinators. The reports include a summary of regional program goals and activities and region-specific evaluations and recommendations.

July 1 — Four regional contract extensions begin, allowing continued drought-related activities in those regions, with most extensions to last through September 30. Two of the four regions receive additional funds.

Nov. 1 — The OSDC ceases drought operations.

1.0 BACKGROUND

1.1 THE WEATHER

The 1976-77 winter season in Colorado was the driest on record since the drought years of the early 1930's. By the end of January 1977, only isolated portions of the State had received normal precipitation. Dry conditions were most severe west of the Continental Divide (Western Slope) where cumulative winter precipitation levels ranged between 11 and 48 percent of normal. Cumulative precipitation levels were somewhat higher in the Eastern portion of the State, averaging about 65 percent of normal. As time progressed through the late winter months, conditions did not improve. The mountains and Western Slope received some late winter snows while the eastern portion of the State experienced drier conditions than it had during the early part of the winter, with the cumulative effect on precipitation levels being negligible.

Under normal conditions, the spring runoff from melting mountain snows provides approximately 75 percent of Colorado's water needs. However, as spring approached in 1977, mountain snowpack stood generally just below 50 percent of normal. (See Figure 1-1). The subsequent runoff was minimal, sustaining average streamflow at levels which were far below normal and, in many cases, below record lows. Many streams and springs dried up completely.

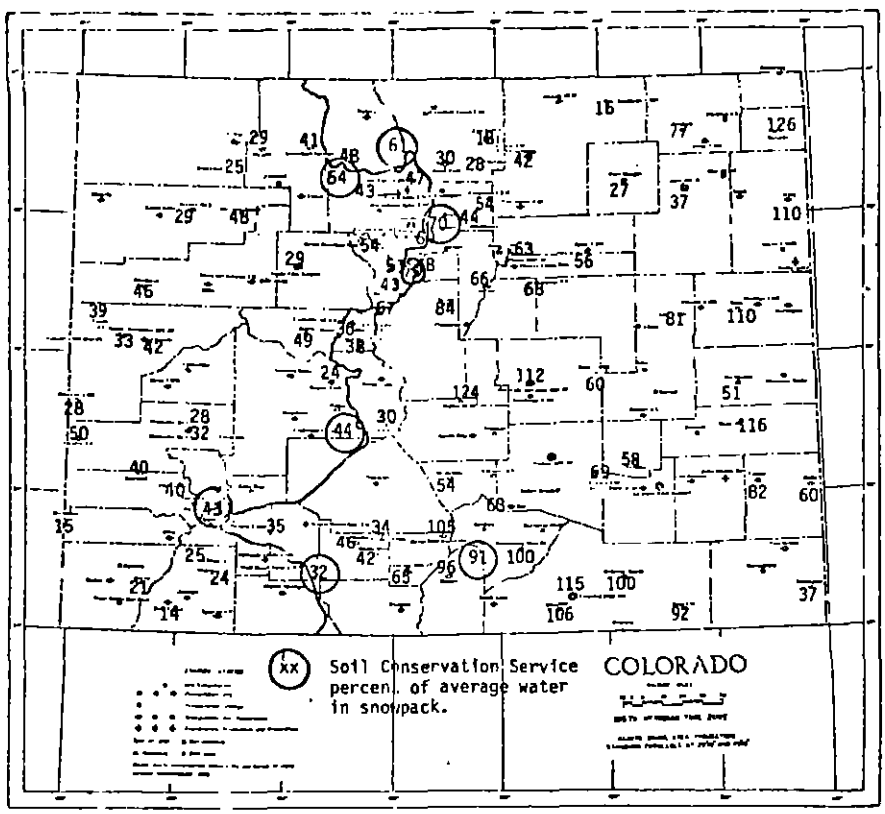
The low streamflow levels which prevailed throughout the State as a result of the reduced winter snowpack were unfortunately not boosted by early spring rains, prompting some to label the situation a "double whammy." In fact, the most significant precipitation occurrence in the State during March 1977 was a blizzard on the Eastern plains which must be considered more of a disaster than a boon to moisture levels. Nine people were killed in the blizzard which brought with it 60 to 80 mph winds which caused snow drifts of up to 25 feet, extensive power outages, severe wind erosion to crops, and thousands of livestock deaths. Ironically, precipitation levels were measured as high as 375 percent of normal for the month of March in some of the areas most heavily impacted by the blizzard. Nevertheless, March was a disaster for many Eastern high plains farmers and ranchers; for others it was a near disaster. Dryland farmers were on the brink of plowing under a winter wheat crop which had first been thrashed by blizzard winds and was about to succumb to the lack of moisture when, finally, the rains came.

April and May were good months for precipitation in the eastern portion of the State. In fact, relatively wet conditions persisted in the east for the duration of the summer. By the end of August, precipitation levels in most eastern areas had reached or surpassed annual norms.

The changes in Western Slope conditions were not nearly as pronounced as those in eastern portions of the State. Although most areas of the Western Slope received substantial rainfall in July and August, the spring and early summer had remained extremely dry. The net result was that Western Slope annual precipitation levels remained significantly below normal, ranging between 44 and 81 percent of the annual norm.

FIGURE 1-1

PRECIPITATION
FROM OCTOBER 1976 THROUGH MARCH 1977
AS A PERCENT OF AVERAGE



Source: Colorado State Climatologist

Unquestionably, the summer rains of 1977 were helpful, but they did not completely allay the effects of the extremely dry winter which had preceded them. By October 1977, streamflows in many river basins remained near 50 percent of normal and soil moisture levels in many areas remained low. Furthermore, the decreased streamwater inflow into reservoirs during the summer resulted in a reservoir depletion rate which more than doubled that of prior years. By October, reservoir storage, which had stood at near normal levels the preceding April, rested at levels 60 percent of normal. Many reservoirs on the eastern and western slopes were dry. If the approaching winter season proved to

be as dry as the preceding winter, many more reservoirs would go dry and, by the summer of 1978, Colorado would be faced with a nearly insurmountable water shortage. (Figure 1-2 illustrates the effects of drought on streamflow.)

Normally, October is a transition month between summer and winter. Weather patterns during the month are often somewhat erratic. However, the weather during October 1977 foreshadowed the dominant patterns of the 1977-78 winter season: The mountains and western portions of the State received above average precipitation, while the area east of the Continental Divide received below average precipitation--an interesting contrast to the precipitation trends which characterized the preceding year.

By March 1978, measurements showed that mountainous Western Slope areas had received three to four times as much snow as they had for the October through March period of 1977. Many Western Slope towns recorded one of the wettest winters ever during the 1977-78 season. Yet the eastern and south central portions of the State remained extremely dry throughout the winter season with precipitation levels at about 60 percent of normal. These dry areas received extremely heavy rains during the month of May, however, which brought their cumulative yearly precipitation measurements to normal and above normal levels by the beginning of June.

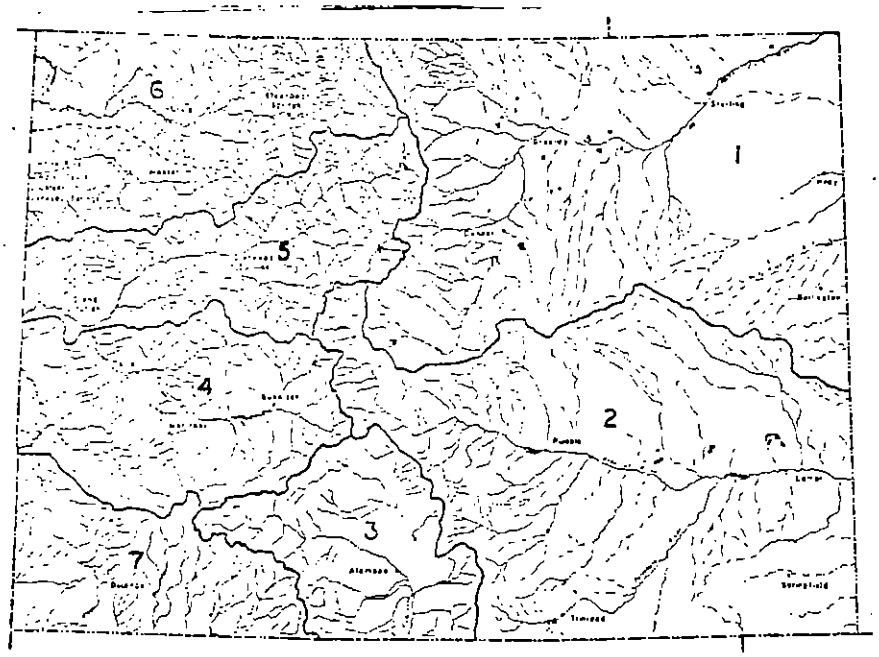
So, the combination of the excellent mountain snowpack and heavy spring rains distinctly brightened the Colorado weather and water picture for the summer of 1978. Spring streamflow levels were high, indicating that reservoir storage levels would return to normal. Except for areas centered in certain central and southeastern portions of the State, it appeared that drought recovery would not be impeded by the weather or a shortage of water. (Appendix A, pages 96 , contains maps showing Statewide precipitation levels at various stages of the drought, January 1977 through July 1978.)

1.2 I M P A C T S

1.2.1 SKI INDUSTRY

The ski industry in Colorado was the first and most blatantly affected sector of the economy to be damaged by the reduced snowfall of the 1976-77 winter season. An industrywide survey showed that lift ticket sales declined by 40 percent (a decline of 2.3 million when compared to the previous season). The reduction in skier visits resulted in an estimated revenue loss to the ski resort communities of $78.6 million. The heaviest declines occurred in the more remote resort areas. The four Aspen areas, Crested Butte, and Steamboat all showed 60 percent declines in lift ticket sales. In the more remote southwest corner of the State where snow was even more scarce than in other regions, the Purgatory and Telluride ski areas showed 90 percent declines in sales and were closed for most of the season. Those ski areas which were close to Denver, owned snowmaking equipment, or were located at high elevations fared somewhat better than other areas but nevertheless showed substantial declines in lift ticket sales.

FIGURE 1-2



STREAMFLOW DURING
THE 1977 WATER YEAR
AS A PERCENT OF NORMAL*

Division**	Basin	1977 Streamflow as Percent of Normal
1	South Platte	38.2
2	Arkansas	38.1
3	Rio Grande	31.1
4	Gunnison	32.7
5	Colorado	47.1
6	White/Yampa	37.8
7	San Juan	30.5

*Figures are based upon measurements taken at key gauging stations within each Division.

**Colorado's seven Water Divisions are shown on the map above.

The economic misfortune of the ski industry flowed through to numerous other closely related industries. Commercial airlines serving Colorado, for instance, lost revenues estimated at $15 million. In eight Colorado counties economically dependent upon skiing, retail sales dropped $7 million, while hotel and restaurant revenues slipped to levels about 29 percent below those of the previous winter season.

The employment picture of those Colorado counties where skiing and tourism provide the economic base was deceiving. Due to general trends of growth and expansion, employment figures were higher than ever on countywide bases. However, employment figures for ski-related businesses were approximately 15 percent below previous years. The 15 percent employment drop could, in fact, have been more drastic had not many ski-related business operators retained skeleton crews in hopeful anticipation of snow and customers.

1.2.2 AGRICULTURE

Statistically speaking, the impacts of the 1977 drought upon Colorado farmers and ranchers were subtle. Given the drastically reduced precipitation and water supply during 1977, crop and livestock production did not appear to have been proportionately impacted for the year. Cattle and calf inventories rose by 5 percent during 1977, while total income from crops dropped from about $705.5 million in 1976 to about $685.3 million in 1977, for a loss of just over $20 million. Generally, crop production in Colorado increased during 1977, so the $20 million income loss during the year is attributable in part to the reduced prices which often accompany increased supplies of agricultural products.

The relative stability of Colorado agriculture indicated by the Statewide production and income figures is deceiving. Due to rising production costs and low commodity prices, net farm income has shown a sharp downward trend over recent years, falling from $540.6 million in 1974 to $115 million by the end of 1977. The lack of moisture during 1977 merely aggravated a bad situation. Constantly rising production costs were exacerbated by farmers having to buy temporary or additional water rights to supplement their own lagging supplies; or having to bear additional pumping costs to fulfill water needs which, in better years, were supplied by streamflow. The lack of moisture during 1977 greatly reinforced a pattern which had emerged during the relatively dry years since 1974; the widening gap between the number of acres planted and the number of acres harvested. That gap, on a Statewide basis, was almost four times as large by the end of 1977 as it had been at the end of 1973.

The drought also seriously afflicted ranchers, especially on the Western Slope, where 1977 precipitation levels were low enough to prevent the replenishment of rangeland forage. The resultant lack of grazeland on the Western Slope meant that ranchers were forced to sell off some of their cattle prematurely at reduced prices, rent grazeland from public and private owners, or obtain feed supplements from the open market. Each alternative obviously meant increased costs to the rancher.

A number of federal aid programs were available to farmers and ranchers prior to the 1977 drought year. During 1977, additional assistance became available as a result of President Carter's "Drought Package." Between May 1977 and July 1978, the Farmers' Home Administration (FmHA) allocated close to $63 million in low interest loans to 1,180 farm and ranch applicants, mainly to refinance debts and to provide operating funds. Those loans served to supplement about $30 million in allocations, administered under pre-existing FmHA programs.

The Agricultural Stabilization and Conservation Service (ASCS) and the Bureau of Reclamation were also tapped in the Carter "Drought Package" to administer agricultural aid. The ASCS distributed grants totaling close to $4 million, while the Bureau of Reclamation channeled about $2.8 million in interest-free loans to water conservation programs. Most of the assistance money went toward increasing the efficiency of irrigation and reservoir storage systems. The irrigation projects mainly entailed lining ditches or outfitting them with pipes to eliminate water loss attributable to ground seepage and the evapotranspiration caused by the presence of weeds in the ditches.

The Emergency Livestock Feed Program was a pre-existent ASCS program which proved valuable to Colorado farmers and ranchers. Through the program, they received approximately $6.1 million worth of feed supplements during the period October 1976 through September 1977.

A safe conclusion regarding drought impacts on Colorado agriculture is that the impacts are invisible unless one looks beyond the final production and income statistics to the costs incurred in production of the final crop and livestock output. Without the ample federal assistance that was available, the timely rains on the Eastern plains, or the efficient use of Colorado's limited remaining water and grazing resources, the final crop and livestock production figures for 1977 would undoubtedly have been far less substantial than they turned out to be.

1.2.3 MUNICIPALITIES

Colorado's drought-induced water shortage reduced municipal water supplies throughout the State. Although few municipalities suffered the complete demise of their water supplies, the reduced availability promoted an increased awareness of conservation and water quality problems among local officials and the commensurate deficiencies of many municipal water systems.

Numerous programs were undertaken on the municipal level to curtail the use of short water supplies. Among them were domestic outdoor use restrictions (lawn watering), higher usage and tap fees, and reduced allotments for new taps. Some of the programs were effective. In Denver, mandatory restrictions were placed on lawn watering during the summer of 1977. During that period, water consumption dropped 20 percent from an average daily use of about 313 million gallons per day to 247 million gallons per day.

The state of disrepair that characterized many water systems in Colorado ran contrary to the basic drought management objective of making efficient use of short water supplies. A large amount of State and federal monies was allocated to municipalities for water system repairs and improvements. With monies made available by the Carter "Drought Package," the Economic Development Administration (EDA) administered about $4.6 million in loans and grants for water system improvements in municipalities whose populations were more than 10,000. Generally, the EDA grants and loans were aimed at improving water quality and water use efficiency. Addressing problems with water line and reservoir leakage, water intake and recovery systems, and treatment capacity and pumping stations, characterized most of the EDA-funded projects in Colorado. Over 50 similar projects in municipalities of under 10,000 were funded with about $34.4 million in loans and grants from FmHA. The Four Corners Regional Commission supplemented 12 water projects, whose basic funding came from FmHA or EDA, with just over $1 million in grants.

Over 60 Colorado communities received assistance for water system improvements during 1977 and early 1978. The drought which highlighted numerous water system problems resulted in action which will render those systems less susceptible to similar water shortage crises in the future.

1.3 INTERSTATE REGIONAL RESPONSE

1.3.1 WESTERN REGIONAL DROUGHT ACTION TASK FORCE

As the severity of the drought became more evident during the winter months of 1977, western leaders undertook a coordinated regional effort aimed at producing a strong federal response to western drought needs. It appeared during those winter months that Federal policy toward the drought would be swayed largely by the view that the drought would not significantly disrupt the normal business cycle. It thus became incumbent upon the states to show Federal policy makers that expected impacts could in fact be extreme and, at the very least, exceed most states' capacities to respond adequately.

On February 20, 1977, 18 states--including the Governors of 14 western states, along with four Governor's representatives--met in Denver with Interior Secretary Andrus to discuss the need for a focused federal drought relief program and the placement of drought relief authority in the White House. The meeting produced the immediate result of the President's appointment of his Cabinet Secretary and Assistant for Intergovernmental Relations as the Federal Drought Coordinator on February 22. Simultaneously, under the direction of the Governor, working through the Western Governors' Task Force on Regional Policy Management (now called WESTPO), the decision was made to establish a 21-state Western Regional Drought Action Task Force (WRADTF). Meeting in Washington, D.C., on February 27 in conjunction with the winter meeting of the National Governors' Conference, the WRDATF Governors agreed to appoint a state drought coordinator in each state to serve as Governors' alternates on the WRDATF; to staff the WRDATF through the Western States Water Council (WSWC) and the Institute for Policy Research (IPR); and to call a meeting of the WRDATF alternates to shape a multistate action plan for drought mitigation and relief.

Working under the direction of the Governor and in cooperation with the Federal Drought Coordinator, the WRDATF was instrumental in shaping the proposal and prompting timely passage of the President's $844 million "Drought Package." (See Appendix B, page 90 .) The "Drought Package," including some new funding as well as supplements to existing federal programs, provided needed relief assistance to drought-stricken areas in the West. Federal/regional coordination was highlighted by the dispatch of four federal agency personnel to Salt Lake City to work with WRDATF staff.

The WRDATF played a significant role in providing valuable information to drought coordinators and policy-makers. The Western States Water Council, a staff arm of the WRDATF, published and distributed a newsletter "Update: Weekly Drought Conditions: 1977" which provided reliable information regarding regional weather conditions and status reports on federal and State drought-related activities. The WRDATF further carried out its coordination mission with the assignment by Governor Lamm of the Director of the Institute for Policy Research, the other WRDATF staff arm, to the Office of the Federal Drought Coordinator in the White House. This assignment resulted in formal "Weekly Reports" to the western region of firsthand information on the progress and tone of Administration and Congressional drought activities and a comprehensive "Directory of Federal Drought Assistance." The publication and distribution of 6,000 copies of the "Directory of Federal Drought Assistance" in early June 1977 provided federal, state and local officials with concise descriptions of federal assistance programs and where and how the described assistance could be obtained. (See Figure 1-3.)

The WRDATF was a unique and valuable governmental entity--valuable in the essential nature of its mission (Who knows how long it would have taken to procure federal aid without it?), and unique in its ephemeral disposition (It disbanded when its job was done). (See Appendix B, page 107 , which contains a copy of a letter from Governor Lamm to Lieutenant Governor George Nigh of Oklahoma recommending the termination of WRDATF.)

FIGURE 1-3

THE PRESIDENT'S DROUGHT EMERGENCY PROGRAM

AGENCY		TITLE	AMOUNT	KIND AND DATE OF ACTION	PURPOSE/DESCRIPTION
Department of Agriculture	Farmers Home Administration (FmHA)	Emergency Loans Program	$100 million	OMB Reapportionment 4-20-77	5% loans to cover prospective loses to farmers and ranchers
		Community Program Loans	$225 million	Supplemental appropriation 5-4-77	$150 million in 5% loans and $75 million in grants to communities less than 10,000 population for emergency water supplies
	Agricultural Stabilization and Conservation Service (ASCS)	Emergency Conservation Measures Program	$100 million	Supplemental appropriation 5-4-77	Soil Conservation cost sharing grants
	Federal Crop Insurance Corporation (FCIC)	FCIC Insurance	$ 50 million	Supplemental appropriation 5/4/77	Increase FCIC capital stock
Department of the Interior	Bureau of Reclamation	Drought Emergency Program	$100 million	New authorization (P.L. 95-18) 4-7-77	Creation of water bank, protection of fish and wildlife, grants to states, 5% for water supply and conservation measures
		Emergency Fund	$ 30 million	Supplemental appropriation 5-4-77	Emergency irrigation loans
	Southwestern Power Administration (SWPA)	Emergency Power	$13.8 million	Supplemental appropriation 5-4-77	Purchase of emergency power supply
Economic Development Administration (EDA), Department of Commerce		Community Emergency Drought Relief Program	$225 million*	New authorization (P.L. 95-31) 5-23-77)	$150 million in 5% loans and $75 million in grants to communities over 10,000 for emergency water supply
Small Business Administration (SBA)		Physical Loss and Economic Injury Loans	$ 50 million**	Amendments to the Small Business Act 8-4-77	Low interest loans for small businessmen (including farmers)

* Only $175 million of this amount was finally appropriated.
**Action on this proposal resulted in the lowering of interest rates for Physical Loss and Economic Injury Loans (both ongoing, funded programs) but no additional appropriation as originally requested.

Source: Western Governor's Policy Office, Institute for Policy Research.

2.0 POLICY MANAGEMENT

Policy management, as it will be used here, refers to a strategic function involving goal-setting, needs assessment, planning, and resource allocation, all of which are performed on an interjurisdictional and interinstitutional basis.[1] Within the framework of the Colorado drought coordination effort, policy management occurred on the distinctly separate state and intrastate regional levels.

2.1 THE EARLY ROLE OF THE GOVERNOR

The earliest, most basic decisions regarding the need for a Statewide drought response organization rested with Governor Lamm. Upon consultation with the USDA/ASCS State Emergency Board on December 28, 1976, the Governor requested Secretarial and Presidential Emergency Declarations of 16 Colorado counties as agricultural disaster areas. The Governor's request was predicated upon an ASCS report that showed significant crop and livestock losses in the counties for which the Declaration requests were made. Furthermore, the reduced precipitation and mountain snowpack which had plagued the State during the early winter indicated that problems related to the lack of moisture might persist on a larger scale.

Within a week after requesting Emergency Declarations, the Governor held two significant meetings--one with his cabinet and one with his Advisory Council on Science and Technology, which includes scientists and administrators whose expertise lay in areas pertinent to drought response. The meetings were significant in building the agenda and the consensus for subsequent policy and program decisions on the drought. The overriding policy issue in both meetings was to determine whether the lack of winter precipitation constituted a drought situation for which mitigative programs needed to be undertaken. Over the course of the two meetings, it was decided that a drought crisis did exist which merited at least some initial planning and program directives. The January 19, 1977, cabinet meeting ended with the establishment of some basic groundwork upon which to build a drought response network. The Division of Disaster Emergency Services (DODES) of the Department of Military Affairs was charged with identifying the probable impacts of drought in Colorado and assessing the capabilities of State agencies to address those probable impacts. The use of weather modification (cloud-seeding) was also considered as a means to quickly augment the mountain snowpack.

During the meeting with his Advisory Council on Science and Technology three days later, the Governor and council members further explored the feasibility and risks of using weather modification. Due to the lack of

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[1] Philip M. Burgess, "Capacity Building and the Elements of Public Management," The Public Administration Review, December 1975, p. 10.

extensive testing, there was uncertainty regarding the reliability of cloud-seeding. The Governor faced a classic public policy dilemma. If the cloud-seeding did not work or if the weather improved (in the sense of providing moisture), then any outlay for weather modification would be made to appear foolish and a waste of time and money. On the other hand, if cloud-seeding worked too well--to the point that excessive moisture caused life or property damage--the Governor could have been in a worse situation. There were also problems with popular attitudes toward tampering with the natural processes of the weather.

Given the above parameters, the group of scientists assembled by the Governor's Science and Technology Advisory Council to consult with the Governor was diverse. The group included social scientists, climatologists, weather modification experts, and water experts. Included in the group were those who had dealt with previous droughts in either climatological or administrative capacities. The briefing the Governor received from the scientists culminated a few days later in a meeting between the Governor and legislative leaders. The Weather Modification Bill (HB 1160) was drafted, passed, and signed into law and, in less than a week, HB 1160 called for a $251,200 appropriation to the Department of Natural Resources for a weather modification program to be implemented during the remainder of the winter season, then evaluated for the purpose of undertaking a fullscale weather modification program during the following winter. (See Appendix D, page 113 , for a copy of HB 1160.)

2.2 THE FIRST DROUGHT COUNCIL

On January 25, 1977, one day after his meeting with the legislative leadership on weather modification, Governor Lamm announced the formulation of the State Drought Council. The Drought Council was composed largely of the same scientists and administrators with whom the Governor had consulted during the previous week. The Drought Council was to continue in the advisory capacity that had begun the week before. A major focus of the Drought Council was to monitor and report weather and snowpack conditions and concurrently continue to develop a State drought response mechanism. (The membership and affiliations of the Drought Council appear in Figure 2-0, page 26.)

The Drought Council met formally three times during the five weeks between February 1 and March 8. During that period, the State's drought response organization and activities began to form. Many of the policies and programs devised during that period were fostered outside of the formal confines of the Drought Council. Management policies and program initiatives were put together by the Governor's staff--often with the advice of particular Drought Council members with pertinent expertise--and were then presented formally at Drought Council meetings for additional consultation.

For instance, during the two-week interim between the Drought Council meetings on February 1 and February 15, plans were put together by the Governor's staff and selected consultants, most of whom were Drought Council members, to implement a drought management structure. The plan presented to the

February 15 meeting of the Drought Council contained two facets: first, the appointment by the Governor of a State Drought Coordinator to work out of the Governor's Office and coordinate the program activities of the State's drought response; second, the establishment of regional drought coordinators and drought councils set up along the multicounty guidelines of the State's 13 planning and management districts. The plan was presented to the Drought Council for additional comment and consultation by the membership. Despite the conflicting opinions expressed at the meeting regarding the drought management plan, it was eventually implemented in the form in which it was presented to the Council. The Council was not mandated to overturn any of the policies or programs advocated by the Governor. Its purpose was strictly advisory but, in fact, many of the Governor's policy and program decisions were based upon Drought Council recommendations.

The following summary of Drought Council actions illustrates more specifically the areas in which it provided advisory support to the Governor:

- Considered and supported a Statewide water conservation campaign aimed at an overall consumption reduction of 10 percent; activities included the publication and distribution of water conservation pamphlets by the Colorado State University Extension Service for home consumers and agriculturists.

- Served as a focal point for State agency coordination of drought response, wherein agency constituent drought needs were assessed and departmental drought response inventories were compiled.

- Provided advice on the organization of a State Drought Coordination Program which eventually resulted in the appointment of a State Drought Coordinator and the development of an intrastate regional drought coordination mechanism.

- Participated in the development of a task force approach to drought management based upon eight functional problem areas of drought that needed to be addressed: water supply and demand, domestic water supplies, economic modeling, fire suppression, agricultural credit, agricultural conservation, public awareness and weather modification.

- Considered and recommended the implementation of a winter weather modification program aimed at augmenting mountain snowpack.

- Monitored and provided advice on the preparation of a budget sent to the State Legislature requesting drought management funds.

On March 31, 1977, Governor Lamm, with the support of the Drought Council, sent a letter to the Colorado General Assembly describing the drought situation in the State and requesting an appropriation of $533,491 for the implementation of the State Drought Management Program. (The letter and budget request have

FIGURE 2-O

MEMBERSHIP OF THE FIRST DROUGHT COUNCIL

Member	Affiliation
Representative Robert Burford	Colorado House of Representatives
Henry Caulfield	Professor, Colorado State University Department of Political Science
Senator Eldon Cooper	Colorado State Senate
Barbara Farhar	Senior Scientist, HERS
Michael Glantz	National Center for Atmospheric Research
Evan Goulding	Colorado Commissioner of Agriculture
Lewis Grant	Professor, Colorado State University Department of Atmospheric Sciences
Floyd Mann	Professor, University of Colorado Graduate School of Public Affairs
Betty Miller	Executive Director, Department of Local Affairs
James Monaghan	Assistant to the Governor for Natural Resources
Anthony Robbins	Executive Director, Department of Health
Stephan Schneider	National Center for Atmospheric Research
Harris Sherman	Executive Director, Department of Natural Resources
Jim Thomas	Independent Bankers of Colorado
Lowell Watts	Director, Colorado Extension Service
General William Weller	Executive Director, Department of Military Affairs

been included as Appendix D, page 115 .) There occurred in the Legislature a significant amount of resistance to the Governor's request. It appeared that resistance was based upon notions that the prevailing weather conditions did not merit the comprehensive State response suggested by the Governor. There was also the feeling in the Legislature that the regional management approach for which funds were requested was unnecessary, given other localized management jurisdictions that already existed within the State--such as the Colorado State University (CSU) Extension Service, which had offices in 54 of the State's 63 counties. The net result of the resistance was that the Governor's request received no attention in the Legislature until the Governor wrote a letter on May 3, 1977, to the legislative leadership stressing the urgency for action on his March 31 appropriation request. (See Appendix D, page 111.) The Legislature began considering the request in mid-May and on June 10 the Governor signed into law two appropriations bills, HB 1722 and HB 1723. (Copies of both bills have been displayed in Appendix D, pages 123-126.)

2.3 THE SECOND DROUGHT COUNCIL

House Bill 1723 drastically altered the complexion of the Drought Council. The text of the bill specified the membership of the new Drought Council:

> The drought council shall consist of fourteen members as follows: One member to be appointed by the governor from each congressional district, of which one shall be from the agricultural community, one shall be from an association representing municipalities, one shall be from an association representing counties, one shall be affiliated with financial institutions, and one without regard to affiliation; one member who is an atmospheric scientist to be appointed by the governor; a faculty member of Colorado State University to be appointed by the governor; three members of the house of representatives, including not more than two from each major political party, to be appointed by the speaker thereof; three members of the senate, including not more than two from each major political party, to be appointed by the president thereof; and the governor, who shall act as chairman. There shall be five associate members of the drought council, who shall be appointed by the governor from appropriate state agencies.
>
> The executive committee of the drought council shall consist of the governor; four of the legislative members of the drought council, of which two shall be state representatives designated by the speaker of the house of representatives and two shall be state senators designated by the president of the senate; and two of the associate members of the drought council to be designated by the governor.

The bill called for an appropriation of $103,868 to the Drought Council "for expenditure as directed by the executive committee of the drought council."

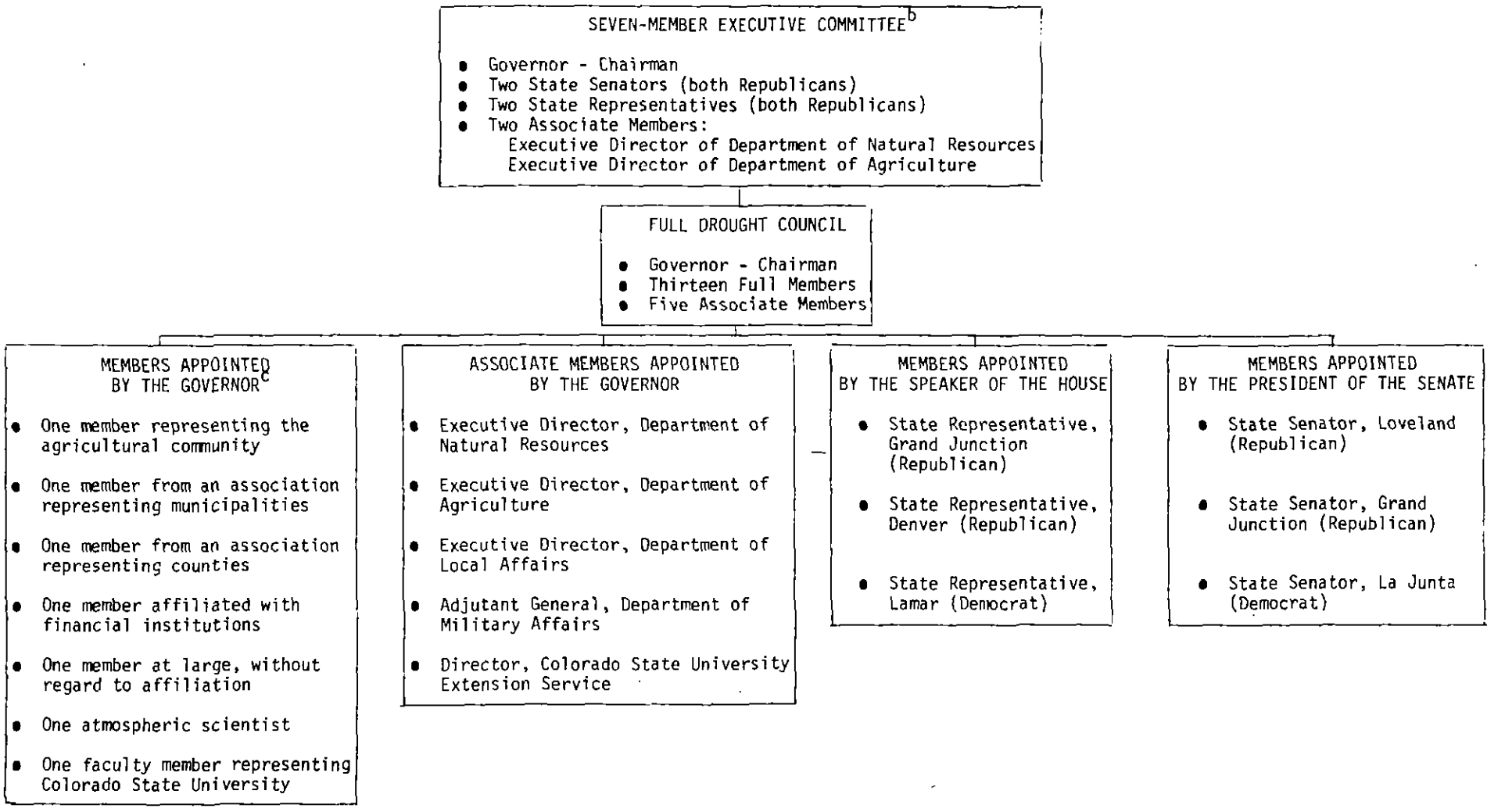
The dynamics of the Drought Council set up in HB 1723 are interesting. First, the Drought Council assumed a politicized complexion. At the time HB 1723 was formulated by the Colorado General Assembly, Republican majorities reigned in both the House and Senate. As a consequence, the Speaker of the House and the President of the Senate, the two individuals with the power of making appointments of legislators to the Drought Council, were Republicans. The result was that four of the six legislators appointed to the Drought Council were Republicans--the maximum allowable representation by one political party under the terms set forth in the bill. Similarly, all four legislators appointed to the executive committee of the Drought Council were Republicans. (See Figure 2-1.) However, as tempting as the conclusion might be, the Drought Council did not become a forum for partisan gamesmanship. Beyond the political desire to implement Republican legislative oversight of Drought Council proceedings, the major thrust of the legislatively imposed structure was to create a cohesive problem-solving body. Most of the legislators appointed to serve on the Drought Council represented rural, agricultural areas of the State where drought impacts were among the most serious. They naturally were concerned with timely problem-solving. The Governor, who was named chairman of the Drought Council in HB 1723, was authorized to appoint eight of the 14 members of the Drought Council and all five of the associate members. Again, these appointments were based strongly upon the desire to place qualified experts on the council and to have geographic representation. The Governor was also mandated to choose two members of the executive committee of the Drought Council from among the five associate members of the council. His appointments to the executive committee were the head of the Colorado Department of Agriculture and the head of the Colorado Department of Natural Resources. Governor Lamm chaired the executive committee. (Appendix C, page 110, contains a list of the membership and affiliations of the new Drought Council.)

The power of the Drought Council was restricted to the influence of its members over resources within the State government system and the monies appropriated to it by the Legislature for program implementation. It had no power to mandate any programs, projects, or activities outside of the State system, i.e., in counties or municipalities. The legislation setting up the new Drought Council was strictly an appropriation for the fiscal year beginning July 1, 1977. Drought Council funding would cease on January 31, 1979, and would not be renewed unless conditions merited renewal.

The influences of the revamped membership and the appropriation of monies to the second Drought Council combined to transform the largely advisory, legitimizing role of the first Drought Council to the more implementive and administrative role of the second. The following summary of functions and activities of the second Drought Council illustrates its impact on policy development and management:

FIGURE 2-1

COMPOSITION OF STATE DROUGHT COUNCIL[a]



[a]The structure of the Drought Council, i.e., the number of members, powers of appointment, designation of associations to be represented, and the mix of political party affiliations to be represented, was mandated by enabling legislation H.B. 1723.

[b]Appointments to Executive Committee mandated as follows: Associate Members appointed by the Governor; State Representatives appointed by House Speaker; State Senators appointed by President of the Senate. All appointees were members of the full Drought Council.

[c]The first five appointees (those required to be associated with particular groups or associations) were each to represent one of Colorado's five Congressional Districts.

- Allocated $4,000 to Colorado State University for a remote sensing project designed to test the use of satellite technology in assessing drought impact on Colorado rangeland, cropland, and other vegetation.

- Allocated $30,000 to the University of Colorado for an economic and social modeling project which would provide a framework useful in short and long term decision-making concerning projected drought-related needs of Colorado communities.

- Allocated $25,000 to Colorado Water Congress for the implementation of a water conservation awareness program for school-age children, kindergarten through 12th grade.

- Allocated $40,000 to the State Engineer for the performance of a groundwater study in the heavily drought-impacted region of southwest Colorado.

- Sent resolution to the Commissioner of the Bureau of Reclamation encouraging support for a change to the Reclamation Act of 1902; received an affirmative response.

- Sent resolution to members of Colorado Congressional Delegation encouraging the consideration of assistance to stockmen for buy-back of livestock necessary to rebuild foundation herds; received supportive responses.

- Encouraged a Statewide domestic water policy urging the adoption of water conservation practices by water utilities, e.g., the installation of water meters with all new taps.

- Caused ASCS to take a broader view of eligibility for livestock feed assistance.

Where the first Drought Council served a predominately "think tank" advisory role, the second Drought Council took on a more formal, active role in goal-setting, planning, and policy guidance and implementation. Where the first Drought Council held no particular power over policy decisions beyond the power of its expertise, the second Drought Council membership actually formulated and implemented policy decisions, often by way of a formal vote. A significant difference between the two Drought Councils was the composition of their membership. The first Drought Council consisted of scientists and administrators highly qualified to advise the Governor on drought situation response. Since the first Drought Council was completely hand-picked by the Governor, and cognizant from the outset of its strictly advisory capacity, it is safe to say that the Governor reserved ultimate authority over all policy decisions. On the other hand, the in setting up the second Drought Council the Legislature took some of the power of appointment, and thus the power of ultimate authority, out of the Governor's hands, while leaving all the responsibility for policy decisions in the Governor's hands. It was still the

"Governor's Drought Council," and the drought management activities still lay in the Governor's Office. The result was that the Governor, in order to maintain a handle upon the policy direction that the Council would take, played a more direct role in the activities of the second Drought Council than he had in the first.

Due to the presence of the Governor and legislators among its membership, the second Drought Council may be characterized as an influential body with a vested interest in serving constituent needs. This factor, in concert with its power to allocate $103,868, contributed to the increased involvement of the second Drought Council in active policy-making and implementation.

3.0 PROGRAM MANAGEMENT

Program management as it is used in this report refers to the administrative functions and tactical requirements of executing policy. Those requirements include program planning, implementation, monitoring, information networking, and reporting.[2]

In Colorado, drought management was carried out on the State and substate regional levels. Thus, this section is divided into three major subsections:

- regional program management
- State program management
- aggregate program activities.

The section concerning regional program management provides an overview of the implantation of the regional substate organizations into the State's overall drought management mechanism. Therefore, the regions are treated from the perspective of the State's planning and implementation roles. The State was the lead entity in the organization of Colorado's drought response; therefore it is important to understand the progression of events involved in the planning and implementation of the regional drought response programs. The first two parts of the discussion regarding the regions, then, describe the planning process and the subsequent implementation process. As a result of the discussion, the reader should have a clear picture of, first, the concept inherent with the regional drought management approach; second, the intended structure, organization, and activities of the regional programs; and third, the variations which necessarily occurred within the regional management plan during its transformation from concept to reality. The regional discussion continues with a general overview of the decision-making structures which developed within the regions once the drought management programs were in place.

The next subsection, dealing with the organization and role of the Office of the State Drought Coordinator (OSDC), is brief. The management activities of the OSDC touched, either peripherally or deeply, virtually every drought response program undertaken in the State. The OSDC subsection of this report serves three purposes: First, to provide a brief overview of the organization and structure of the office; second, to categorize its general functions and activities; and third, to describe, in some detail, the dynamics of the OSDC coordination role.

The third and final subsection within this "Program Management" section delineates and describes the program activities assumed at the regional and

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[2] Ibid.

State levels. The "activities" section entails a case-by-case format in which State and regional activities within each of the State's eight designated "program areas" are detailed.

Simply stated, the section defines through illustration the functional roles of the State and regions in the Colorado drought response effort.

3.1 REGIONAL DROUGHT MANAGEMENT

One of the unique aspects of Colorado's response to the drought was the State's utilization of substate regional organizations in drought response activities. The following sections describe, in reasonable detail, the regional management options considered at the State level and relevant decision-making criteria; the subsequent formalization of the State/regional relationship and some of the early problems encountered; and, finally, some of the functional modes of decision-making which occurred within various regional management program structures.

3.1.1 THE DEVELOPMENT OF THE REGIONAL DROUGHT MANAGEMENT CONCEPT

During the early stages of the State drought mitigation project it was recognized that a mechanism was needed to localize the focus of drought program activities. The belief at the State policy-making level was that, because the drought was a Statewide phenomenon, it would be difficult, if not impossible, for a handful of administrators in the Governor's Office in Denver to maintain an adequate degree of sensitivity to localized drought-related needs throughout the State. With this consideration in mind, the Governor's chief advisor on natural resources, the newly appointed State Drought Coordinator, and various members of the first State Drought Council undertook the task of developing a localized approach to drought management. The process began in mid-February 1977.

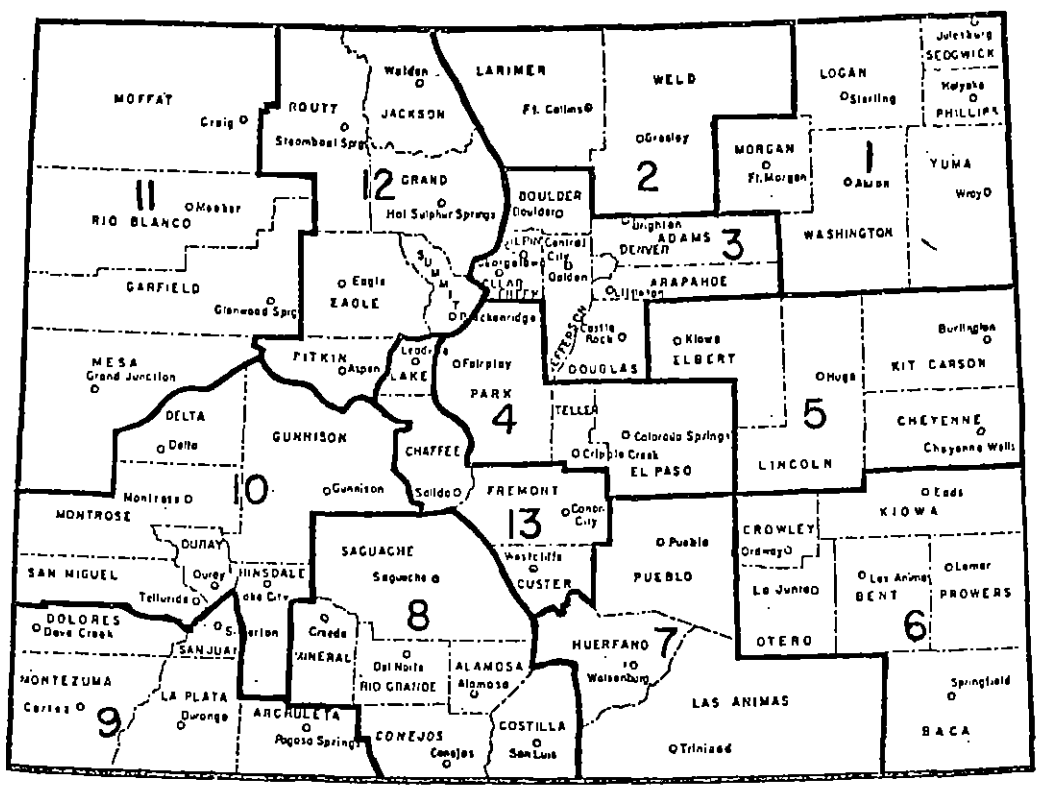
The Colorado State University County Extension offices, established water conservancy districts, and 13 substate regional organizations (11 Councils of Government [COGs], one Regional Planning Commission [RPCs], and one Regional Commission [RC] serving in Colorado's 13 planning and management regions) were the substate entities most seriously considered for the assumption of locally oriented drought program activities. All three groups of entities held established positions within substate governmental and economic arenas, making them credible channels for the localized drought response activities desired by the State. However, it was perceived that the Extension Service offices and the conservancy districts tended toward a one-sided agricultural orientation in their regional substate organizations' normal flow of activities. The COGs, on the other hand, were perceived to have spheres of involvement which featured stronger balances between the State's agricultural and municipal sectors. If the drought were to continue through the summer with the degree of intensity

which characterized it during the winter, it was apparent to State-level administrators that drought impacts would strongly affect municipalities as well as agricultural sectors. Therefore, it was decided to utilize the COGs, RPCs, and RC to undertake local drought response efforts. (See Appendix I, page 169.)

It was the intention of State administrators to initiate drought management organizations within the State's 13 planning and management regions (shown in Figure 3-1) to replicate the structure which had been developed at the State level. A technical advisory committee (TAC), replicating the State Drought Council, was to be established in each region and a regional drought coordinator (RDC), the equivalent of the State Drought Coordinator, was to be appointed or hired within each substate regional organization. Ideally, the TAC would serve in an advisory capacity in the formulation of programs to address the particular drought-related conditions and needs which characterized each region. The RDC would then be responsible for implementing those programs. Additionally, the RDC would coordinate the delivery of federal drought relief assistance to qualifying agriculturalists and municipal entities within his/her region and implement the variety of drought response programs which would emanate from the State.

FIGURE 3-1

13 STATE PLANNING AND MANAGEMENT REGIONS



Source: Colorado Division of Planning

The basic plan behind the development of the regional drought management concept, then, was to devise a comprehensive Statewide response mechanism which would exercise a high degree of sensitivity to drought-related problems at the local level.

3.1.2 REGIONAL PROGRAM IMPLEMENTATION

The State's implementation of the regional drought management project occurred in two phases. First, during the pre-funding phase, the State Drought Coordinator attempted to foster the early development of regional drought response mechanisms. The second or formalization phase occurred after the Economic Development Administration (EDA) awarded the State a technical assistance grant for the funding of the regional management projects. Essentially, activities revolved around the contractual process during which the State/regional functional relationships were formalized.

3.1.2.1 Pre-funding Phase

Although the regional drought management project was conceptually in place at the State level by March 1977, formal implementation did not occur until the late summer. The reason for the delay was that funding was not available. The Governor, in his March 1977 budget request to the Colorado Legislature, asked for $241,500 (out of a total request of $533,491) to fund drought coordinators in the 13 regions. The Legislature turned down the request. It was not until mid-July 1977, when the Economic Development Administration approved a $253,977 technical assistance grant to the Governor's Office, that the formal implementation of the regional drought program could begin.

During the interim, however, the State Drought Coordinator began to contact the administrators of each of the 11 COGs, the Region 10 Regional Planning Commission (RPC), and the Region 9 Regional Commission (RC) to negotiate their proposed roles in drought mitigation. For most of the regional organizations, it was impossible to consider undertaking any substantial drought response program until funding could be provided. However, in anticipation of funding from an as yet unknown source, a few regional administrators began to assemble technical advisory committees to develop region-specific responses to drought conditions.

In the interests of further regional preparation, the Office of the State Drought Coordinator (OSDC) in May 1977 sponsored a "Drought Relief Seminar" in Denver for the staffs of the 13 regional organizations. The purpose of the seminar was to provide regional staffs in attendance with all available information pertaining to federal drought assistance programs so that they could begin to assist individuals and municipalities in accessing the federal drought funds which were becoming increasingly available. The need within the regions for information on federal assistance programs was especially critical because the application deadline for federal programs was September 30, 1977, five months hence.

During the early summer of 1977, prior to the confirmation of EDA funding, the State Drought Coordinator remained in contact with the regions, visiting seven of the 13 regions to further explain their proposed roles in the Statewide drought management program and to help with needs assessments and program implementation.

Also, during this "pre-funding" period, the State Drought Coordinator initiated informal contractual negotiations with the regional organizations. When and if funding was secured, it was planned that the State would contract with the regional organizations to undertake drought response programs. In order that the contracts would address the specific needs and characteristics of each region, the State Drought Coordinator encouraged each region to write its own contract. The regions, however, did not respond to the initiative. The State Drought Coordinator then decided to prepare a short contract, supplemented by a "memorandum of agreement" (MOA) in which each region was again encouraged to design individualized planned program activities. A sample MOA, outlining general suggested program guidelines, was prepared at the OSDC and distributed to the regions. The regional response to this second State initiative was sparse. Only one regional organization replied with its own set of program guidelines. The other regions accepted the basic MOA prepared by the State without tailoring it to their own perceived needs. It was those MOAs which later became part of the formal agreement between each region and the State.

Although the program guidelines within the final MOAs were more general than had been originally planned from the beginning of the contractual process, it had been the intention of the State Drought Coordinator that the contracts feature simplicity and flexibility to expedite regional program implementation. The notions of simplicity and flexibility were manifested within the contracts through the relaxation of the usual State requirements that contractors supply regular financial statements and that an annual State audit be performed. Rather than requiring a monthly financial statement, the contracts stipulated that financial statements were to be forwarded to the State "upon request of the OSDC." In lieu of the usual State audit, the contract allowed for the submission of the "usual COG audit."

3.1.2.2 The Formalization Phase

The $253,977 technical assistance grant to the Governor's Office was approved by the Economic Development Administration (EDA) in mid-July 1977. On August 12, 1977, OSDC personnel organized another meeting in Denver for the staffs of the 13 substate regional organizations to begin to formalize the prior contractual initiatives and to provide further orientation to the State drought management program. Federal personnel were available to provide information pertaining to the federal drought assistance programs. State agency personnel were in attendance to update the regional staff people concerning the State drought program activities. The meeting also provided a good framework within which federal, State, and regional personnel could exchange ideas regarding the implementation of drought program activities and strategies at the regional level.

Most of the discussion, however, focused upon the contractual arrangements between the State and the regions. OSDC and regional personnel performed some minor revisions on the draft MOAs which had been circulated by the OSDC prior to the meeting, but basically the MOAs retained their original generalized formats. The following provision illustrates the tone of the contracts:

> The Contractor shall perform in a complete and timely manner all drought coordination-related activities as mutually agreed upon and as specified in an initial and periodically updated Memorandum of Agreement (MOA) between the Contractor and the State acting through the Office of the Colorado State Drought Coordinator. . . .

Within each MOA were listed three objectives with tasking guidelines appropriate to the fulfillment of those objectives. Those objectives formed the framework for many of the regional programs. They also outlined the areas in which the COGs, as contractors, were responsible to the State. From an academic standpoint, they are significant because they outlined clearly the State's concept of regional drought program management. The objectives were to:

- "Provide technical assistance to individual, local government, and special district applicants for federal drought relief;"
- "Monitor targeted concerns and provide reports thereon to the State;" (a regional monthly report has been shown in Appendix E, page 128.) and,
- "Review and implement local policy in drought related areas of concern."

Figure 3-2 illustrates the complete list of agreements included in the MOAs.

The standard financial arrangement between the State and each region as stipulated in the contract called for the allocation of $18,000, dispensed in monthly installments of $1,500 per month for the period July 1, 1977, through June 30, 1978. Many regions started receiving money in July 1977, and all but two contracts were signed by September 1, 1977.

Contract Variations. In negotiating their contracts, three of the 13 regions chose an optional financial arrangement offered by the State. The optional arrangement allowed for a "split-time" contract in which the regions would receive $9,000 from the OSDC for drought coordination activities and $9,000 from the Colorado Office of Human Resources (COHR) for the coordination

FIGURE 3-2: SUBSTATE MANAGEMENT AND RESPONSE AGREEMENTS

OBJECTIVE 1

Provide technical assistance to individual, local government, and special district applicants for federal drought relief.

Implementation Guidelines

1. Initiate and carry out measures necessary to provide information on available federal programs, program status, and eligibility requirements:
   - sponsor workshops, seminars, and/or other citizen participation forums as appropriate;
   - obtain public service space for local media (newspaper, radio, and/or television) coverage;
   - obtain and distribute informational literature;
   - take action as necessary to participate in meetings of local interest groups and organizations (e.g., Cattlemen's Association, Grange).
2. Act in an advisory capacity to assist applicants in the completion of applications:
   - obtain copies of and become familiar with each type of application form;
   - interpret program rules and regulations;
   - advise of proper application and submission procedures;
   - take action as necessary to resolve apparent conflicts, slippages, and/or impediments to the timely processing of applications.
3. Provide information on state activities and programs:
   - establish a network of working relationships among representatives of state agencies assigned in the region.

OBJECTIVE 2

Monitor targeted concerns and reporte thereon to the State.

Implementation Guidelines

Reports are to be submitted monthly, in a format mutually agreed upon.

1. Monitor the impact of the drought in the region and provide the "Drought Severity Report."
2. Monitor the application process and the applicability of programs for individual and local government applicants and provide "Municipal Water Update: and the "Individual's Status Report."
3. Monitor the efficiency and effectiveness of federal agencies' activities and programs and provide the "Federal Agency Activity Report."
   - visit federal agencies' local and/or district offices as necessary to establish working relationships with staff;
   - request that the local offices provide regional drought coordination offices with weekly activity summaries and/or productivity reports.
4. Evaluate the effectiveness and productivity of federal programs in the region by comparing information provided by federal agencies to that provided by individuals and local governments and provide the "Federal Agency Activity Assessment."
5. Objectively assess regional drought coordination activities and provide the "Objective Review Report."

OBJECTIVE 3

Review and implement local policy in drought-related areas of concern.

Implementation Guidelines

1. Assemble a technical advisory committee to provide a forum for public participation and input into policy development.
2. Assess local/regional areas of concern:
   - gather and provide data as necessary for polity and program planning;
   - work with state task forces in targeted areas as appropriate.

of community services delivery. The intention behind the split-time contracts was threefold: First, the State favored the economic advantages of resource pooling; second, at least one regional administrator did not feel that the scope of drought coordination needs merited an $18,000 allocation; and, finally, it was felt that $9,000 was not enough money to fund a full-time position but that $18,000 of "split-time" funding would substantiate a full-time coordinating position.

Unfortunately, the "split-time" arrangements were not entirely successful. OSDC and COHR administrators were not able to agree on the level of stringency required in the provisions of a single contract. Most of the problems that arose between the OSDC and COHR surrounded the flexible financial reporting requirements which had been advocated by the State Drought Coordinator to expedite the agreement process with the regions. Eventually, two separate contracts were prepared and delivered to the three participating regions. Problems then arose because of the lack of simultaneity in the delivery of the separate contracts: The drought contracts were signed and the monies allocated three months before the COHR contracts were processed. Furthermore, two of the regions opting for the "split-time" arrangement ended up rejecting the COHR contract. The net result was that, while one region was able to handle its drought coordination duties handily on $9,000, the two others did not begin to implement any drought programs until January 1978, ostensibly because of the COHR contract delay.

Another instance of variation in a contractual arrangement occurred with one region in which local administrators did not want State "interference" to begin with. The water conservancy district in the area had already established some of the management activities which the State hoped to implant in the region as part of its drought management strategy. For example, a "Drought Committee" had been independently established in the region in early May of 1977, prior to any OSDC overtures. The difficulty of implementing the State's drought program in the region was compounded by a change in the region's COG administration shortly after the start-up of programs in other regions. Nevertheless, an extremely broad contract and memorandum of agreement were eventually negotiated with the COG. The provisions of the contract allowed the "Drought Committee" as originally set up in the region to sponsor and administer any programs it deemed reasonable, and to supersede the role of a drought coordinator. It is notable that, for the most part, the arrangement worked well.

Contract Terminations. Two regional contracts were terminated by the State prematurely (in May 1978) basically because of inadequate performance. OSDC personnel had been aware of the low levels of program activity in both regions from the beginning of the project. The posture taken by the OSDC may be best described as one of continued intercession to improve performance. A combination of prodding by telephone, letters, field trips, and attempted goal reorientations had not been adequate. Despite the apparent low level of drought response activity in two of the regions, both spent all of their monthly allocations that had been made to them by the State up to the point at which their contracts were terminated. In contrast, it is notable that many of the regions with strong programs were able to return to the State large percentages

of their grant monies at the end of their 12-month programs. In most of the regions where money was left over, drought-related programs often corresponded closely to certain program priorities which constituted their normal flows of operation. Therefore, there was a willingness to absorb many drought program costs.

3.1.3 THE REGIONAL POLICY AND ADVISORY GROUPS

All but two of the regional contracts were signed by early September 1977. Upon closure of the agreement process, the interface between the OSDC and the regions intensified. Over the course of the year-long relationship between the OSDC and the regions, numerous program initiatives flowed downward, from the State to the regional level. It was during this process that certain specific State programs, not having been mandated in the contractual agreements, became subject to a filtration process at the regional level. That is, numerous policy decisions were necessary regarding: first, whether State initiatives would be carried out; and, if so, what the specific applications of these initiatives would be. Also, policy decisions were necessary regarding program initiatives conceived at the regional level.

Each region, in accord with the terms of the MOAs, developed technical advisory committees (TACs). As might be expected, the roles and character of the individual TACs varied greatly. Generally, the TACs assumed three levels of activity in regional policy-making: formulative and implementative, advisory, and inactive.

3.1.3.1 The Inactive Technical Advisory Committees

Inactive TACs did not necessarily connote weak regional drought policy. In many cases, the established regional political infrastructures (i.e., county commissioners or COG Boards) played strong roles in drought-related policy development. Such cases are illustrated by those situations in which some of the regions attempted to utilize existing water advisory groups to undertake an additional advisory role in the formulation of regional drought policy. The water quality groups, which included regional water resource personnel, had been organized by the State prior to the drought to implement various State- and federally-mandated water quality programs. Conceptually, due to their prior and ongoing involvement in water-related activities, these groups would function ideally as technical advisory committees to regional drought programs The water quality groups, however, proved to be generally unresponsive to drought-related issues. Many of the mandated water regulations which the groups had been required to address as part of their water quality activities were, in fact, deemed unnecessary by the group members themselves. It is possible that the groups made no distinction between the regulatory format of their water quality involvement and the technical advisory format of their proposed drought roles. Additionally, the resentment toward the State regarding mandated policy probably adversely affected the water groups' incentive to become actively involved in another State program.

Policy formulation occurred in these regions without the benefits of regionwide policy advisory groups. Instead, policy review and approval took place within the established regional infrastructures. In one region, the county commissioners of each county within the region assumed policy-making responsibilities. In another, all drought program initiatives were reviewed and approved by the COG governing board.

3.1.3.2 The Active Technical Advisory Committees

A similar policy-making procedure occurred in regions where the regional drought coordinators were successful in organizing responsive technical advisory committees (TACs). While policy-making in those regions was performed either by the governing board or the executive director of the regional organization responsible for drought management,the TACs were utilized to the fullest extent possible for input and evaluation pertinent to the full range of planned or ongoing drought response programs within their region.

TAC members were most often chosen on the basis of their drought-related expertise, influence in the regional community, and geographic distribution. The design was to encourage a cross-section of participation from locally based federal and State agency personnel as well as from local officials and citizenry. Available resource pools within the region included:

- Locally based federal Farmers' Home Administration, Agricultural Soil Conservation Service, Soil Conservation Service, or Rural Conservation and Development Districts personnel; and/or
- State Forest Service, Division of Wildlife, or Extension Service personnel; and/or
- Local irrigation company, county, municipal officials, and local citizenry.

Wide geographic representation was sought because the regions in Colorado are large, averaging about 8,019 square miles. The various physical attributes, conditions, and problems within the regions are correspondingly diverse. One RDC compensated for his region's size and diversity by organizing separate TACs, one within each of the four river basins which existed within the region's boundaries.

Wide geographic representation on the TACs was invaluable to many of the RDCs, especially in assessing regionwide drought severity and impacts. One RDC devised a system in which TAC members prepared status reports by indicating the level of local drought severity on county maps. Other RDCs mailed questionnaires to gather comprehensive information on localized drought severity and drought-related needs. The mail surveys were utilized to supplement TAC meetings, most of which were held on a monthly basis.

3.1.3.3 The Formulative and Implementive Technical Advisory Committees

Exceptionally strong TACs involved in policy formulation and program implementation were developed in two regions. In one region, a "Drought Committee" had been established in May 1977--prior to the contract initiatives of the OSDC.[3] Current and longterm water supply problems were the focus of the Drought Committee's policy and program initiatives. The process of policy and program advocacy constituted its basic implementation methodology. Many of the committee's advocacy activities exceeded the boundaries of its region. For instance, the committee passed and submitted a resolution to the Carter administration and the Colorado Congressional delegation against proposed national water policy options which held both Statewide and regionwide implications. In another instance, the Committee recommended to the State that it implement a Statewide weather modification program for the winter of 1977-78. More tangible implementive activities included the sponsorship of programs aimed toward the improvement of local agricultural water management. The committee requested and received funding for a supplemental well-pumping study and for an on-farm demonstration project related to irrigation scheduling.

Another policy-building technical advisory committee (referred to as a "drought council" within the region) was organized in a region in which the regional COG delegated drought responsibilities to the region's largest water utility. The composition of the drought council membership included at least one commissioner from each county within the region, a member of the regional COG governing board, and various other county and municipal officials. The combination of individuals comprising the drought council lent a great deal of credibility to the drought project and substantially supplemented the activities of an aggressive regional drought coordinator. The nature of the drought council membership contributed to its independence in policy-making and its ability to assume an implementative role in program management. For instance, municipal cooperation in providing data for the water systems survey was encouraged in some cases by the presence of a county commissioner and the president of the region's largest water board on the drought council. Many municipal water systems were improved as a result of the resources at the disposal of drought council members.

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[3]Initially, the "Drought Committee" was resistant to State contract initiatives, but later acceded on the condition that it could retain relative autonomy from the State project guidelines in its own drought mitigation activities. The "Drought Committee" chose to retain full rein over drought policy formulation and implementation, in lieu of appointing a drought coordinator. The "Drought Committee" had an adjunct relationship with the regional COG in that some COG board members also served on the "Drought Committee." (The "Drought Committee" has been discussed in Section 3.1.2.2 of this report on page 36.)

Furthermore, the drought council played a direct role in policy-making. In one instance it resolved to approach the State for an expansion of the State weather modification program to include its region. State weather modification experts later met with the drought council to explain that the particular climatological conditions in the area were not conducive to a weather modification program. In another instance the council made the decision not to undertake a regional fire suppression survey requested by the State. The decision was based upon the belief that until municipal water systems were in optimum condition there was no reason to perform a fire suppression survey.

3.1.3.4 Summary

To conclude, there was variation in policy management at the regional level. In most cases, responsive technical advisory committees were a boon to policy-making in an advisory mode. In all but two instances, final policy decisions remained the prerogative of established power structures within the region. The characteristics common to the two technical advisory committees which did exercise high degrees of policy formulation were that membership included the existing power structure within the region and therefore exercised a degree of independence and flexibility in policy and program implementation activities.

3.2 STATE DROUGHT MANAGEMENT: AN OVERVIEW OF OSDC ROLES AND FUNCTIONS

The Governor appointed the State Drought Coordinator on March 1, 1977. Soon afterward, the Office of the State Drought Coordinator (OSDC) was established in the natural resources cluster of the Governor's Office. The natural resources cluster was headed by the Governor's Assistant for Natural Resources, who, during the early stages of the State drought response program, was deeply involved in the formulation of drought policy. The proximity of the State Drought Coordinator to what was essentially the hub of early drought policy formulation facilitated the expedient translation of policy into action.

The Governor's Assistant for Natural Resources remained directly involved in drought management operations until the early summer of 1977. On July 10, 1977, about the time the Governor's assistant began to reduce his drought role, the State Legislature approved an appropriation of $46,132 (in HB 1723) to the Governor's Office for allocation to the OSDC. A short time later, in July of 1977, the Governor's Office received a $253,977 technical assistance grant from the Economic Development Administration (EDA), part of which went toward financing OSDC staff. Later in July, an assistant to the State Drought

Coordinator was hired and the OSDC became a fully operational, relatively autonomous entity with the Governor's Office.[4]

The subsequent, ongoing activities of the OSDC may be characterized as follows:

- provided policy guidance to the Governor and the State Drought Council;
- administered the planning and implementation of State and substate-level drought mitigation programs;
- monitored the operations of State, federal, and substate-level drought mitigation and relief programs;
- established linkages and performed appropriate information-networking among State, federal, and regional drought management entities.

3.2.1 POLICY GUIDANCE

The day-to-day involvement of the OSDC staff in drought management operations rendered it an invaluable advisory source of technical information for the drought-related policy deliberations of the Governor and the State Drought Council. Beyond its capacity to provide technical expertise, the advisory role of the OSDC to the Governor was strengthened first by its proximity and a correspondingly high degree of access to the Governor, and secondly by the weekly drought briefings prepared for the Governor by the State Drought Coordinator. The OSDC exerted a strong influence over Drought Council program expenditures in that many were prompted by the suggestion of the State Drought Coordinator. Furthermore, OSDC staff were largely responsible for setting the agendas for the relatively infrequent Drought Council meetings.

There were, however, limits upon the scope of the OSDC's policy influence. While the State Drought Coordinator played a primary policy-making role in, for instance, the allocation of State Drought Council monies, he was not nearly as successful in actualizing some other longer term, further-reaching policies, such as the "Front Range Water Policy."

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[4]The State Drought Coordinator, prior to his appointment by the Governor, had been the head of the Division of Administrative Services in the State Department of Agriculture (DOA). Throughout his tenure as State Drought Coordinator, the DOA paid his salary and was reimbursed by the Governor's Office from monies received from the Legislature and the EDA.

Briefly stated, the focus of the Front Range Water Policy was water conservation. The primary methodology espoused in the policy was metering. The proposed target areas were the rapidly developing portions of the State that lie in a 200-mile strip on the plains just east of the Rockies. The State Drought Coordinator went to some length to informally test the feasibility of eventually implementing the policy. He surveyed a number of Front Range cities to assess the present extent of metering and future plans for it. A copy of the policy proposal was also distributed to the Front Range regions where the proposal was reviewed by regional drought coordinators, their technical committees, and the COG governing boards. Reactions appeared to be favorable.

Ultimately, the State Drought Council refused to take a position on the Front Range Water Policy. The reasons for its refusal are difficult to pinpoint. Possibly, the Drought Council membership, a small, bipartisan group, did not deem the Drought Council an appropriate forum from which to take a stand upon the controversial metering issue. Their reasons are not as important as the cogent point here: that there were, in fact, limits to the extent of OSDC policy formulation capabilities and to the extent of the Drought Council's policy formulation interests.

3.2.2 PROGRAM PLANNING AND IMPLEMENTATION

After program initiatives had been developed by the Governor's staff, the Drought Council, or the OSDC staff itself, it became the responsibility of the OSDC to administer their planning and implementation in cooperation with appropriate State and regional management entities. OSDC activities in this regard may be categorized in three ways:

- coordinating the implementation of programs funded by the State Drought Council;
- coordinating and overseeing the regional implementation of programs which were either contractually mandated or encouraged by the State; and
- developing program and project initiatives deemed necessary for drought mitigation, and encouraging appropriate State agencies to undertake their development and/or implementation.

With the exception of those substate and independent agencies working under contract to the State, relatively few actors within the drought response framework were actually mandated (either by legislation or executive order) to undertake drought-related mitigation activities. Accordingly, there was a great deal of reliance upon the abilities of OSDC personnel in promoting programs and prompting action, especially within substate regions and State agencies. Undoubtedly OSDC capacity to promote and implement programs was augmented by the credibility associated with its placement in the Governor's Office and, commensurately, the Governor's direct support of many of its mitigation activities. The OSDC role was probably enhanced also by the

presence, and thus implicit support, of Cabinet members and legislative leaders on the State Drought Council. Nevertheless, although the OSDC had "clout by association" over the implementation of drought programs, its authority was also very tangibly limited.

3.2.3 REGIONAL PROGRAM MONITORING

The contractually mandated reporting requirements constituted the primary facet of the ability of the OSDC to monitor regional drought mitigation and relief activities. Each regional drought coordinator was required to submit monthly reports to the OSDC pertaining to:

- regional drought severity and impact;
- the status of municipal and individual applications to federal agencies for drought assistance in terms of the number of applications made and the number accepted, rejected, or in process;
- the efficiency, effectiveness, and productivity of the activities and programs of local federal offices;
- the status of current programs and projects under the auspices of the regional drought coordinator which are underway in the region in terms of the proportion of total man-hours devoted to each project and its *proximity to completion; and*
- the delineation of drought activities planned for the future.

Field trips constituted another element of the OSDC monitoring procedure. A visit to a regional drought coordination office improved the ability of OSDC staff to assess the viability and quality of a region's program. The sole purpose of the field trips was not simply to "spy," however. The field trips contributed to the firsthand knowledge of the problems and conditions specific to each region, and thus contributed to the OSDC's capacity for effective management. Furthermore, the presence of OSDC staff in a particular region often generated media coverage which enhanced the visibility of the region's drought program.

3.2.4 INFORMATION NETWORKING

By virtue of its existence at the hub of the Colorado drought response mechanism, a large portion of OSDC staff time was devoted to information-networking, coordination, and reporting. The characteristics of its multi-jurisdictional interface are best summarized as follows:

- established linkage between regional and State drought managers and federal agency administrators;

- maintained linkage with the Colorado Congressional delegation in Washington relevant to the coordination of legislative initiatives and Colorado drought-related needs;

- developed linkages between regional drought managers, and between regional drought managers and State agnecy personnel;

- prepared and distributed a weekly newsletter to appropriate State legislators and State and regional administrators, containing comprehensive information relevant to Statewide climate conditions, mitigation activities and federal assistance programs; and

- prepared and distributed weekly updates to regional agency administrators and drought coordinators containing summaries of regional drought mitigation activities and inforamtion regarding program logistics, i.e., reporting deadlines and activity announcements.

A significant amount of space in the regions' monthly reports to the OSDC was devoted to the character of federal assistance and response within each region (i.e., the number of applications in process, the nature of the aid requested, and the amount of federal funds obligated). Also, within the "federal assistance" framework, regional drought coordinators were asked to include assessments of federal agency activity in the region. The most common complaint regarding federal agency activity was that drought assistance applications caused increased workloads for federal agency staff, resulting in a slowdown in application processing. In assessing federal agency performance, regional drought coordinators were able to identify various isolated instances of particularly slow handling of drought assistance applicants by federal personnel. In cases where problems with federal assistance arose, the OSDC was able to provide additional clout to any regional effort aimed at resolving a problem and, in some instances, was successful in working with federal program administrators in Denver in the redistribution of local agency personnel to better serve applicant needs. Based upon its physical proximity to federal agency drought program administrators in Denver and the additional clout and credibility gained by its placement in the Governor's Office, the OSDC was able to serve in a networking capacity which coalesced local needs and federal response capacity, and in many instances, provided quantifiable results.

The OSDC liaison capacity stretched beyond its communication with federal program implementors to an interface with federal policy-makers. The bulk of communication flowed between the OSDC and the staffs of Colorado Congressional Delegation. On the basis of information from the regional status reports and other sources, the OSDC was able to provide input to the delegation relevant to their legislative involvement in maximizing federal drought assistance to Colorado. Knowledge of drought severity at local levels was crucial to the determination of need inherent in the legislative process aimed at channeling federal dollars into the State. Due to the fact that drought conditions throughout the West began to ease while existent federal drought assistance

packages were still in effect, Colorado representatives in Washington wound down their efforts to obtain drought program extensions.

A weekly newsletter called the Colorado Drought Coordination Report (CDC) was one mechanism used by the OSDC to promote interagency and interjurisdictional coordination within the State. Included on the CDC mailing list were members of the State Drought Council, State agency heads, task force managers, and the regional drought coordinators. The CDC included comprehensive information on Statewide and regional climate conditions, Statewide and regional drought mitigation activities, and updates on State and federal drought assistance programs. The CDC afforded drought managers at every level of State drought management a summary view of Statewide drought activities, the intention being to promote cross-jurisdictional communication and exchange of ideas. (A CDC has been displayed in Appendix E, page 141.)

Another set of weekly reports, referred to as "Friday Updates," was prepared by the OSDC and distributed to the COG executive directors and regional drought coordinators. Primarily, the "Friday Updates" were management tools employed by the OSDC to update regional personnel on program logistics, e.g., report requirements and deadlines. However, the "Friday Updates" served as an important coordination device in which summaries of regional activities were included monthly. Like the CDC, the "Friday Updates" served, in part, as a forum for the exchange of ideas and methods relevant to drought management. (An example of a "Friday Update" has been displayed in Appendix E, page 134 .)

Another important OSDC information networking activity was the sponsorship and organization of a regional drought workshop held on January 19 and 20, 1978. The agenda of the workshop, which included presentations by each of the drought coordinators describing their own drought management activities, was again designed to provide a format for the exchange of ideas. Through the presentations, the drought coordinators were able to identify common management problems and gain exposure to the different approaches in meeting those problems. The workshop was of value also, from the standpoint of affording the drought coordinators the opportunity to meet each other, and those federal and State personnel with whom they worked on a somewhat consistent basis. Part of the intention of OSDC in holding the workshop was to promote face-to-face interaction among those involved in drought management, facilitate working relationship; a freer exchange of ideas, and a more productive use of interjurisdictional resources.

3.3 THE PROGRAM AREAS

During the early stages of the State Drought Management Project, high level State administrators--the Governor, the Governor's natural resources advisor, the State Drought Coordinator, and the State Drought Council--developed eight program areas to provide the framework for subsequent drought mitigation activities. The program areas were devised to facilitate the optimum mix of State and regional drought management capabilities. The activities within each program area were to be carried out by multi-agency task forces at the State level and contractually established drought management structures at the substate level.

The following list identifies and briefly describes the eight drought program areas:

- The Public Awareness Program Area. State and regional program activities were aimed primarily at the dissemination of information pertinent to drought conditions, federal assistance programs, and water conservation.

- The Agricultural Credit Program Area. State and regional program activities were designed to assess agricultural credit needs and credit availability to assist farmers and ranchers in obtaining credit and/or federal assistance.

- The Agricultural Conservation Program Area. State and regional program activities were designed to promote efficient on-farm soil and water use techniques.

- The Water Supply and Demand Program Area. State and regional program activities were designed to identify and project probable water shortage problems in time for mitigative actions.

- The Municipal Water Availability and Quality Program Area. State and regional program activities were aimed at determining the viability of water systems and the probability of water source failure in order to prioritize system rehabilitation plans and to prepare grant requests for federal and State aid.

- The Fire Suppression Program Area. Program activities were aimed at augmenting State and local capacities to address the increased potential of fire in municipal, rural, and forested areas.

- The Weather Modification Program Area. State projects were designed to supplement winter snowpack and increase subsequent water supplies.

- The Economic and Social Modeling Program Area. The State program consisted of one project designed to forecast drought effects on production values of agricultural commodities, dependent sectors, and the tourist industry to assess corresponding impacts upon sales tax revenues, family incomes, and unemployment rates.

The eight sections that follow detail the activities that occurred at the State and regional levels within the framework of each of the program areas listed above.

By way of further introduction to the program areas, it may be useful to identify some basic threads which ran throughout State and regional response activities.

- Variability characterized the regional activities when viewed from a cumulative perspective. The degree to which regional drought

coordinators carried out programs depended to a large degree upon a variety of region-specific forces including the severity of regional drought conditions and the program priorities of the drought coordinators, technical advisory committees, and pre-existent intraregional political infrastructures.

- Delivery of services to drought-impacted clientele characterized regional efforts, especially. The mode of delivery activities centered upon survey processes for identification of needs followed by appropriate mitigative activities such as technical assistance.

- Intergovernmental coordination characterized efforts at the federal, State, and regional levels. Cooperation among all levels of government were necessary elements of program areas in which effective delivery of services occurred. Also included in this category of activity is intragovernmental coordination manifested at the State level by the development of multi-agency task forces to preside over each of the program areas.

- Long-term spinoffs grew out of many of the program initiatives aimed at drought. Often drought mitigation programs overlapped ongoing State and regional concerns and/or lay the groundwork for future beneficial programs and activities.

3.3.1 THE PUBLIC AWARENESS PROGRAM AREA[5]

The media did not require much prompting to pick up on the powerful onslaught of the drought during the winter of 1976-77. The peculiarities of the drought conditions--its climatological aspects, its impacts, and the mitigation responses generated by it--naturally attracted media attention. National media chronicled the contrasts between the severe cold and snows which characterized the winter in the Eastern United States and the unusually mild and dry conditions which prevailed in the West. The meeting between the U.S. Secretary of the Interior Cecil B. Andrus and 18 Western Governors in Denver to discuss Western regional drought relief needs provided fuel for national media coverage as did the subsequent, stepped-up consideration and enactment by Congress of drought assistance legislation. In the meantime, the disastrous ski season and the potential crisis fostered by severe water shortages tantalized Colorado media. It is safe to conclude that the public could not help but become acutely aware that drought conditions did indeed exist in Colorado and the West.

With the inception of the first State Drought Council, conservation became the focus of the State's public awareness campaign. The Governor officially proclaimed 1977 as CONSERVE WATER! YEAR to emphasize a Statewide need

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[5] A summary of Colorado's public awareness activities is depicted in Figure 3-3.

FIGURE 3-3

PUBLIC AWARENESS ACTIVITIES

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	AUTHORITY/CATALYST	FUNDING
Governor's Office	• Conserve Water! Year Declaration • Conserve Water! Week Declaration	March 1977 May 1978	• Executive Order • Executive Order • Request and encouragement from quorum of regional drought coordinators	No No
Colorado State University Extension Service	• Development of "Conserve" logo • Development and distribution of brochure containing domestic water conservation hints	March 1977	Request of Governor/Drought Council	Yes. $10.00 from Governor's Office
Colorado Water Congress and State Department of Education Regional Drought Coordination Offices	• Adaptation of "Captain Hydro" for inclusion in Colorado school curricula • General information dissemination and technical assistance re federal programs • Introduction of Captain Hydro to schools	August 1977 August 1977 August 1977	Request of State Drought Council Contractual mandate (per Objective 1 of Memorandum of Agreement) Request of OSDC (per Objective 3 of Memorandum of Agreement) Guidance from Colorado Water Congress	Yes. $25,000 Yes. Remuneration for work hours spent on the project covered by State contract. Yes. Remuneration for work hours spent on the project covered by contract with the State.
Regional Drought Coordination Offices	• Development of regionwide emergency preparedness plans (some regions)	August 1977	Encouraged by Office of State Drought Coordinator (per Objective 3 of Memorandum of Agreement)	Yes (Remuneration for work hours spent on the project covered by contract with the State)
Office of the State Drought Coordinator/ Department of Disaster Emergency Services (OSDC/DODES)	• Sponsorship of emergency preparedness seminar and workshop for regional personnel	May 1978	Conceived and encouraged by OSDC and DODES	Yes In kind and cash from Drought Council general fund account

for water conservation. He set a goal for a 20 percent reduction in domestic water use. To further promote conservation, the Governor hosted interest groups, including Boy Scouts and Girl Scouts, at his residence. At the request of the Governor, Cub and Boy Scouts distributed 750,000 water conservation leaflets to homes throughout Colorado. The Governor devoted space to the drought in his weekly newsletter to community leaders and in his weekly newspaper column distributed Statewide. The Colorado-Wyoming Restaurant Association promoted an effective conservation campaign in which restaurant customers were served water only upon request. The Governor's Press Office prepared numerous releases containing water conservation tips for domestic users and supplementing the normal flow of information related to the Governor's early day-to-day drought activities.

Upon the request of the Governor and the State Drought Council, the CSU Extension Service undertook an extensive conservation awareness program. The Extension Service developed a logo depicting a pair of hands holding a drop of water with the word "Conserve" printed below. (See Figure 3-4.) The logo was introduced Statewide by the Governor in March 1977 as part of the kickoff of his CONSERVE WATER! YEAR campaign. The logo was widely used by the Colorado media and quickly became a familiar symbol of water conservation throughout the State. The Extension Service also prepared 550,000 copies of a brochure containing domestic water conservation tips. The brochures were widely distributed via mass mailings and placement at key distribution points such as banks, libraries, and shopping centers.

FIGURE 3-4
THE "CONSERVE" LOGO

It is evident, then, that State-level administration recognized the importance of public awareness. The OSDC and the Governor's Office began to organize media events and various public awareness campaigns during the earliest stage of the State Drought Project. Furthermore, the media contributed to public awareness activities, especially during the periods in which the drought was most severe.

Public awareness was also a high priority item on the program agendas of many regional drought coordinators. From the beginning of regional program implementation, the State had stressed the importance of regional public awareness efforts geared especially toward the dissemination of information regarding federal drought assistance programs. Therefore, many of the earliest regional activities centered upon supplementing federal agencies' own public

awareness initiatives through the distribution to local media of information pertinent to federal drought assistance. It is significant also that in some regions, the technical advisory committees (TACs) played into the public awareness process. Many TACs featured broad geographic representation which facilitated regionwide dissemination of assistance information via informal "word of mouth" systems.

Ironically, the above average 1977-78 winter snowpack produced an adverse impact upon State and regional drought management activities. Colorado media interpreted the substantial winter snowpack as a signal that the drought had broken when, in fact, it had not. Certainly the high snow yield vastly improved lagging streamflows and depleted reservoirs, but many portions of the State continued to suffer severe drought conditions.

The mountains in the southern portion of the State, for instance, did not receive nearly as much snow as those further north. The eastern plains continued to experience consecutive months of record and near-record lows in precipitation. Furthermore, low levels of soil moisture and use-worn rangelands characterized most of the State's agricultural land.

In the early spring of 1978, the State began to organize public awareness activities designed to counter the erroneous media contention that the drought had ended. In March, the State Drought Council allocated $25,000 to the Colorado Water Congress (CWC), a quasi-governmental agency, to implement a water conservation education program--a program that would yield both short and long term benefits.

The long term thrust of the program was that the CWC, in cooperation with the State Department of Education, would initiate a water resources awareness program for the K-12 school curriculum. The program was developed around the theme of "Captain Hydro," a cartoon character billed as the "hero of water conservation. (See Figure 3-5.) The program had been originally developed by a California educator during that state's drought for use by the East Bay Utilities District of Oakland, California. In bringing "Captain Hydro" to Colorado, it was the responsibility of the CWC to develop teachers' guides to represent the unique features of Colorado's water resources. of Colorado.

For purposes of program implementation, CWC divided Colorado into four quadrants. Separate teachers' guides and workbooks were subsequently published to address the unique water-use and -resource characteristics of those four quadrants. The CWC was also responsible for distributing the guides and workbooks and for sponsoring workshops to orientate teachers into the program. As a result, the Captain Hydro program was ready for introduction into Colorado school curricula for the 1978-79 school year.

"Captain Hydro" also played into the short term, more timely aspects of State and regional public awareness activities. "Captain Hydro" buttons and posters obtained for the OSDC by the CWC were distributed by the regional drought coordinators to communities and key individuals throughout the State.

FIGURE 3-5
CAPTAIN HYDRO--THE HERO OF WATER CONSERVATION

Furthermore, "Captain Hydro" was introduced to the Colorado media as a new symbol of conservation in an effort to rekindle public interest in conservation.

In line with stepped-up Statewide public awareness activities, the regions began to combine efforts to strengthen their public awareness capabilities. In March 1978, two regional drought coordinators organized a seminar designed to enhance the abilities of coordinators in every region to utilize the media to disseminate drought-related information. The seminar agenda included guest speakers representing a range of media, but primarily radio stations and newspapers.

A major spinoff of the seminar was a request by regional drought coordinators for the Governor to proclaim May 7-13, 1978, as "Conserve Water! Week." The Governor honored the request by issuing a "Conserve Water! Week" proclamation and taping three 20-second radio spots which were distributed and broadcast throughout the State. In addition, regional drought coordinators contacted

local radio and television stations and major newspapers in their regions to encourage their cooperation in activities such as running the "Conserve" logo during "Conserve Water! Week" and devoting editorial space to public reminders to "maintain our drought-inspired conservation habits."

From a summary perspective, it is evident that the newsworthiness of drought in Colorado supplemented the organized State and regional efforts to maintain a high level of drought awareness. However, the substantial winter snows fooled the media and public into believing that the drought was over, when in fact it was not. To counterbalance the misconception, the State attempted to renew efforts to inform the public that the drought was "still with us." Whether the State efforts were successful is difficult to quantify. The indications are, however, that the efforts probably fell short. Many municipalities in Colorado eased watering restrictions. Concurrently, water consumption rose. In Denver, for instance, restrictions limiting lawn-watering to three hours every third day were enacted during the summer of 1977. During the summer of 1978, watering restrictions were relaxed, largely on the basis of citizen complaints, to allow unlimited watering every third day. Accordingly, Denver water consumption rose by approximately 25 percent, from a total of about 30.1 billion gallons consumed during the summer of 1977 to approximately 41.1 billion gallons consumed during the summer of 1978.

The implication is that water conservation too often is a function of severe conditions such as drought. The justification for the implementation of ongoing water conservation practices, then, may be the oft-stated notion that there is always a drought in Colorado.

3.3.2 THE AGRICULTURAL CREDIT PROGRAM AREA[6]

Agricultural credit problems in Colorado predated the drought and worsened as drought conditions became more severe. In many areas of Colorado--particularly the southeast, southwest, and Western Slope--the demand for agricultural loans from private and federal lending institutions rose sharply. Meanwhile, farmers' repayment capacity and ability to produce collateral slipped. The drought aggravated an already poor relationship between commodity prices and production costs--a relationship in which costs were rising while prices remained depressed. Sound collateral was also in increasingly short supply. In many instances, chattel securities were depleted. Land values were leveling off, cutting into the viability of real estate as a collateral base. Generally, loan refinancing and second mortgages began to take a more dominant role in credit transactions; or, many farmers had used all of their equity and to augment their cash flow were forced to sell some of their assets. Given the financial position of many farmers and ranchers, many lending institutions were wary of extending loans to many of those agricultural producers in need of

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[6]A summary of Colorado's public awareness activities is depicted in Figure 3-6.

FIGURE 3-6

AGRICULTURAL CREDIT ACTIVITIES

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	AUTHORITY/CATALYST	FUNDING
State Department of Agriculture Extension Service Colorado Bankers' Assn.	Presentation of six on-farm financial management seminars	August 1977	• Encouraged by State Agricultural Credit Task Force	No
Regional Drought Coordinators	• Regional assessments of agricultural credit situations via informal survey process	October 1977	• Encouraged by OSDC (per Objective 3 of Memorandum of Agreement)	•Yes Remuneration for work hours spent on the project covered by contract with the State
	• Supplement federal information dissemination and technical assistance activities	September 1977	• Contractual mandate (per Objective 1 of Memorandum of Agreement)	Yes Remuneration for work hours spent on the project covered by contract with the State

financial assistance. The loan volume for many Colorado rural lenders in 1977 was well over the 1976 level. In some areas, loan-to-deposit ratios were at or above their limits, while in others, money was still available. However, in those areas where money was available, the prevailing notion was that the benefits to be accrued by putting more money into the economy were outweighed by the dangers of possible losses attributed to overextended credit.

The inital charge of the Agricultural Credit Task Force was to explore and make available new credit alternatives to assist Colorado farmers and ranchers during the period of severe drought conditions. The task force, composed mainly of private bankers and headed by the Commissioner of the Colorado Department of Agriculture, shifted the conceptualized focus of its activities from exploring new credit alternatives to promoting the use of alternative, on-farm financial management schemes aimed at ameliorating price/cost ratios.

The belief among the task force members was that credit problems resulted largely from the high costs of agricultural production. High costs cut into profitability; low profits cut into farmers' ability to accumulate collateral; the lack of collateral diffused the availability of credit.

The task force developed a series of seminars for Western Slope ranchers designed to provide information regarding the various management arrangements available to ranchers under the conditions of drought, declining prices, and rising costs. The seminars, sponsored by the CSU Extension Service, the State Department of Agriculture, and the Colorado Bankers' Association, were presented in six locations on the Western Slope during the late summer of 1977. Agenda items were geared to provide ranchers with criteria for sound financial decision-making. Most of the information presented in the seminars focused on good management techniques related to the efficient use of feed and rangeland resources.

A common problem which afflicted ranchers during the drought was one of depleted rangelands caused by overgrazing in previous years and aggravated by current drought conditions. There were a number of possible approaches to the problem of low feed supply. Ranchers most often incurred additional, sometimes ruinous expense in renting pastureland or bringing in feed from outside sources. The purpose of the seminars was to mitigate against ruinous possibilities through the promotion of various alternative plans, such as selling real estate to reduce budget expenses; selling some chattel; or selling all chattel and changing production programs to custom pasture grazing enterprises. County Extension Offices were promoted as good resource locations for alternative program planning and implementation assistance.

Regional efforts in the agricultural credit program area centered upon the performance of informal surveys of local bankers involved in agricultural lending. The OSDC requested that the regional drought coordinators perform the surveys to: First, identify and quantify region-specific agricultural credit problems; and second, to elicit recommendations from bankers pertinent to

remedying those problems. (An agricultural survey has been displayed in Appendix F, page 152 .)

The resultant survey process was not of an adequate scope to comprehensively quantify the extent and nature of region-specific credit problems. However, the interviews were useful in providing a general synopsis of regional credit pictures from the perspective of bankers who were involved in the delivery of credit services on a day-to-day basis. The general tone of the bankers' perceptions of the agricultural credit situation was that farmers and ranchers were holding up fairly well under drought conditions. A number of bankers noted the need for loan extensions, but few foresaw any need for "drastic actions" such as foreclosures. There were indications, though, that if severe drought conditions continued, then credit would tighten and many more agribusinesses would fail.

It is significant that the overriding factor attributed to agricultural credit problems was not drought, but the perpetually low level of prices for agricultural products. The bankers had no particular solutions for the pricing problems except to indicate that "government," or the farmers themselves, should opt for higher prices.

Certainly there was no simple solution to the poor price-to-cost ratio that underlay the agricultural credit problem. The approach taken at the State level--which focused upon cutting operating costs through the use of better management techniques--held possible implications for rectifying the problem. However, it is difficult to determine whether the farm management seminars offered by the agricultural credit task force brought substantive results. It is doubtful that the seminars produced timely results in that the benefits of improved management techniques often accrue over relatively long periods of time. The treatment of the price aspect of the price-to-cost ratio in an industry like agriculture--in which prices are functions of national and often international markets--on the other hand, was simply beyond the capacity of the drought program.

As for alternative credit possibilities, it would have been unrealistic to expect the private sector lending institutions to take risks that did not make economic sense. Besides, in some regions, bankers did not see the drought as having any substantial effect on their customer credit situations. Instead, they perceived agricultural credit problems as functions of the ongoing disequilibrium between prices and costs. In other regions, bankers did attribute the increased volumes of credit problems to the drought, but in most cases were able to service and support their agricultural customers, especially their established customers. The point is that it was basically "business as usual" for private agricultural lending institutions. Loan volumes may have been higher, but credit requirements did not change.

A large portion of the agricultural credit burden during the drought, as during normal years, was assumed by the federal government. The federal

programs were effective in getting some farmers and ranchers through a period of severe drought. The assistance was of a quick-fix nature, leaving an open question as to what happens next year or the year after that. Rising costs and falling prices are ongoing economic facts of life in the agricultural sector which temporary credit solutions do not fix.

3.3.3 AGRICULTURAL CONSERVATION PROGRAM AREA[7]

The Agricultural Conservation program area was conceived to promote the Statewide use of resource-efficient farming and ranching techniques. The scope of consideration was broad, ranging from water conservation practices to wind erosion mitigation activities.

The Agricultural Conservation program area was one that depended largely upon the mobilization of resources at the State level. The regions were not called upon to participate formally in this particular area of drought response activity.

The designation of a task force was the approach taken by the State to organize and implement agricultural conservation activities. The Director of the Colorado State University (CSU) Extension Service was chosen to head the task force--a logical choice given that conservation and efficient agricultural practices represented a large portion of the Extension Service's normal area of concern. Also, the Extension Service network of offices reached 58 of Colorado's 63 counties, providing a strong resource for the dissemination of information.

Additional Extension Service personnel and representatives from the Soil Conservation Service, the Colorado State Farm Bureau, the Colorado Agricultural Stabilization and Conservation Service, the Agricultural Research Service, water conservancy district officials, and private farmers rounded out the task force membership. Also, task force "subcommittees" were formed on an ad hoc basis in which professionals who were willing to provide farmers and ranchers with information and problem-solving assistance within their specific realms of expertise were identified throughout the State.

A number of the program activities of the task force were undertaken in conjunction with the Extension Service's normal course of drought-related activities. Promotional spots on water conservation were produced for television. Water conservation brochures were prepared and distributed Statewide. Water management seminars were developed and presented throughout the State. Most of the seminars targeted for farmers and ranchers focused on on-farm management techniques. Others--the most notable of which were the "Colorado

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[7] A summary of Colorado's agricultural conservation activities is depicted in Figure 3-7.

FIGURE 3-7

AGRICULTURAL CONSERVATION ACTIVITIES

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	SUPPORT AUTHORITY/CATALYST	FUNDING
Agricultural Conservation Task Force	• Basinwide water user meetings promoting cooperation and coordination in the use of scarce water resources	June 1977	Letter of encouragement from Governor Lamm to appropriate basin leaders upon request of Agricultural Conservation Task Force	No
	• Development of information and resource pool composed of scientists and experts with agricultural expertise	May 1977	Independent action	No
	• Colorado drought workshops for a cross section of agricultural, recreational, and municipal water users and managers	November 1977	Drought Council; Colorado Water Conservation Board	No

Drought Workshops" held in Denver and Grand Junction in November, 1977--were held for State and local water managers to provide symposia for data review and the development of alternative courses of action in dealing with potential short water supplies.

Possibly the most significant programmatic thrust of the Agricultural Conservation Task Force was the organization of meetings between water users in each of the State's major river basins. Traditionally, there has been a significant degree of antagonism among water users within a single river basin. Most often, the basis for conflict has been the issue of water use priorities. Drought or no drought, water is a scarce resource in Colorado, one for which demand has often outweighed supply. The onslaught of severe drought in 1976 aggravated water shortages and threatened to further complicate the problems associated with water use priorities. As many water shortages approached or achieved emergency proportions, the task force organized water user meetings to explore the options of various cooperative arrangements available to mitigate the water shortages. The task force identified key personnel in each river basin and asked them to convene meetings with managers of irrigation companies, conservancy districts, and others responsible for water use. Key State personnel were also asked to attend. The movement received further impetus when Governor Lamm wrote a letter to lead personnel in each of the river basins supporting the cooperative concept. The meetings represented a breakthrough in many river basins in that water users who normally avoided communication were willing to meet and at least attempt to cooperate.

The results fostered by the meetings varied from basin to basin. In most, no substantive cooperative arrangements were developed. In one, the Arkansas Valley in southcentral Colorado, the meeting provided a forum in which the differences among the water interest groups surfaced. Certainly, conflicts were not completely resolved, but they were clarified. A spinoff of the Arkansas Valley meeting was a heightened sense of conservation which prompted the arrangement and presentation by the CSU Extension Service of 12 "clinics" covering irrigation scheduling and on-farm water management.

The meeting which most closely approached the ideal model originally conceived by the task force occurred in the South Platte basin in northcentral Colorado. The success of that meeting was due to similar cooperative processes among water users having occurred consistently over the prior five years. The gist of the arrangements in the South Platte district was that senior water right holders were willing to exchange some of their extra water with junior holders for future compensation. The situation in the South Platte basin was such that many junior water right holders owned irrigated lands upstream from senior right holders. Arrangements were worked out whereby the downstream senior right holders allowed upstream junior holders to divert water to their irrigation ditches as long as the water was eventually allowed to return to the stream for their own use later. The significant point is that senior holders had the right to demand that the water not be temporarily diverted to the fields of junior right holders, but instead be allowed to flow directly to their own fields. Another cooperative arrangement occurred in cases in which senior holders allowed juniors to utilize their surplus ground water supplies as long as the juniors paid the pumping costs.

The achievement of cooperative arrangements among water users in the South Platte basin supports the feasibility of cooperative arrangements among water users. If the initial meetings in the other basins did not result in substantial cooperation, at least the foundation was laid for future interaction. The cooperative spirit regarding water use must be developed over a period of years. The issue is too big to be resolved in one or two meetings.

The Agricultural Conservation Task Force was one of the few task forces organized under the auspices of the Drought Council which assumed an independent organizational structure and undertook the design and implementation of drought mitigation programs. Although those programs met with varying degrees of success, they may be characterized as creative attempts to promote efficient on-farm management and water use techniques. The variable success of the educational programs developed by the task force may be attributable to the success of such programs hinging upon their recipients' willingness to utilize the concepts. It might have been unreasonable to expect one or two exposures to new ideas to bring about substantial adjustments in long standing practices.

3.3.4 WATER SUPPLY AND DEMAND PROGRAM AREA[8]

Given the threat posed by drought to Colorado water resources, the need to monitor water supply and demand on a Statewide basis took on primary importance. The essential forces behind the development of the Water Supply and Demand program area were the desire to: devise an information system which would first facilitate monitoring of drought conditions; and facilitate the anticipation of water shortfalls, allowing for the timely preparation of response activities.

The maintenance of much of the State's data necessary for the monitoring process--figures on reservoir storage, streamflow levels and snowpack levels, and average consumption rates--was the chartered responsibility of the Colorado Division of Water Resources (DWR). Thus, the DWR became the focal point at the State level for most of the monitoring and simulation activities with regard to water.

In order for the State Drought Coordinator to keep track of water availability on a Statewide basis, DWR provided him with monthly reports containing figures showing current snowpack, streamflow, and reservoir levels and also provided comparison data from previous years. These reports were in turn sent by the OSDC to the regions where regional drought coordinators were able to use them to supplement their own monitoring efforts. The water availability levels illustrated in the State Engineer's reports, when correlated with average consumption figures and weather forecasts, provided a useful tool in identifying

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[8]A summary of Colorado's water supply and demand program activities depicted in Figure 3-8

FIGURE 3-8

WATER SUPPLY AND DEMAND ACTIVITIES

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	AUTHORITY/CATALYST	FUNDING
State Division of Water Resources	• Monitoring and reporting on physical conditions: streamflow, reservoir storage, snowpack	May 1977	Request of Drought Council and OSDC	No
	• Initial attempts at Statewide water supply and demand simulator	August 1977	Request of OSDC	No
	• Initiation of groundwater study in southwest Colorado	December 1977	Request of State Drought Council	Yes--$40,000
	• In-house water data coding to facilitate usability	December 1977	Request of State Drought Council and OSDC	No
Regional Drought Coordination Offices	• Consolidation of fragmented groundwater data into usable form (one region)	December 1977	Contractual mandate (per Objective 3 of Memorandum of Agreement)	Yes. (Remuneration for work hours spent on the project covered by contract with state)
	• Survey of groundwater levels (two regions) form (one region)	December '77-January 1978	Contractual mandate (per Objective 3 of Memorandum of Agreement)	Yes. (Remuneration for work hours spent on the project dovered by contract with state)
	• Computer simulation prioritizing water rights (one region)	January 1978	Contractual mandate (per Objective 3 of Memorandum of Agreement)	No. Project performed by University of Denver graduate students.
	• Monitoring and reporting on local impact (all)	August 1977	Contractual mandate (per Objective 2 of Memorandum of Agreement)	Yes. (Remuneration for work hours spent on the project covered by contract with state)
Colorado Water Resources Research Institute (CSU)	• Study of the impact of irrigation efficiency changes on water availability in South Platte River	June 1977	Request of OSDC	Yes. From the Bureau of Reclamation emergency drought funds

those areas in which water shortage problems could be anticipated. However, for numerous reasons--including the unpredictability of the weather--it was difficult to produce accurate shortfall predictions.

It was the unpredictability of the weather which prompted the State Drought Council to ask the State Engineer to devise a simulation model aimed at pinpointing water availability given various snowpack levels which might occur during the approaching winter. In September 1977 the DWR produced a tabulation of expected water shortage, estimated under three conditions of snowpack: 70 percent of normal, 100 percent of normal, and 120 percent of normal. The expected storage was projected as a percentage of total usable storage capacity in the various river basins, corrected for different levels of soil moisture and sublimation. Unfortunately, the simulation model was never developed to a point at which it would have been of use in anticipatory decision-making. In developing the model, the State Engineer felt that there were an overwhelming number of constraints which cut into all possibilities of the model being accurate. However, had the snows of the winter of 1977-78 been deficient, it seems that there would have been no choice except to continue to attempt to refine the model to one that would have served as a viable management tool.

At the State level, the lack of consolidated information concerning the availability of ground water left a substantial void in the supply-and-demand equation of Colorado's water resources. The problem was not necessarily that there was no information on ground water supplies, but that the data was neither easily accessible nor in a clear, usable form. The State recognized this problem during the early stages of the drought project and highlighted it in a presentation to the State Drought Council by a ground water expert from the Department of Geophysics at the Colorado School of Mines. The expert noted that there was an excellent resource of technical personnel in Colorado, capable of performing the tasks necessary to clarify the fluctuations in ground water availability. He recommended that the various State agencies involved with ground water be funded at levels substantial enough to organize extensive studies of the major ground water basins in the State. The studies would include geological and geophysical mapping for calculation of total reserves, evaluation of water quality, and estimation of the cost-benefit factors and environmental impact of large scale utilization of the ground water reservoirs.

The ground water presentation to the Drought Council resulted in the assembly of an ad hoc Ground Water Committee composed of State and federal personnel and ground water experts from the State's university system. The committee further considered the deficiencies in information on ground water resources in Colorado and eventually put together a proposal aimed at developing some solutions.

Later, in December, 1977 the State Drought Council allocated $40,000 to ground water resource studies in southwest Colorado, an area where ground water data was especially deficient. The study, which was match-funded by the U.S. Geological Survey, is in process at this writing under the auspices of the Colorado Division of Water Resources (DWR); it will culminate in the production of a series of maps which will show ground water resources at various depth

intervals, identify their sources, indicate expected yield data for existing and potential pumping sites, and denote the water quality at identified pumping sites. The maps, when completed, will be accessible to all interested parties and provide interpretable information to technical as well as nontechnical consumers. The mapping project is being performed in concert with a project in which the data already on hand at the DWR will be coded. The DWR in-house project, like the mapping project, is designed to organize and simplify technical ground water data so that it is accessible to and interpretable by all potential consumers. The intention behind the entire coding and mapping project is to provide a valid, usable management tool which ideally will contribute to the prudent consumption of scarce ground water resources.

The concept of monitoring water supply and demand, as expensive as it was, was highly important in light of the water shortfalls associated with drought. The utility of general water supply and demand data as a State level management tool, however, was somewhat limited by the lack of comprehensive data. The discovery of the data gaps, especially those associated with ground water resources, was significant in that it highlighted the importance of knowledge pertaining to ground water resources on a level and at a time when appropriate measures could be taken to correct the deficiencies. The resultant studies will produce information which should foster long term improvements in the State, regional, and local level management of scarce ground water resources.

Regional water availability activities fit loosely into the State's structured water supply and demand program format. Although the work in the program area, initiated at the State level, had positive implications for the regions, no formal program mandates were given to regional drought coordinators requiring them to undertake specific activities within the water supply and demand framework.

However, most RDCs needed little prompting to undertake activities related to monitoring water supply and demand. Water availability was and is a matter of ongoing concern at regional and local levels. Water management is the primary activity of many substate organizations such as water conservancy districts, soil conservation districts, and irrigation companies. Inherent in most of their water management activities is the constant assessment of ground and surface water availability. For the most part, the water management organizations are knowledgeable of the patterns and intricacies of water supply and demand. The drought-related activities of the regional water management organizations and the regional drought coordinators, then, flowed more as a matter of course than in response to formal State program initiatives.

Despite much demonstrated expertise, it would be a mistake to imply that local water management was either infallible or without additional data needs. The assessment of water availability, especially ground water availability, is exceedingly complex. In fact, many RDCs recognized gaps in their regions' ground water availability data and sought funding for studies to provide necessary additional information. In one region, the RDC in compiling a contingency plan for future drought recognized an almost total lack of

integrated ground water availability information. The RDC then initiated efforts to compile a previously existing supply of fragmented ground water information into a usable, comprehensive document. In another region, the RDC performed a survey of well water levels for the purpose of identifying those wells where water levels were dropping at a rate at which supplemental water supplies would be required. In another region, a computer model was designed to identify water users who would face limited availability of water during drought situations or as a result of increased water use by other users.

Drought impacts on ground water resources are especially intimidating in some of the State's agricultural regions, especially those where irrigation systems depend upon massive amounts of pumped ground water and where ground water tables were dropping at alarming rates. (In one region there were instances of ground water tables dropping from 6 to 130 feet.) Another problem was that heavy deep aquifer pumping in one location sometimes resulted in diminished ground and surface water supplies elsewhere. Simply stated, the problem in some regions is that the underground flow patterns of water were unknown. In response to such problems, at least one RDC undertook the initiation of a program to study and monitor ground water recharge systems within his region. In another region, the Drought Committee was able to put together a water supply and demand forecast capable of targeting potential shortage areas; additionally, the committee sought funding for a study of the feasibility of supplementing surface water use by additional ground water wells to allay potential drought-induced water shortages.

At both the State and regional levels, the problems inherent in the assessment of water supply and demand patterns are complicated. The programs initiated by the State under the auspices of the drought program and independent programs at the regional levels were valuable and hold long term implications. The assessment of water availability is an ongoing concern at all levels of government. The programs fostered during the drought within the framework of water supply and demand assessment certainly augmented ongoing efforts.

With regard to timeliness, it seems that had the water supply shortage become more severe--that is, if snowpack had not been what it was during the winter of 1977-78--the State and regions held data resources sophisticated enough at least to pinpoint isolated water shortage areas in time for response programs to be planned. However, if the 1977-78 winter snowpack had, in fact, materialized to a level only equal to that of the previous winter, Colorado would have had problems far beyond the solution capabilities of raw data and planning.

3.3.5 THE MUNICIPAL WATER AVAILABILITY AND QUALITY PROGRAM AREA[9]

Municipal water availability and quality were identified by high level State administrators--the Governor's staff advisor on natural resources, the

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[9]A summary of Colorado's municipal water availability and quality program activities is depicted in Figure 3-9.

FIGURE 3-9

MUNICIPAL WATER AVAILABILITY AND QUALITY ACTIVITIES

IMPLEMENTIVE STRUCTURE	ACTIVITY	DATE BEGUN	AUTHORITY/CATALYST	FUNDING
Office of State Drought Coordinator and various state agencies	• Development of state emergency response schematic	August 1977	• Request of OSDC	No
Colorado Water Conservation Board	• Review municipal applications for federal assistance re water system improvements	Ongoing	• Statutory charter	No
	• Initial State contact point in water emergency response schematic	August 1977	• Request of OSDC	
Regional Drought Coordination Office	• Performance of municipal water systems inventory and needs assessment survey	September 1977	• Contractual mandate (per Objective 1 of Memorandum of Agreement)	Yes -- remuneration for work hours spent on the project covered by contract with State
	• Technical assistance to municipalities in procuring federal assistance	October 1977	• Contractual mandate (per Objective 1 of Memorandum of Agreement)	Yes -- remuneration for work hours spent on the project covered by contract with State

State Drought Coordinator, and subsequently the State Drought Council--as a primary area of concern to which drought response activities at the State and regional levels ought to be focused. It was common knowledge that a number of municipal water systems--especially those in small communities--featured inadequacies which increased the risk of system breakdowns under the additional strains imposed by the drought. The risks of system breakdowns were especially high, for instance, in towns dependent upon wells, springs, or streams which threatened to go dry; or where system leakage wasted scarce water resources and disrupted delivery efficiency.

To address potential municipal water system problems, the State and regions engaged, primarily, in two forms of mitigation activity. First, the State Drought Coordinator, in concert with the CWCB and other State agencies, developed an emergency response procedure designed to expedite the mobilization of State resources in the event of a serious municipal water system breakdown, e.g., the complete dissipation of a water source. The response mechanism which was developed identified the functional areas of various State agencies in the event of an emergency and graphically outlined coordination procedures. Furthermore, the response schematic identified the regional drought coordinators (RDCs) as the initial contact and ongoing coordination points at the substate level. Although the emergency plan was never utilized under extremely pressing emergency conditions, it did establish a framework within which the roles of the RDCs were clarified regarding the coordination of less pressing drought-induced municipal water system problems (of which there were many).

The second most significant activity undertaken within the municipal water quality and availability program area was the performance of a Statewide municipal water systems inventory. The purpose of the inventory was to provide the State and regions with a tool with which to assess the capacities of municipal water systems to withstand the added stress imposed on them by drought conditions.

The information for the inventory was obtained through a survey questionnaire prepared jointly by OSDC personnel and State water experts. The questionnaires were distributed to the RDCs in September 1977 soon after the regional drought programs had been formally initiated. It then became the responsibility of the RDCs to distribute the questionnaires to appropriate local officials for completion. At first, local response to the questionnaires was variable. In most cases, the questionnaires received little attention until the RDCs were able to follow up in person. Eventually, however, the inventory process culminated in a completion rate that approached 100 percent within those regions that actively participated in the inventory program. (An example of a municipal water survey has been displayed in Appendix F, page 157.)

With regard to the functional regional drought projects, the municipal water systems inventories had a number of ramifications upon subsequent regional drought activities. First, the surveys uncovered a substantial number of drought-related municipal water system problems to which federal drought assistance funds were applicable. Although federal assistance deadlines were

imminent or had passed by the time many of the inventories were completed, many of the assistance program deadlines were eventually extended. The extra time allotted by federal deadline extensions enabled many RDCs to provide communities having inadequate or problematic water systems with the technical assistance necessary to procure, or at least apply for, federal grants and loans for water system repairs.

Another ramification of the inventory process was that it uncovered a number of municipal water system problems which were not drought related and, therefore, did not qualify for federal emergency drought assistance. However, in those instances, RDCs were often able to identify other sources of aid. In some cases, RDCs were able to provide assistance in the discovery of and application for nondrought-related State and federal assistance funds. In other cases, RDCs were able to tap local assistance resources. In one region, for instance, the RDC, with his drought council, reviewed the inventories prepared by the localities within his region, recommended system repairs based upon data contained within those inventories, and directly assisted in some water system repairs by arranging for the provision of low cost equipment and materials.

A third ramification of the survey process was the RDCs' discovery that many municipal water system managers had been aware of their system problems, had made prior application to federal and State agencies for assistance, but had not received assistance. Where it was needed and requested, some RDCs were able to expedite grant and loan procurement procedures. In other instances, RDCs discovered that local water managers were aware of their systems' problems but unaware of how to undertake systems improvements projects or obtain financial assistance. Again, RDCs provided assistance to water managers in utilizing State and federal funding sources. One region prepared a comprehensive water and sewer systems improvements guide for use by municipal officials; the guide outlined in detail applicable project planning and funding techniques and funding sources. It was distributed to municipal officials and water managers within the region and later to all regional drought coordinators.

To further utilize the data obtained in the municipal water systems surveys, the State plans to develop a multipurpose indexing and management system which will enable State and federal funding agencies to allocate more rationally scarce grant resources to address water system needs. Continual updating of the data contained in the municipal water system inventories will also allow the State to identify those water systems which are particularly vulnerable to stress and to propose remedial alternatives to address immediate and long term water system needs (such as drilling and capping wells for use only in cases of primary water source depletion).

The overall success of the water systems surveys and the regional activities undertaken within the municipal water availability and quality program area were tempered by four important factors:

(1) There were occasional instances in which local officials were opposed to "outside" intervention and would not complete the water system survey forms or allow RDCs to assist them in applying for assistance funds.

(2) Some jurisdictions complied in supplying survey information and accepted needed technical assistance, but simply could not qualify for certain federal assistance monies--for instance, as in cases in which municipalities could not procure FmHA assistance unless all water taps within their jurisdictions were metered.

(3) The drawn-out application and approval processes that occurred within some of the federal funding agencies impeded the success of regional technical assistance programs. Much of the delay was attributable to most agencies' lacking adequate staff to handle the additional paper work resulting from the drought emergency assistance programs. It is significant, however, that in some instances, the State Drought Coordinator was able to work with federal agency headquarter personnel to redistribute some staff to local federal offices in substate areas where additional application burdens were the most severe.

(4) The lack of total required participation imposed a fourth constraint upon the overall success of the municipal water availability and quality program. The initial survey information obtained and the follow-up activities undertaken in some regions far outweighed the corresponding activities assumed within other regions. Part of the performance gap was attributable to the overall start-up problems that occurred during the initial implementation by the State of the regional drought management program. By September 1977, when most of the other regions were actively administering the municipal water surveys, four regions had either not contracted with the State or had not yet operationalized their programs. Once their programs were initiated, however, some of those lagging regions were able to "come up to speed" at least with regard to the technical assistance activities associated with the municipal water program area.

The intent here is not to discount the value of the municipal water availability and quality program area, but to highlight some of the problems experienced during its implementation. By and large, the program did produce significant results. Many local and municipal jurisdictions accrued long term benefits manifested in improved local water system management capabilities and tangible water system improvements. State and substate regional organizations now have an organized compilation of accurate, comprehensive water systems data for over 150 municipalities, water districts, and water treatment districts. The short and long term use possibilities for the data, as illustrated by the State's proposed indexing and management system, are significant.

3.3.6 THE FIRE SUPPRESSION PROGRAM AREA[10]

Drought conditions in Colorado automatically increased the dangers of structural fire in municipalities and wildfire in forests and rangelands. The

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[10] A summary of Colorado's fire suppression program activities is depicted in Figure 3-10.

FIGURE 3-10

FIRE SUPPRESSION ACTIVITIES

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	AUTHORITY/CATALYST	FUNDED
Fire Suppression Task Force	• Identification of State agency fire suppression resources	June 1977	Request of Office of the State Drought Coordinator	No
Colorado State Forest Service	• Assistance in regional fire suppression survey design	July 1977	Request of Office of the State Drought Coordinator	No
Regional Drought Coordination Office	• Performance of fire suppression inventory and needs assessment survey	September 1977	Encouraged by Office of the State Drought Coordinator (per Objective 3 of Memorandum of Agreement)	Yes (Remuneration for work hours spent on the project covered by contract with State)
	• Development of regionwide emergency preparedness plans (some regions)	August 1977	Encouraged by Office of State Drought Coordinator (per Objective 3 of Memorandum of Agreement)	Yes (Remuneration for work hours spent on the project covered by contact with the State)
Office of the State Drought Coordinator/ Department of Drought Emergency Services (OSDC/DODES)	• Sponsorship of emergency preparedness seminar and workshop for regional personnel	May 1978	Conceived and encouraged by OSDC and DODES	Yes In-kind and cash from Drought Council general fund account
Governor's Office	• Letter to all county sheriffs about wildfire control and assistance	June 1977	Request of a Colorado State Forest Service and OSDC	No
Colorado News Media	• Increased wildland fire prevention message allocations	June 1977	Colorado State Forest Service and Interagency Wildfire Coordination Group	No

increased vulnerability of municipal water systems to break down as a result of the drought adversely affected municipal fire-fighting capabilities. The general lack of moisture also contributed to increased potential for structural fires, as well as for forest and rangeland fires. Drought conditions starve out annuals and grasses which "fireproof" many wildland areas for part of the year. Furthermore, water sources, useful in firefighting during normal years tend to go dry during drought years.

The fire suppression program area was initiated by the State in response to the increased fire risks connected with drought. Fire suppression activities devolved to the regional level in a needs assessment and technical assistance process and culminated in a planning and coordination effort at the State level.

At the request of the State Drought Coordinator, a multiagency, intergovernmental task group met during the summer of 1977 in an attempt to identify wildfire suppression resources in the State and to otherwise develop an increased degree of coordination with regard to wildfire suppression. In order to foster a comprehensive wildlands approach, the task group consisted of representatives from a variety of State and federal agencies including the Colorado State Forest Service, the U.S. Forest Service, the Colorado Department of Military Affairs, the Colorado State Patrol, the Colorado Division of Communication, the Colorado Division of Wildlife, and the U.S. Bureau of Land Management.

The meetings of the task group produced results in two respects: First, there was a valuable information exchange as to the nature and Statewide availability of agency fire suppression resources (i.e., staff and equipment). Secondly, the Colorado State Forest Service agreed to prepare a wildfire suppression contingency plan--a document outlining the availability of wildfire suppression resources, agency-specific wildfire suppression responsibilities, and guidelines for interagency coordination during wildfire emergencies.

The development of the contingency plan was significant in two respects: First, because Colorado forest and rangelends are subject to a great diversity of federal, State, county, and private ownership, the name of the game in fire suppression has become "coordination." Secondly, the document condensed and summarized the progress in interagency coordination which had occurred prior to the drought. The Colorado Interagency Wildfire Group had been organized two years prior to the drought project with the specific purpose of fostering a higher degree of coordination in the wildfire suppression efforts of the Colorado State Forest Service and federal agencies than had occurred in prior years. During those prior years, fire suppression efforts had been hampered by agency provincialism. There had been fragmented decision-making, no consistency in training or personnel qualification criteria, and no coordinated fire prevention activity. The fragmentary arrangements were neither cost efficient nor conducive to first-rate wildfire suppression. The Colorado Interagency Wildfire Coordinating Group had been organized to rectify some of those problems and had been responsible for a number of cooperative results. The onslaught of the drought added impetus to the group's coordination efforts. During the summer of 1977, the group realized achievements that included:

- The launching of a formal analysis of interagency fire emergency radio communication possibilities.

- The full acceptance by State and federal wildfire organizations of a standard "fire-job" qualification system.

- The formalization of the Northern Front Range Wildfire Alliance, an agreement between seven State, local and federal agencies to assist one another during fire emergencies.

- The initiation of negotiations between the Colorado State Forest Service, the Bureau of Land Management, and U.S. Forest Service focusing on the repriortization of administrative procedures, i.e., dealing with cost allocations after a fire emergency instead of during the fire emergency.

Regional fire suppression efforts focused upon preparing comprehensive assessments of local fire suppression capabilities, with the emphasis on structural fires in rural areas. The regional emphasis on assessing the fire suppression capabilities of rural areas was particularly significant because in many rural areas--especially those areas which are neither forested nor urbanized--fire suppression activities had traditionally been light. The OSDC, with input from pertinent State personnel, prepared a survey for distribution by regional drought coordinators (RDLs) to every rural and municipal firefighting organization within their region. The information obtained in the surveys was valuable in terms of identifying local firefighting capabilities and problem areas. An example of a fire suppression survey has been included in (Appendix F, page 158.)

The majority of the problem areas uncovered by the fire suppression survey, like those uncovered by the municipal water survey, were not necessarily drought-induced but had existed long before the drought arrived. But, unlike municipal water surveys, the fire suppression survey uncovered problem areas for which there were no drought assistance funds. Some RDCs were able to assist local fire departments or districts in preparing assistance requests to pre-existing programs such as the Rural Community Fire Protection program which provides for equipment and training on a cost share basis. Often, however, ingenuity and luck were required to fill the gaps left by scarce funding. In one region, for instance, the RDC was able to coordinate the repair of a fire truck by utilizing the resources of a vocational school where students undertook the repair work at an extremely low cost. In other regions, RDCs were able to assist local fire districts in obtaining surplus fire equipment.

Aside from some notable exceptions, fire suppression activities became low priority items on regional drought program agendas. Part of the reason for this was that follow-up activities to the fire assessment survey potential were limited. Many RDCs were adept at the procurement of assistance monies, but because fire assistance monies were in such short supply, there was little that the RDCs could do. Furthermore, the character, degree, and intensity of fire suppression activities became subject to region specific conditions, i.e.,

physical and demographic characteristics and the priorities of political and administrative infrastructures. One regional technical advisory committee saw no reason to undertake a fire suppression program "until the various municipalities corrected their water problems so they could support a decent fire suppression system. Fire suppression is a concern that must be dealt with in the near future." Another RDC found his region's fire suppression capability to be "in good shape."

At least three regions undertook extensive fire suppression activities in organization and coordination. In one region, the RDC, upon approval of the COG governing board, organized a special fire technical advisory committee to assist in the development of a comprehensive regional fire protection needs assessment program in which the fire suppression survey was an important initial step. In another region, the development of a comprehensive emergency operations plan had been a high priority activity since the inception of its drought program. Thus, the performance of the fire survey played well into the preparation of that emergency operations plan. Contrastingly, the performance of the fire suppression survey in another, heavily forested region highlighted the need for a more comprehensive approach to emergency preparedness.[11]

It is obvious, then, that the drought fire suppression program spun off or fit into a number of good, long-term regional fire suppression efforts. Fire suppression efforts at the regional level, however, did not produce many immediate results which were timely to the impacts of drought, simply because there was little money available for expedient, mitigative procedures.

It appears that bottom line in strengthening fire suppression capability at the State and regional levels is the need for more funding. Economics enter into the problems of interagency wildfire suppression at State and federal levels as well as into the equipment and training needs uncovered by the regional surveys. The data gathered through the regional fire suppression surveys, however, certainly provides the State with an opportunity to take a stronger, more centralized advocacy and coordination role in local fire suppression funding and organization.

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[11]The implementation of drought response programs in the regions spawned an awareness of emergency preparedness and operations at regional levels which later manifested in many regions' undertaking more comprehensive approaches to emergency preparedness planning. In support of these and other emergency preparedness activities, the OSDC in conjunction with the Colorado Department of Military Affairs, Division of Disaster Emergency Services, sponsored an emergency preparedness workshop in May 1978. The workshop, attended by many regional drought coordinators and regional administrators, focused upon the preparation, response, and assistance activities pertinent to most disaster contingencies.

3.3.7 THE WEATHER MODIFICATION PROGRAM AREA[12]

The use of weather modification to augment winter snowpack is a sensitive issue in Colorado. Nevertheless, it became a keystone in State program activity at the earliest stages of the Colorado drought response. A little over a week after the first State Drought Council was formed, the Colorado Legislature appropriated $221,200 to the Department of Natural Resources for a winter weather modification program. Cloud-seeding operations began on February 15, 1977, fewer than two weeks after the appropriations bill had been signed by the Governor. In June 1977 the Legislature appropriated $300,000 for a second weather modification program to be put in place the following winter.

When viewed within the context of the State drought program, the weather modification program was unique in three respects: (1) It received far more legislatively appropriated funding than any other single drought-related program activity--a total of $521,000 for operations and $80,000 for studies and evaluation. (2) The program activities required close cooperation between State personnel and independent private contractors. (3) Many of the weather modification program activities were subject to strict guidelines outlined in the Colorado statutes.

Viewed from an administrative and management perspective, the weather modification programs undertaken each winter were nearly identical. In 1976 and 1977, the Legislature made appropriations for weather modification activities to the Colorado Department of Natural Resources (DNR) for allocation to the Colorado Water Conservation Board (CWCB). The CWCB, under the authority of H.B. 1160 (the appropriation for the first winter weather modification program) contracted with Colorado State University (CSU) to administer the program and to provide technical assistance in its operation. CSU then entered into agreements with two subcontractors to operate the program in the central mountains (the Leadville-Vail-Aspen area) and the northern Front Range. A program funded under H.B. 1160 was also implemented in southwestern Colorado, but was handled independently by the Southwest Water Conservancy District. Part of the reason for the exception was that the H.B. 1160 appropriation to the southwest area provided match-funding to monies raised independently by local conservancy districts.

The contract arrangement between the State and CSU specifically called for the CSU Department of Atmospheric Science to provide ongoing technical consultation and direction to the program implementors. The arrangement resulted in a unique day-to-day working interface between university and private sector personnel. Because cloud-seeding operations are actually performed only when a potentially moisture-producing weather system moves into range of cloud-seeding equipment, the role of CSU personnel in program implementation was to

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[12] A summary of Colorado weather modification activities is depicted in Figure 3-11.

FIGURE 3-11

WEATHER MODIFICATION

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	SUPPORT/AUTHORITY/CATALYST	FUNDED
	FIRST WEATHER MODIFICATION PROGRAM			
Governor/Drought Council	• Request for appropriation for weather modification for two successive programs	January 1977	• Gubernatorial request	Yes -- $251,000
State Legislature	• Legislated appropriation for weather modification	February 1977	• Legislative appropriation, H. B. 1160	
Department of Natural Resources/Weather Modification Advisory Committee	• Issued permits to private contractors to undertake clous-seeding operations	February 1977	• Weather Moficication Act (1972)	
Colorado Water Conservation Board/Colorado State University Department of Atmospheric Sciences	• Coordinated cloud-seeding operations	February 1977		
	SECOND WEATHER MODIFICATION PROGRAM		• Gubernatorial/Drought Council support	
State Legislature	• Legislated appropriation for weather modification program	January 1977	• Legislative appropriation, H. B. 1722	Yes -- $350,000 appropriation; 690,000 of Bureau of Reclamation matching funding
Department of Natural Resources/Weather Modification Advisory Committee	• Issued permits to private contractors to undertake cloud-seeding operations	September 1977	• Weather Modification Act (1972)	
Colorado Water Conservation Board	• Coordinated cloud-seeding operations with private contractors	November 1977		

provide daily technical guidance to equipment operators regarding the seedability of each weather system. Furthermore, under the contracts between CSU and equipment operators, it was the "responsibility of the subcontractor (operators) to contact the contractor (CSU) at least once daily, and to contact the contractor if weather changes occur which may require a change in seeding operations." CSU personnel, then, held the primary coordinating and managerial responsibilities of weather modification program implementation.

The second weather modification program funded under H.B. 1722 was administered in a fashion almost identical to the program run the winter before. H.B. 1722, however, was a much larger appropriation than H.B. 1160. The $300,000 authorized by the Legislature in H.B. 1722 required 100 percent match-funding from "sources other than this appropriation," which effectively raised the total appropriation to at least $600,000. (Colorado eventually received a $690,000 weather modification grant from the Bureau of Reclamation.) The second program was correspondingly more expansive than the first. Maps showing cloud-seeding equipment placements are displayed in Appendix G, page 151.) Due to the increased size of the second weather modification program, the State contracted with a member of the CSU Department of Atmospheric Science to work full time at the CWCB running the program rather than splitting time between weather modification and university duties, as had been the case during the preceding winter. Because the second weather modification program was administered exclusively by the CWCB, the State contracted directly with the cloud-seeding operators, rather than subcontracting through CSU. Otherwise, the second weather modification program was administered identically to the program one year before.

The guidelines for the issuance of weather modification permits are law, set forth in the Colorado Weather Modification Act of 1972. The DNR Executive Director, upon the advisement of a statutorily mandated Weather Modification Advisory Committee (the composition of which includes appropriate scientists and experts as well as agriculturists representing all Colorado river basin areas) was charged with issuing permits to those weather modification firms best qualified to perform the necessary cloud-seeding operations. Also, in accordance with the law, weather modification permits are to be issued individually to address the specific needs of specific areas. In keeping with the law, public hearings were held in locations which would be directly affected by the proposed cloud-seeding programs. On the basis of consultation with the Weather Modification Advisory Committee and the input received at the public hearings, the DNR director was then able to issue permits containing extremely specific "terms and conditions under which the contractor could operate." Those "terms and conditions" ranged from the delineation of specific operational guidelines, tailored to anticipated snowpack and weather conditions, to statutorily mandated reporting requirements.

Efforts to assess the effects of each weather modification program on snowpack and streamflow were carried out by the CSU Department of Atmospheric Science. Neither assessment effort provided precise indications of the increases in snowpack and streamflow due to the numerous limitations on the precision with which such determinations may be made. The assessment of the second (and much larger) weather modification program yielded evidence that:

- cloud-seeding materials were involved in the precipitation process on at least certain occasions;

- precipitation in most areas was somewhat greater than would be expected, although those differences were statistically significant (at the 5 percent level) in only one of seven areas studies; and

- analyses of weather modification impacts on streamflow are in progress at this writing.

It is estimated that from nine to 12 seasons of weather modification operations will be necessary before reasonably precise estimates of associated precipitation increases are feasible.[13]

3.3.8 ECONOMIC AND SOCIAL MODELING PROGRAM AREA[14]

The economic and social modeling concept was developed during the early stages of the Colorado drought project with the specific intention of providing the State with a management tool--an economic simulation model of Colorado--to be used in policy formulation under various scenarios of drought intensity. On June 1, 1977, a research team at the University of Colorado College of Business and Administration had received a $30,000 technical assistance grant from the Office of the Governor and were able to begin work on the modeling project. The narrative which follows describes the components of the model and some of the results it provided.

The economy of Colorado was modeled by a dynamic input-output simulation technique. The model (hereafter referred to as COLOSIM) was designed to identify a base performance level of the economy. This base was not to be used as a forecast but rather as a measure from which disturbances which flow from drought conditions could be examined and compared. The model was designed to allow a variety of scenarios to reflect mild or severe drought conditions over the next several years. Aside from the base run, an "optimistic scenario," a "most likely scenario," and a "pessimistic scenario" were run for the years 1976

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[13]Copies of the 1977 weather modification program evaluation report and the 1977-78 interim program evaluation report are available from the CSU Department of Atmospheric Sciences and the Colorado Water Conservation Board. The final evaluation report on the 1977-78 program should be ready in early 1979.

[14]A summary of Colorado's economic and social modeling activities are depicted in Figure 3-12.

FIGURE 3-12

SOCIAL AND ECONOMIC MODELING

IMPLEMENTIVE BODY	ACTIVITY	DATE BEGUN	AUTHORITY/CATALYST	FUNDED
CSU Department of Earth Resources	• Feasibility of using remote sensing devices to assess physical impacts of drought	March 1978	• Request of State Drought Council and OSDC	Yes -- $4,000
CU School of Business Administration	• Development of computer simulation of drought impacts upon statewide economic picute (COLOSIM)	June 1977	• Request of State Drought Council and OSDC	Yes -- $30,000

through 1980. In each scenario, the revenue losses attributable to drought to the agricultural and winter recreation sectors were estimated and plugged into the model. As implied by the nomenclature, drought severity differed in each scenario; while drought conditions abated in 1978 in the "optimistic" scenario, they continued through 1980 in the "pessimistic" scenario. The outputs attained from the simulation runs were targeted to measure the impact of the drought on four specific indicators of the Statewide economy: personal consumption, government income, growth rate, and employment.

The following results obtained from the three simulation runs indicate the effect of drought on the State's economy as described by the four indicators mentioned above. The cumulative losses in personal consumption over the period 1978-80 were: $40 million in the "optimistic" scenario, $60 million in the "most likely" scenario, and $263 million in the "pessimistic" scenario. The cumulative losses in government income over the same period were: $13 million in the "optimistic" scenario, $20 million in the "most likely" scenario, and $80 million in the "pessimistic scenario." In employment, the cumulative losses were: 1,600 job-years in the "optimistic" scenario, 4,200 job-years in the "most likely" scenario, and 35,700 job-years in the "pessimistic" scenario. All three scenarios showed relatively small economic impacts when the effects of drought were spread throughout the economy. However, it is significant for purposes of analysis to note that the effects of drought were concentrated in certain geographic areas.

To illustrate methods of mitigating the effects of the drought, a government intervention strategy was designed which provided transfers (to supplement 60 percent of the wage loss) and capital formation through a loan underwriting program (to supplement 50 percent of the apparent losses to business). Cost/benefit analysis of this policy against the "pessimistic" scenario had the following results: The estimated costs to government were $175 million over the three-year period and government income increased $25 million, yielding a net cost to government of $150 million. That expenditure produced a $225 million gain in personal income, significantly diminishing the number of extremely poor households, but made very little improvement in employment. Thus, the simulated policy accelerated the recovery from the simulated drought but did not restore the economy to performance levels of the base scenario of "no drought."

It should be underscored that the policy illustrated above is only one of many which could have been chosen; perhaps there are others which would have been more effective. Furthermore, other drought scenarios could have been designed. COLOSIM was a flexible tool which could provide comparative analyses of many situations, but government policy-makers would have to make the final decisions.

The COLOSIM model was essentially "up to speed" by mid-December 1977. By that time, however, it was obvious that the winter snowfall would augment streamflow and reservoir levels by spring. Thus, the COLOSIM model was never utilized in the determination of drought-related policy in Colorado. Had severe drought conditions continued through a second consecutive winter and into the

spring and summer of 1978, as had been possible at the inception of the modeling project, the COLOSIM should undoubtedly have been utilized in policy decisions.

4.0 EVALUATIONS AND RECOMMENDATIONS

These evaluations and recommendations flow strictly from the State management perspective. Most of the ideas which follow are based upon the perceptions of the State Drought Coordinator and the Assistant State Drought Coordinator. The design of the evaluation and recommendations section is to provide an overview of some of the most visible problems and successes encountered at the State management level and to, in turn, formulate a basis for future management structures from the lessons learned from the first State drought management experience.

Accordingly, the discussion which follows is divided into three main topic areas:

- the data needs inherent in a Colorado drought management program;
- the organizational elements of a Colorado drought management program, including the strategic elements of an illustrative Colorado drought management program; and
- secondary issues associated with a Colorado drought management program.

4.1 DROUGHT MANAGEMENT IN COLORADO -- INFORMATION AND DATA NEEDS

Data is crucial to decision-making, especially in crisis and near-crisis situations. During the recent Colorado drought management effort, it became increasingly apparent that there was a critical shortage of timely, accurate, and precise data pertinent to the physical and economic impacts of drought.

4.1.1 PHYSICAL DATA NEEDS

Data related to the physical aspects of drought--its climatological aspects and the severity of its impacts upon physical resources such as water supply--are available. The State Drought Coordinator was supplied with a bevy of information pertaining to Statewide weather, water, and soil conditions. The information, however, was not current--usually becoming available thirty days or more after its retrieval. This slow turnaround time hindered decision-making and the initiation of timely mitigation action. State and regional drought managers simply did not know where drought conditions stood from day to day.

Colorado needs a system whereby physical data (i.e., snowfall, rainfall, soil moisture, water storage, and streamflow levels) become available on a current basis--that is, on the basis of a one- or two-day turnaround time. The information would most certainly facilitate drought management efforts, but justification for the development of a sophisticated monitoring system goes

beyond its ability to support drought efforts. Good monitoring facilities would prove invaluable to ongoing water and soil management activities carried out in Colorado on a perpetual basis. It is notable that the U.S.D.A. Soil Conservation Service has already begun to consider augmenting the automated monitoring system to provide fast information on soil moisture as well as snowpack. It is unfortunate, however, that indications from Washington are that current S.C.S. physical monitoring programs such as U. S. remote snowpack measuring program will not be expended. In fact, they will be cut back during the next fiscal year.

Another mammoth but significant project which would contribute immensely to ongoing water management as well as drought management would be the development of input/output models for river basins. There are seven such basins in Colorado. A basinwide input/output model holds tremendous implications for water use planning and management. The format of such a model would consist of many input components including water availability information, water requirement information, water administrative constraints (i.e., priorities and compacts), and a schematic of physical parameters (i.e., transmission paths, etc.). Model output would provide comprehensive information to individual water users on a basinwide scale regarding the timing and amount of water each may expect to receive over a given period of time. Comprehensive information such as this can aid greatly farmers' and ranchers' abilities to manage their land.

Drought management capabilities would also be enhanced immeasurably by the availability of such a comprehensive data system. During a period of severe drought, for instance, the knowledge of current and projected drought impacts on individual water users would aid greatly in the planning and delivery of mitigative activities.

4.1.2 ECONOMIC DATA NEEDS

The gaps in economic data during the drought management program were probably more pervasive than those of physical data. Essentially, if severe drought had continued on a Statewide scale, data pertaining to its impacts upon business revenues, employment, and credit, for instance, would not have been readily accessible. Again, had fiscal decisions been necessary to relieve drought impacts, the "where" and "how much" questions would have been extremely difficult to answer.

Two specific approaches exist to allay the dangers inherent in relatively uninformed crisis decision-making:

- First, the development and maintenance of economic simulators such as COLOSIM would aid policy-making immensely by providing solid, quantitative bases upon which timely decisions could be made.

- Secondly, consultation with professional economists, preferably from within the State university system, would contribute tremendously to the validity of the fiscal decision-making process.

A particularly cogent point to remember here is that the development of economic models and the retention of professional economic consultation merit application to the normal flow of policy-making, not just drought-related policy.

4.2 DROUGHT MANAGEMENT IN COLORADO -- THE ORGANIZATIONAL ELEMENTS

The development of the organizational and strategic response to the mid-70s drought did not occur in Colorado until after it was determined that a drought emergency did, in fact, exist. Although a drought management program was devised which adequately addressed the drought-related needs of the State, hindsight now provides a fitting vantage point from which to assess the positive and negative aspects of the Colorado State drought management approach and, accordingly, will facilitate a more effective State drought management effort in the future.

4.2.1 DROUGHT CONTINGENCY PLANNING

The fact that drought is a recurring phenomenon in Colorado merits its consideration in the State's natural disaster contingency planning activities. Currently, Colorado has a Natural Disaster Emergency Operations Plan (CNDEOP) in which State administrative functions and interagency coordination procedures are delineated for most of the potential natural disaster occurrences which threaten Colorado.

Although drought contingency is not treated at this time in the CNDEOP, it is essential that it be included. The delineation of State agency roles and functions prior to the onslaught of a drought emergency situation will facilitate a more expeditious delivery of services to drought-impacted individuals and localities.

The CNDEOP was developed by the Colorado Department of Military Affairs, Division of Disaster Emergency Services (DODES). It is recommended, therefore, that DODES be responsible for the coordination of the development of a drought contingency plan for inclusion in the CNDEOP. The planning process itself must necessarily include the cooperation and input of the many State agencies which will play roles in future drought response efforts.

The preparation of a drought contingency plan is basic to the management of future drought situations. The planning process will most likely be time-consuming and difficult, yet the benefits to be accrued from a pre-planning

process will hopefully outweigh the costs in terms of effective and decisive future drought response. The recommendations which follow in this report provide basic guidelines within which future planning activities may proceed.

4.2.2 STATE AGENCY RESOURCE ALLOCATION

A formidable State-level drought management problem was prompting the reallocation of State agency personnel toward the assumption of drought-related activities. The normal flow of individual State-agency operations are largely designated by the Colorado statutes. In order to perform within the context of their charters, State agencies utilize a limited resource of implementive personnel. When an extraordinary phenomenon such as Statewide drought occurs, State agency personnel are asked to take on additional responsibilities whose breadth, in terms of time, often conflict with the needs of normative program operations. Problems thus arise with respect to priorities, i.e., which activities should be undertaken? The Governor, State Drought Coordinator, and State Drought Council all served at one time or another as the catalyst for State agency drought activities. There were, however, no official guidelines or mandates delineating the reprioritization of State agency activities toward drought response.

A corollary aspect of the State agency reprioritization issue is the problem associated with functional overlaps. The drought required numerous forms of State agency response which, in many cases, were not traceable to the response capacities of one specific agency. Instead, coordinated agency activities were required. The working solution to the problem within the framework of the Colorado drought response effort was the development of State task forces in which State agency resources were to be coordinated to work within the framework of specific problem areas. In most cases, the task force formula was unsuccessful in eliciting tangible, coordinated agency response.

It seems that the development of a State drought contingency plan during a non-crisis period would allay many of the resource allocation problems encountered during the recent Colorado drought management program. The following is a list of advantages inherent to the development of a drought contingency plan:

- The predetermination of agency roles and functions will eliminate indecision and confusion when a drought emergency strikes.
- The clear delineation of agency roles and functions will eliminate conflict and confusion concerning individual agency responsibilities in the drought response process.
- The fact that agencies are directly involved in the construction of the drought contingency plan will facilitate their reprioritization of activities when a drought emergency occurs.

- The plan will delineate "action threshholds" in which specific levels of drought severity will automatically prompt specific response activities.

An important consideration in the development of a drought contingency plan is that the process begin as soon as possible. There are numerous State and regional agency personnel who remain sensitized to the problems of drought management due to their relatively recent involvement in the State drought project. As time passes, "fresh knowledge" slips away.

4.2.3 THE OFFICE OF THE STATE DROUGHT COORDINATOR

The concept of designating a State Drought Coordinator was a viable management approach to addressing drought-induced problems on a Statewide basis. The Office of the State Drought Coordinator (OSDC) was an action center which provided necessary elements of consistency and coherence to the Statewide effort. It established the necessary linkage between the State, local, and federal elements of the drought response program.

The establishment of the OSDC in the Governor's Office lent visibility and credibility to the drought problem. The direct ties between the Governor and the drought project played directly into the successes of the drought management program. It is doubtful that drought response activities would have attained a similarly high degree of effectiveness had the OSDC not been directly sanctioned and supported by the Governor.

It is recommended, therefore, that an Office of the State Coordinator be established by Executive Order of the Governor to play a central coordination role in future State drought management activities. It is not necessary, however, that the Office of the State Drought Coordinator be housed in the Governor's Office. Although physical proximity to the Governor and his senior staff was important during the early policymaking and program implementation stages of the recent drought response effort, it was not as crucial to the later day-to-day operations. Strong and direct gubernatorial support will certainly give strength to any future drought coordination effort, but the drought office itself may be more appropriately situated in a State agency where the normal flow of operations correspond closely to drought related activities. In addition to denoting the location of the drought management office, the drought contingency plan will provide a clear indication of the specific point within the drought response process at which the State drought coordinator ought to be appointed and his office actualized. The point of designation will best be correlated closely with a specific threshhold of drought severity in the drought contingency plan.

4.2.4 THE REGIONAL DROUGHT MANAGEMENT STRUCTURE

The implementation of a regional drought management structure provided a necessary mechanism by which local input fed directly into region-specific

drought mitigation activities. Additionally, the rapid development and implementation of regional drought management programs were facilitated by the fact that the jurisdictions of the substate organizations (COGs, the Regional Planning Commission, and the Regional Commission) utilized as the primary linkages in the State-to-local program channels, represented clean, geographic apportionments of the State.

However, the drought management experience brought to bear numerous plusses and minuses of the regional drought response mechanism as it was organized to address the impacts of the 1977-78 drought. Thus, the following recommendations are offered in the interests of refining the design and organization of future substate drought response structures:

First, it became apparent during the recent State drought coordination project that many of the substate organizations selected by the State to coordinate drought response programs were more strongly oriented toward responding to local government problems than those of individual farmers and ranchers. To avoid similar situations in the future, it is recommended that the capacities and orientations of regional organizations be assessed closely for their adaptability to the comprehensive scale of drought-related problems besetting each region. State decision-makers ought not to ignore the possibilities of utilizing substate organizations other than COGs or utilizing dichotomous arrangements such as an agriculturally oriented organization in tandem with a municipally oriented organization. A dual drought coordination arrangement worked well during the recent drought in one region where the COG executive director and regional Resource Conservation and Development representative split drought coordination duties. If a suitable drought management organization is not discernible within a particular region, then State decision-makers ought to consider the possibility of contracting directly with a local individual to assume drought coordination responsibilities.

Second, regional resistance to joining the State drought mitigation effort and lax response activities by some of the regions underscore the fact that State drought programs should not necessarily be designed to address conditions on a comprehensive, Statewide basis. Instead, drought severity should be assessed on an area-by-area basis, and organized regional response ought to be advocated by the State only in those areas where drought is perceived to be a problem by the local citizenry. Additionally, in those areas where drought is perceived to be a problem, local and regional officials ought to be directly involved in the goal-setting associated with the development of drought response programs.

Third, in many instances, regional technical advisory committees were forceful and useful entities in regional drought mitigation. Their success highlighted the fact that regional drought programs ought to be managed by local rather than State personnel. A further important ingredient of technical advisory committees was representation on the committees of local elected officials whose presence added clout and credibility to regional drought response efforts.

Finally, contracts between State and regional structures should be flexible serving the interests of the State and the contracting region. To aid in the State monitoring process, the financial reporting requirements dropped from the contracts in the recent drought effort should be included in future, similar contracts. Furthermore, where it is possible contracts offering "front end" money ought to be avoided in favor of reimbursable or product contracts.

4.2.5 COLORADO DROUGHT MANAGEMENT STRATEGY: PUTTING THE PIECES TOGETHER

The organizational elements of Colorado drought management structure described in the preceding section constitute the basic ingredients of an organized, consistent State response to a drought emergency. The purpose of this section is to describe a Colorado drought response strategy--that is, to illustrate how the organizational elements of the drought response structure could fall together into a cohesive drought response system.

As an example, a conceptualized flow of strategic events is roughly illustrated in Figure 4-1. The vertical axis in the figure represents different levels of drought severity while the horizontal axis represents time. Simply stated, the figure illustrates a situation in which drought conditions strike, grow more severe over time, and then begin to taper off. Specific mitigative and relief activities are triggered as drought conditions pass through various threshholds of severity.

Each of the following sections briefly describes the response activities associated with each level of drought severity as illustrated in Figure 4-1. Each section is intended to be illustrative rather than comprehensive. The task of filling in the gaps is left to the drought contingency planners.

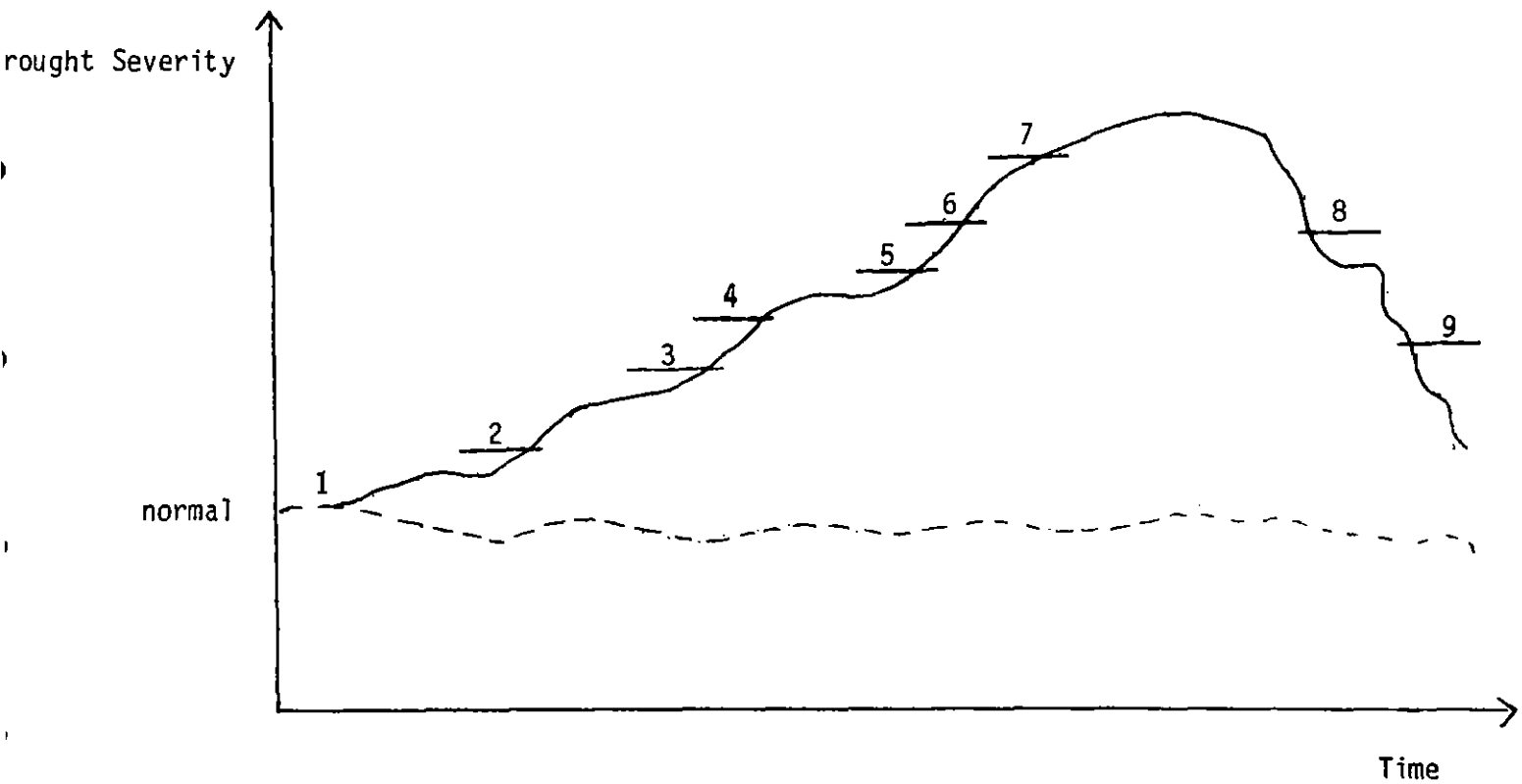
1. *Pre-Drought Preparation and Planning*

Possibly, the activities assumed during the pre-drought phase i.e., the period of normal conditions, are as important as any of those activities undertaken during the period of drought emergency, and in that sense pre-drought activities may be considered drought mitigation activities. They include the following:

- drought contingency planning
- the development of improved data retrieval and monitoring systems relevant to physical conditions such as soil moisture, streamflow, snowpack, and reservoir storage levels
- the development of models capable of assessing physical and economic impacts for purposes of drought response planning
- the continued development and promotion of agricultural and municipal water conservation programs and techniques.

FIGURE 4-1

A COLORADO
DROUGHT MANAGEMENT
STRATEGY



1. Pre-drought Preparation and Planning
2. Initiate Physical Impact Analysis
3. Initiate Economic Impact Analysis
4. Establish State Drought Office
5. Begin Targeting Programs toward Substate Entities
6. Governor's Intervention
7. Economic Strategies Implementation
8. Governor's Withdrawal
9. Close State Drought Office

These mitigative activities are powerful in two respects. They strengthen Colorado's ability to cope with its ongoing problem of increasingly scarce water, while concurrently fortifying its capacity to withstand the impacts of severe drought.

2. The Initiation of Physical Impact Analyses

As conditions begin to veer from normal, that is, as monitoring equipment begins to register sustained incidences of drier-than-normal conditions (those levels being determined by appropriate experts during the contingency planning process), the first component of the State drought response mechanism should be triggered. Initial activities ought to consist of analyses related to the implications of conditions such as lower than normal soil moisture, low forest fuel moisture levels, streamflow, groundwater, and reservoir storage levels for purposes of developing alternative management strategies should dry conditions persist. Analyses should be performed only in those portions of the State where dry conditions exist, rather than on a Statewide basis.

If dry conditions abate, the analytic procedures may be shut down. On the other hand, if they persist, the next phase of mitigation activities ought to begin at the appropriate priority threshhold.

3. The Initiation of Economic Impact Analyses

Economic impact analyses are initiated to formulate alternative State management approaches to potential fiscal impacts of the drought. The utilization of economic simulation models and other forms of economic analysis would aid in the determination of potential region-specific fiscal needs (if any) and, accordingly, aid in the development of mitigation and relief strategies.

4. The Establishment of the State Drought Office

If drought conditions worsen, it will become necessary to establish a State Drought Office. Most logically, the coordination of drought activities prior to this point would have rested with the Division of Disaster Emergency Services whose statutory responsibility is to coordinate activities for a State emergency. The establishment of a State Drought Office would occur at the drought severity threshhold which merited the beginnings of an intensified, centralized State mitigation and relief effort that would exceed the manpower capabilities of the DODES staff.

Ideally, the State drought office would be established by Executive Order of the Governor based upon information garnered from prior physical and economic impact analyses supplied to him by DODES. A State Drought Coordinator would be appointed to operationalize the Drought Office. The start-up and operational activities of the drought office would entail the following activities:

- trigger appropriate State agency responses as delineated in the drought contingency plan
- establish federal linkages
- begin to establish regional drought coordination offices in impacted areas

5. Evolvement to Local Jurisdictions

At this point State and regional drought coordination offices are operational. Accordingly, mitigation activities evolve to the local level where preparatory actions such as water use restrictions are put in place.

6. Governor's Intervention

This stage of action would be prompted by an extremely severe level of drought (as in a situation experienced by two consecutive extremely dry winters instead of just one). The Governor would enact the drought response gubernatorial actions which had been determined and legislatively enacted during the level "1" pre-planning phase:

- to mandate appropriate drought mitigation and relief activities in State and local jurisdictions.

7. Economic Strategies Implementation

At this level, State and federal relief strategies would be implemented based upon information extracted from prior development of the economic and physical impact analyses.

8. Governor's Withdrawal--Restoration of Rights

Drought impacts taper off, and the Governor recedes restoring rights to local jurisdictions. Notice that the Governor withdraws at a level of drought severity below that which he intervened. This is simply an act of caution to reduce the possibility of withdrawing before conditions are in fact at a level which merits his withdrawal and the corresponding restoration of rights.

9. Close State Drought Office

Again the shutdown activities are not undertaken until drought conditions reach a sufficiently low level to indicate that a resurgence is unlikely.

4.3 ISSUES ASSOCIATED WITH COLORADO DROUGHT MANAGEMENT

The issues central to the organization and implementation of a State drought management program have constituted the gist of the evaluations and recommendations outlined so far in this report. The evaluations and recommendations which follow are not so central to drought management, but have impact upon the potential feasibility and success of potential drought response activities. Conservation issues are treated because they feed into an ongoing process of attempting to "drought-proof" Colorado through an acknowledgment of the State's scarce water resources. Western regional and federal drought efforts merit consideration here because they also have proven to play directly into State-level drought management efforts.

4.3.1 WATER CONSERVATION: DROUGHT-PROOFING COLORADO

A fact of life in Colorado is that water is a scarce resource. In this semi-arid area, precipitation levels are chronically low and, accordingly, water supplies often stand at levels which minimally support the present needs of the State's water users. The occurrence of drought merely serves to make a bad situation worse. Although severe drought is not a perpetual phenomenon in Colorado, it has proven to be a recurring one. The recurrence of drought in tandem with the State's scarce water resources, highlight the need for Statewide activities to make the most efficient use of those water resources.

4.3.1.1 Agricultural Conservation

The drought experience in Colorado highlighted the need for a continued promotion of agricultural water-saving techniques. The promotion of agricultural water conservation certainly preceded the onslaught of drought, yet many of the approaches assumed within the framework of the drought program met with little success. Basinwide meetings among water users, for instance, were an attempt by the Water Conservation Task Force to foster coordination among water users with the objective being to distribute scarce water supplies more efficiently. The meetings were largely unsuccessful in bringing about the desired results in all but one basin where the use coordination process had been going on for years. The point is that it takes time to turn concepts into realities. The hard promotion of agricultural conservation must continue over time for it to take hold in practice.

There are numerous water- and moisture-conserving practices available to agriculture. The following are deemed to be among the most appropriate for addressing Colorado agricultural needs:

- Further research and active promotion of on-farm minimum tillage and chemical fallow (spraying the weeds as opposed to turning the soil

which increases its susceptibility to wind erosion and moisture loss).

- Reestablishment of windbreak/shelterbelt tree programs aimed primarily at reducing topsoil loss due to wind exposure.
- Further investigation and promotion of irrigation ditch lining to reduce water seepage and water loss to parasitic vegetation.
- Further research and active promotion of techniques to reduce reservoir evaporation.
- Further research into rangeland rehabilitation with an emphasis on drought recovery.
- Additional research for improving on-farm irrigation to increase water use efficiency.

4.3.1.2 Municipal Water Conservation

If one is willing to accept the notion that water conservation is an important aspect of allaying the impacts of scarce water resources, and more specifically, the impacts of drought, then one ought to recognize the necessity of extending water conservation practices beyond the agricultural sector to municipalities. It was no secret prior to the onslaught of drought that a large number of municipalities in the State relied upon water storage and transmission systems which were in need of repair. The drought, however, served to further sensitize local, State, and federal administrators to the deficiencies of many municipal water systems under high stress conditions.

To foster better adaptation municipal systems to Colorado's perpetual condition of scarce water and the severe impacts of recurrent drought, the following activities are recommended:

- The identification of those municipalities most dependent on potentially unstable water sources and the development of a program to drill reserve emergency wells to be utilized only under conditions of greatly reduced water availability.
- The interconnection of Front Range water utilities to permit transfer of water between communities.
- The development of a Statewide water conservation program administered by water utilities and aimed toward:
  - metering all water users
  - imposing restrictions on lawn-watering

- encouraging the winterization of municipal water systems prone to freezing (particularly mountain systems) to eliminate reliance on system bleeding

- restructuring water use rates so that rate increments rise as consumption levels rise (similar to lifeline rate structures)

- The development of a management efficiency index at the State level to be utilized in the allocation of monies for municipal water system repairs; the system would facilitate the allocation of funds to municipalities on the basis of assessed need rather than on the first-come, first-served basis currently employed.

4.3.1.3 Domestic Water Conservation

The Colorado population features a mix of natives and transplants, both wanting the water amenities of a wet environment from Colorado's semi-arid environment. Reorientations in water use habits must occur, especially in light of Colorado's increasing population. New residents must be acclimated to the reality of the State's scarce water resources.

Certainly, methods such as metering and rate restructuring will provide economic incentives to conserve water, but these rather blunt incentives to conserve ought to be complemented by an ongoing flow of information related to the why's and how's of water conservation. The drought-sensitized water consumers to Colorado's condition of scarce water, so the time is right to augment that sensitivity through:

- continued public awareness activities utilizing the media to paint the Colorado water picture, and

- the continued encouragement of school programs similar to the "Captain Hydro" program which educate students to the Colorado water situation and associated water conservation needs and techniques.

4.3.1.4 Watershed Management

Much of Colorado's water originates as snow in the mountains. When moisture levels are low, the management and regulation of flow, i.e., the rate of snowmelt, can be critical. There are forest management techniques available today which would allow a significant degree of control over the rate at which runoff occurs at the watershed. Runoff may be sped up or retarded depending upon the water use objectives sought at the point at which the water is used.

Basically, Colorado can make large strides toward a more rational utilization of its scarce water resources through the implementation of those forest management techniques geared toward controlled watershed objectives.

4.3.2 THE COOPERATIVE DROUGHT RESPONSE EFFORT OF THE WESTERN STATES

The value of a Westwide response to the recent drought, as exemplified by the activities of the Western Regional Drought Action Tank Force (WRDATF), manifests in two particular ways. First, WRDATF was a primary force in inducing the Carter administration and Congress to develop a good federal drought assistance package. It is doubtful that federal drought mitigation policy would have been as strong and timely as it was, without pressure from a strong Western coalition. Secondly, WRDATF, through one of its primary staff arms, the Western States Water Council (WSWC), was a valuable information source to which State drought managers could turn for information relevant to drought conditions and impacts, federal drought response activities, and approaches to solving common drought management problems. In short, the existence of the WSWC information clearinghouse enhanced the capacities of State-level administrators to manage drought response activities.

The successes of WRDATF in its advocacy, coordination, and clearinghouse role merit a recommendation that a similar regionally-oriented entity be developed in response to future Westwide drought occurrences.

4.3.3 THE MANAGEMENT OF FEDERAL DROUGHT ASSISTANCE PROGRAMS

The Federal agencies which were stipulated in the special drought legislation enacted by Congress to distribute drought emergency funds were mandated to assure those drought-related responsibilities in addition to their normal operations. Usually, in presidentially declared disaster emergencies Federal agencies are assured that they will be reimbursed for administrative support activities out of the president's disaster fund. Federal agencies, then, normally do not experience significant administrative problems in carrying out their relief duties. But, because the drought was addressed by special legislation, there was no assurance to the key Federal agencies that administrative expenses would be reimbursed. The result was a lack of adequate administrative support. Accordingly, the processing of applications for drought relief monies was slow, much to the dismay of the applicants.

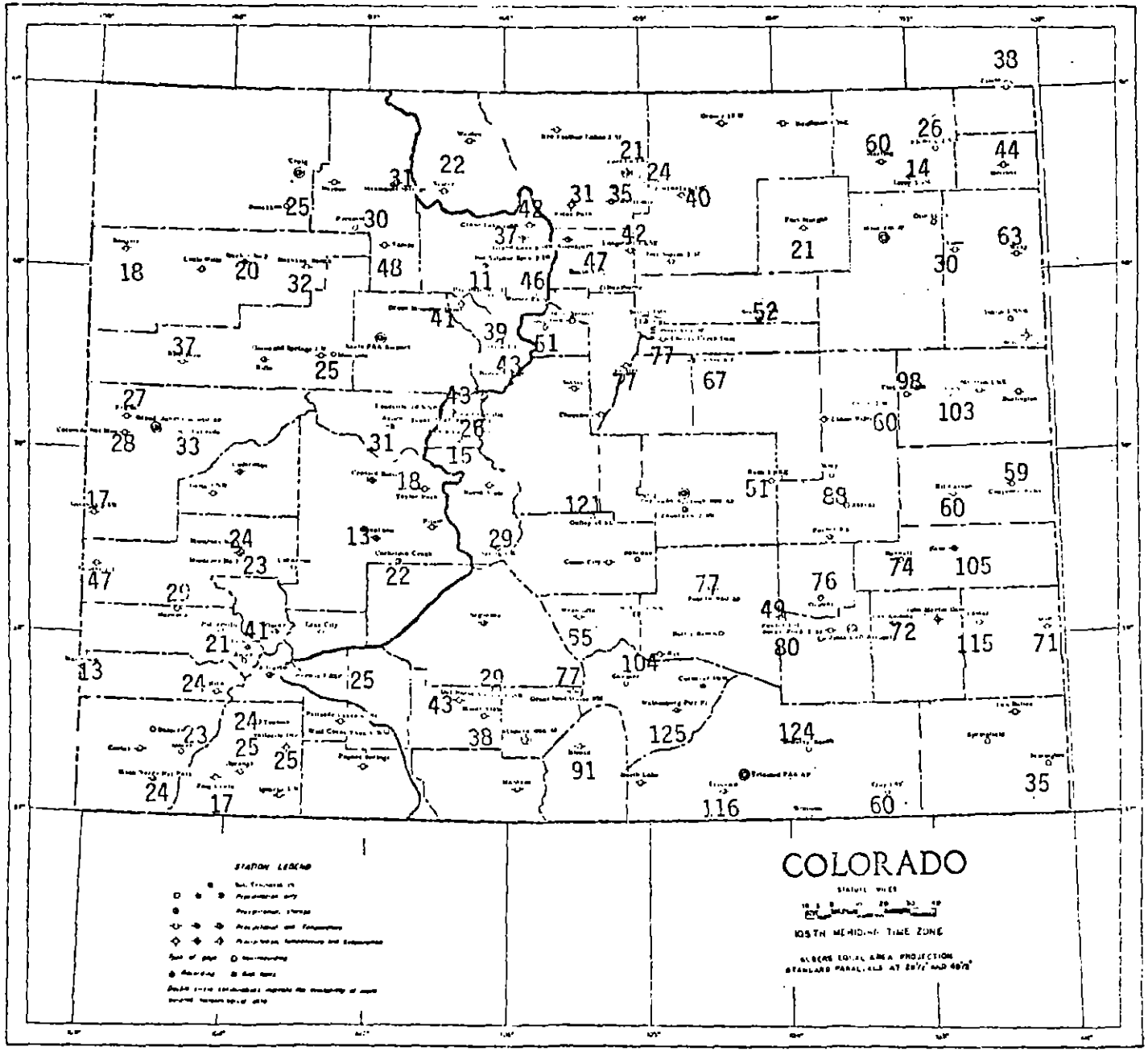
It is recommended therefore that the federal agencies devise a system to provide understaffed federal assistance offices with supplemental personnel during periods of emergency. One option that merits exploration is one in which teams of highly trained individuals are utilized to provide temporary support to assistance offices where permanent staffs are not able to keep up with the demand for services which accompany emergency and crisis situations.

APPENDIX A

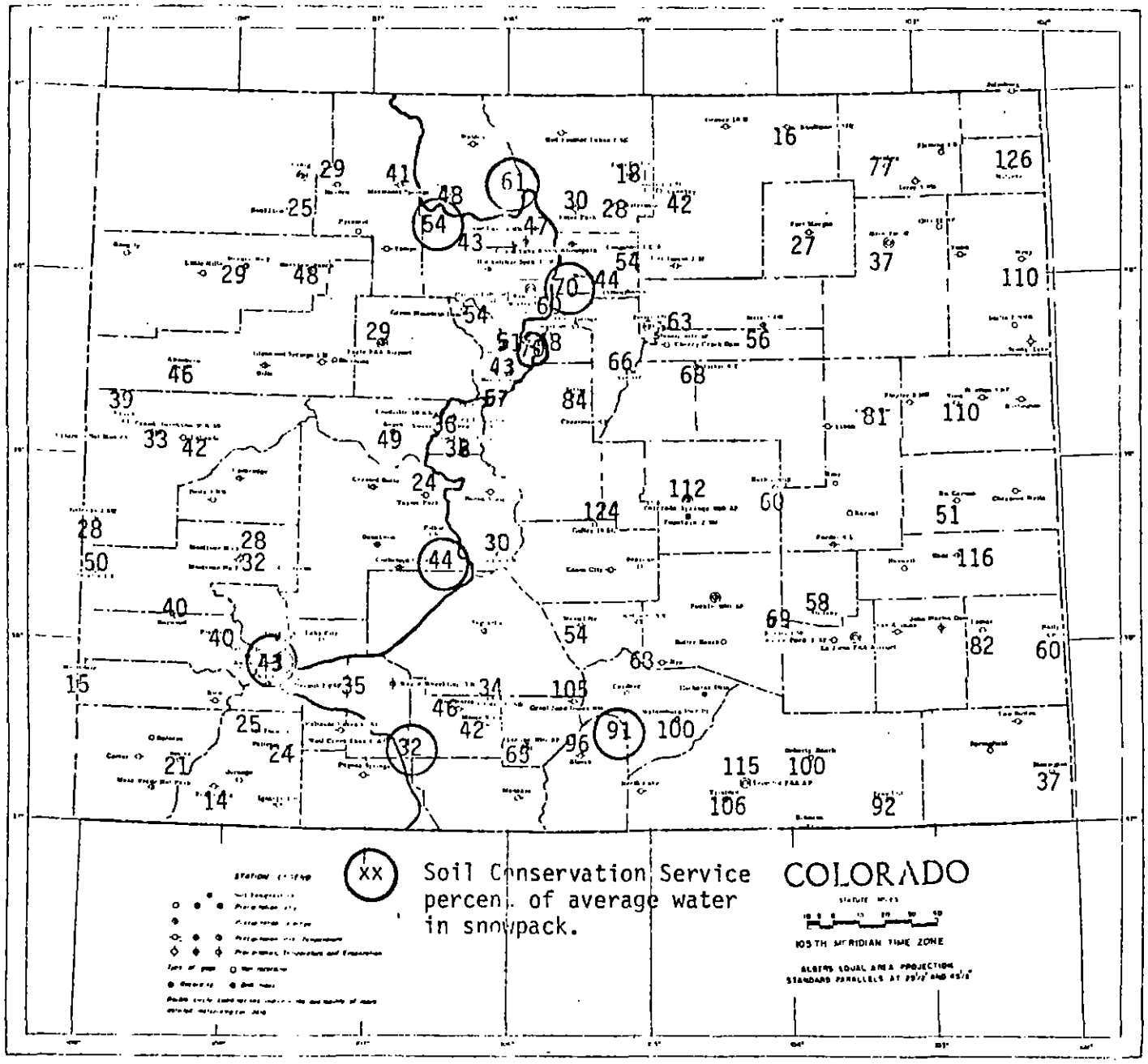
Statewide Precipitation Levels

Source: Monthly Colorado Climate Reports prepared by the Colorado Climatology Office, Department of Atmospheric Science, Colorado State University

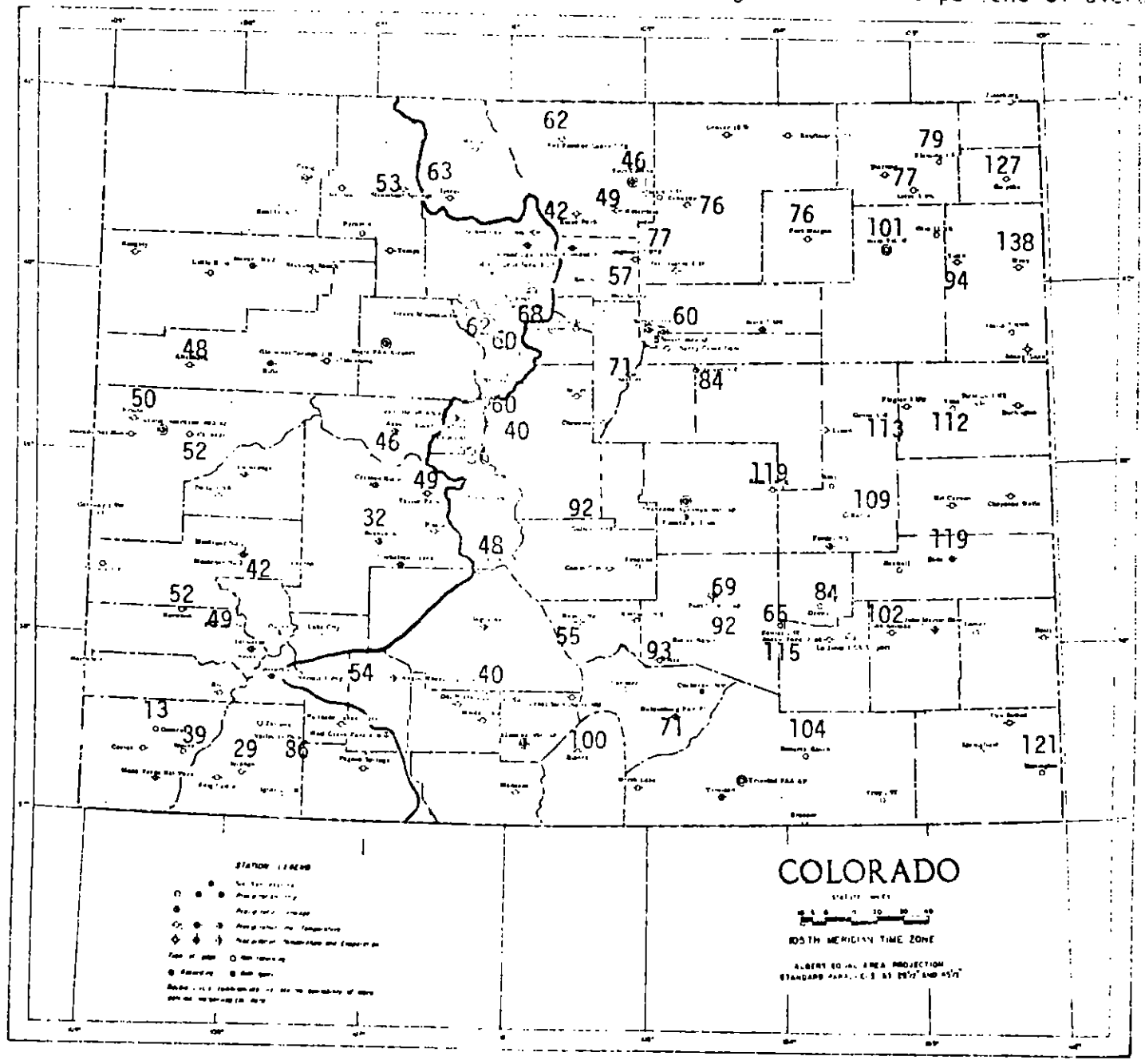
Precipitation for period October 1976 through
January 1977 as percent of average (1951-1970).



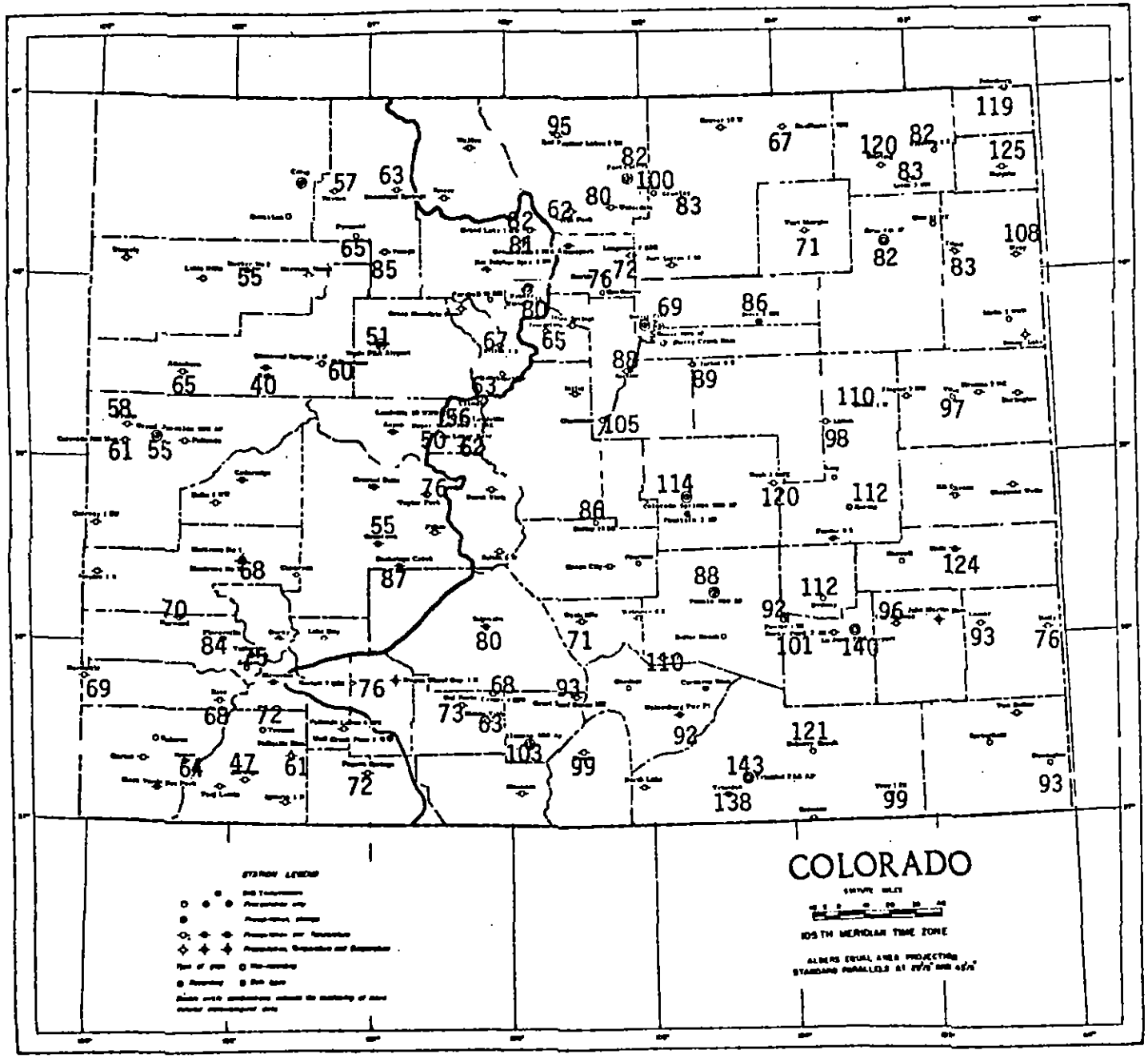
Precipitation for period October 1976 through
March 1977 as percent of average (1951-1970).



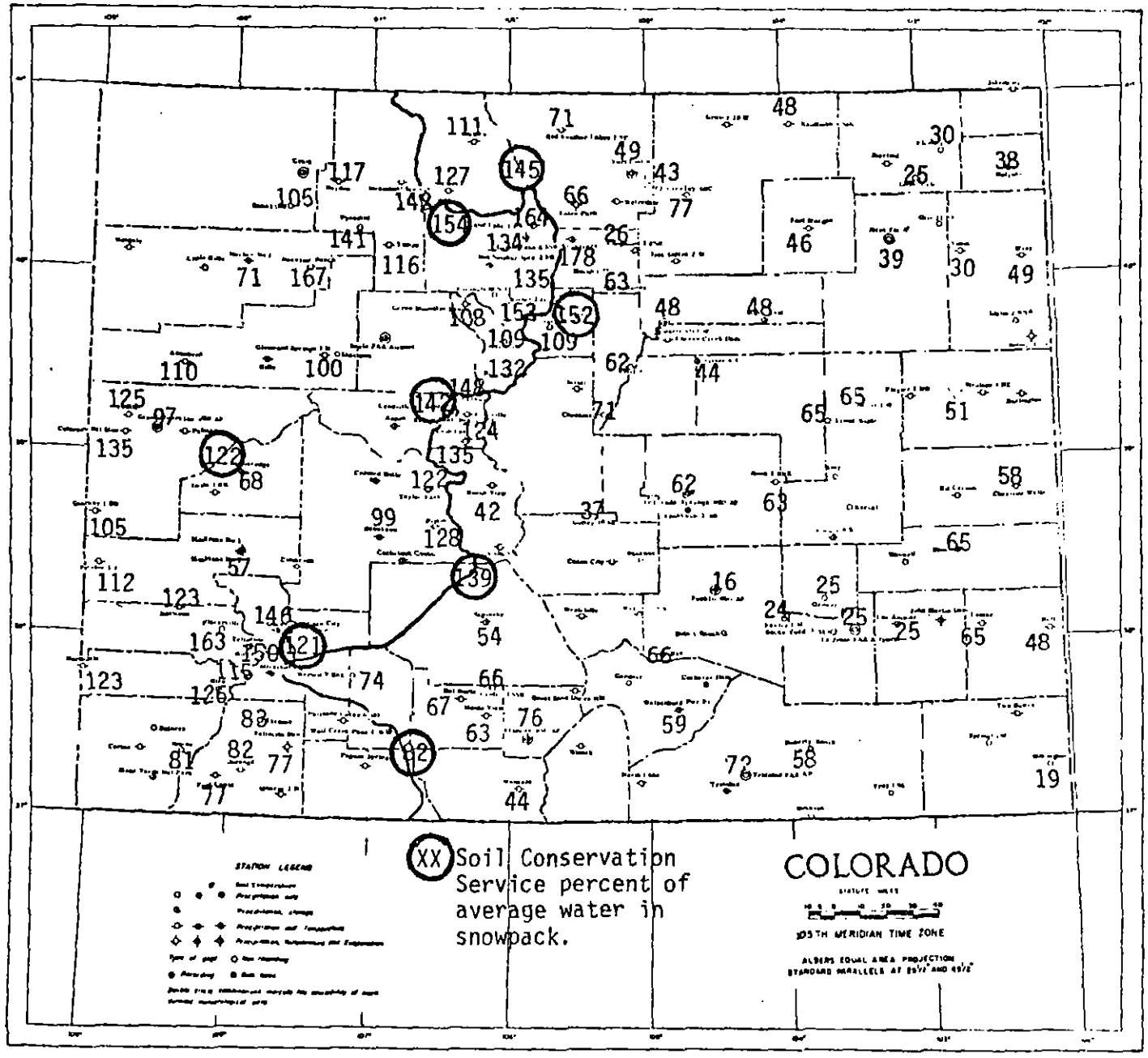
Precipitation for period October 1976 through June 1977 as percent of average (1951-1970).



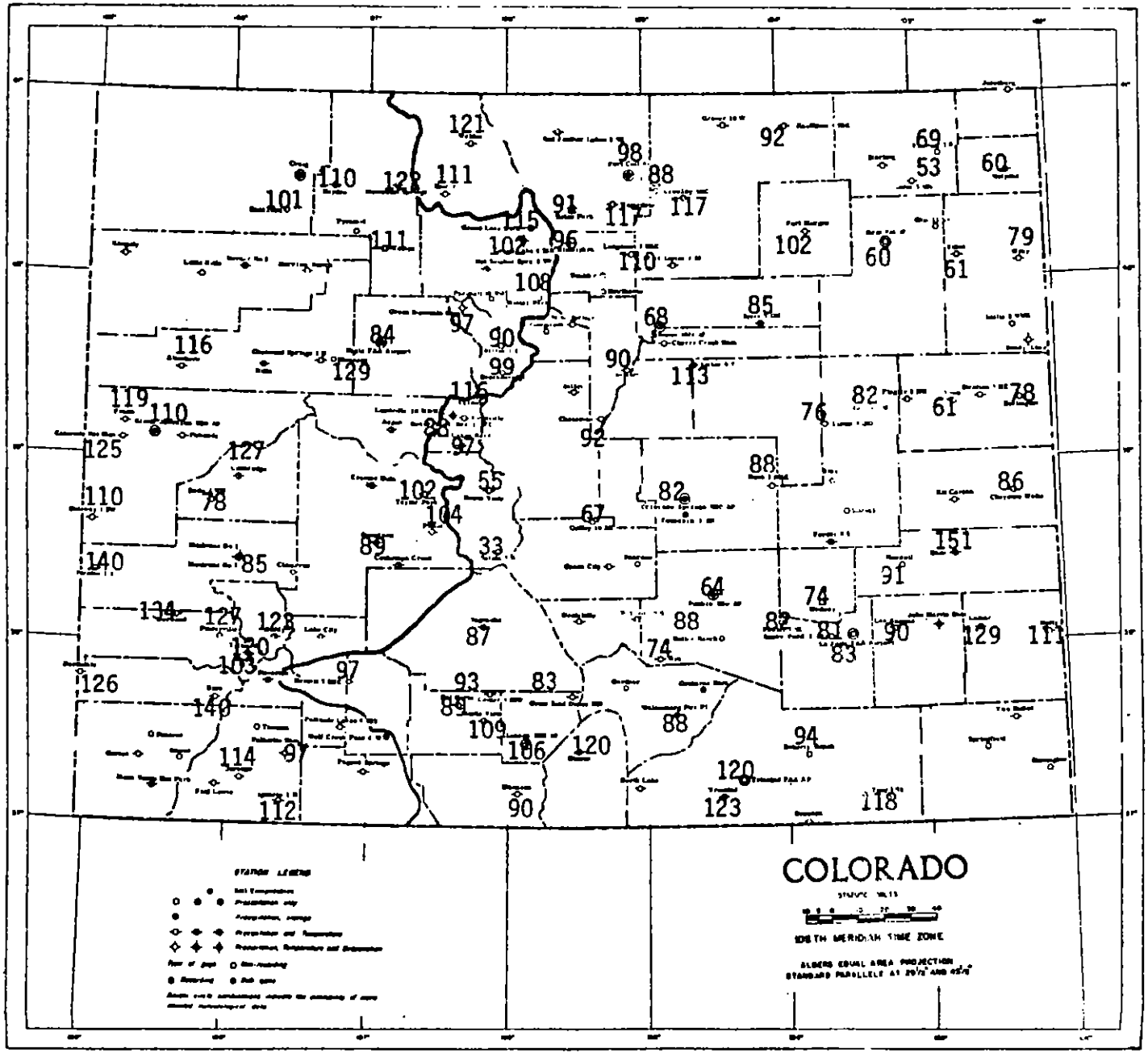
Precipitation for period October 1976 through September 1977
as percent of average (1951-1970).



Precipitation for period October 1977 through January 1978 as percent of average (1951-70).



Precipitation for period October 1977 through July 1978 as a percent of average (1951-1970).



APPENDIX B

Correspondence Pertinent to Federal Drought Response

Prompted by the

Western Regional Drought Action Task Force

western union Telegram

DVA003(0018)(1-000048C082009)PD 03/23/77 0008
TWX WHITEHOUSE WSH
009 DLY GOVT WHITE HOUSE DC MAR 23
PMS GOVERNOR RICHARD D. LAMM, DLR DONT DWR
STATE CAPITOL
DENVER, CO 80203

DEAR GOVERNOR:

BASED ON REPORTS PROVIDED TO ME BY JACK WATSON AND THE DROUGHT COORDINATING COMMITTEE, SUGGESTIONS MADE BY YOU AND OTHER GOVERNORS, AND IDEAS FROM MEMBERS OF CONGRESS, I AM TOMORROW SENDING A MESSAGE TO THE CONGRESS OUTLINING A SET OF LEGISLATIVE PROPOSALS TO ASSIST FURTHER IN MITIGATING THE IMPACT OF THE DROUGHT. THE DETAILS OF THESE PROPOSALS WILL BE ANNOUNCED TO THE PRESS AT A WHITE HOUSE NEWS CONFERENCE AT

SF-1201 (R5-69)

11:30 A.M. TOMORROW BY AGRICULTURE SECRETARY BERGLAND AND INTERIOR SECRETARY ANDRUS, AND ANY RELEASE OF THIS INFORMATION IS EMBARGOED UNTIL THAT TIME.

SPECIFICALLY, MY LEGISLATIVE PROPOSALS ARE:

- NEW TEMPORARY AUTHORITY TO ALLOW THE ECONOMIC DEVELOPMENT ADMINISTRATION AND THE FARMERS HOME ADMINISTRATION TO PROVIDE GRANTS AND LOW INTEREST (5/) LOANS TO COMMUNITIES FOR EMERGENCY WATER SYSTEM IMPROVEMENTS WHICH CAN BE COMPLETED QUICKLY AND WHICH ARE ESSENTIAL TO PROTECT HEALTH AND SAFETY. ($150 MILLION IN GRANTS; $300 MILLION IN LOANS)

SF-1201 (R5-69)

- ESTABLISHMENT OF A NEW SMALL BUSINESS ADMINISTRATION

DROUGHT ASSISTANCE LOAN PROGRAM TO PROVIDE LOW INTEREST (5/) LOANS TO SMALL BUSINESSES IN MAJOR DROUGHT DESIGNATED AREAS. ($50 MILLION IN LOANS)

. ESTABLISHMENT OF A NEW FARMERS HOME ADMINISTRATION DROUGHT ASSISTANCE LOAN PROGRAM IN WHICH PROSPECTIVE LOSSES CAN BE INCLUDED. ($100 MILLION IN 5/ LOANS TO FARMERS AND RANCHERS IN MAJOR DROUGHT AREAS.)

. NEW LEGISLATION TO AUTHORIZE THE SECRETARY OF THE INTERIOR TO PROVIDE LOW INTEREST (5/) LOANS TO PURCHASERS OF WATER. ($100 MILLIONS IN LOANS)

SF-1201 (R5-69) SUPPLEMENTAL FUNDS FOR THE SOUTHWESTERN POWER

ADMINISTRATION TO ENSURE ADEQUATE ENERGY SUPPLIES. ($14 MILLION)

. SUPPLEMENTAL FUNDS FOR THE BUREAU OF RECLAMATION TO PROVIDE ASSISTANCE TO IRRIGATORS ON FEDERAL RECLAMATION PROJECTS. ($30 MILLION)

. TRANSFER TO THE DEPARTMENT OF AGRICULTURE FROM THE FEDERAL DISASTER ASSISTANCE ADMINISTRATION AUTHORITY TO ADMINISTER AND FUND THE EMERGENCY LIVESTOCK FEED PROGRAM.

. SUPPLEMENTAL FUNDS TO THE AGRICULTURAL STABILIZATION AND CONSERVATION SERVICE TO PROVIDE FOR COST-SHARING OF EMERGENCY SOIL CONSERVATION PRACTICES. ($100 MILLION)

SF-1201 (R5-69)

IN ADDITION, I HAVE DIRECTED THAT THE FOLLOWING ADMINISTRATIVE STEPS BE TAKEN:

- THE SECRETARIES OF AGRICULTURE AND INTERIOR WILL MAKE AVAILABLE ADDITIONAL FEDERAL LANDS FOR GRAZING AND ISSUE EMERGENCY PERMITS AS APPROPRIATE.

- THE SECRETARY OF AGRICULTURE WILL TAKE ADMINISTRATIVE STEPS TO ENSURE THAT TRAINED FIRE-FIGHTERS AND ESSENTIAL EQUIPMENT ARE AVAILABLE TO MEET THE INCREASED DANGER OF FOREST AND WILDFIRES.

WHEN ADDED TO THE SUPPLEMENTAL APPROPRIATION OF $200 MILLION FOR DISASTER ASSISTANCE, THESE NEW LEGISLATIVE PROPOSALS WILL PROVIDE ALMOST $1 BILLION IN ADDITIONAL DROUGHT ASSISTANCE AND BRING TO ALMOST $2 BILLION THE ASSISTANCE PROVIDED BY THE FEDERAL GOVERNMENT.

I HAVE ASKED JACK WATSON TO SEND A REPRESENTATIVE TO ATTEND THE MEETING OF STATE DROUGHT COORDINATORS ON THURSDAY, MARCH 24, IN SALT LAKE CITY. AT THAT TIME, YOUR REPRESENTATIVES WILL BE FULLY BRIEFED ON THE FEDERAL INITIATIVES I SHALL RECOMMEND.

I BELIEVE THAT THE LEGISLATIVE PROPOSALS AND ADMINISTRATIVE ACTIONS OUTLINED ABOVE OFFER THE BEST POSSIBILITIES OF PROVIDING IMMEDIATE RELIEF TO THOSE AMERICANS MOST AFFECTED BY THIS CRISIS.

I APPRECIATE YOUR HELP AND ADVICE IN DEVELOPING THESE PROPOSALS AND ASK FOR YOUR CONTINUED SUPPORT.

JIMMY CARTER

.....

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

The Honorable George Nigh
Office of the Lt. Governor
211 State Capitol Building
Oklahoma City, OK 73105

Dear George:

On behalf of the governors constituting the Western Regional Drought Action Task Force (WRDATF), I want to congratulate you on your outstanding performance as Chairman of WRDATF Alternates. The Drought Task Force--ably supported (as you noted in your letter of January 9) by the Western States Water Council and the WESTPO Institute for Policy Research--achieved many victories, helped many people, and turned in a good job for the West in a time of need.

I have noted and concur with the January 9 recommendation of your executive committee to inactivate the WRDATF. That is something of a first: an organization gets life, does its job, and puts itself out of business. That's the kind of responsiveness, flexibility, and effectiveness in multistate efforts that many of us have been searching for. And the unprecedented built-in "sunset" process is something of which we can all be proud.

Along with others, including Governor Jay S. Hammond, whose actions created the Drought Action Task Force of which I was privileged to serve as chairman, I am grateful for your leadership over the past year. Your continuing advice and counsel on drought matters will be very much appreciated by all of us.

Sincerely,

Richard D. Lamm

APPENDIX C

State Drought Council Memberships and Affiliations

MEMBERSHIP OF THE FIRST DROUGHT COUNCIL

Rep. Robert Burford	State House of Representatives
Henry Caulfield	CSU Department of Political Science
Sen. Eldon Cooper	State Senate
Barbara Farhar	Senior Scientist, HERS
Michael Glantz	National Center for Atmospheric Research
Evan Goulding	Commissioner of Agriculture
Lewis Grant	CSU, Director, Department of Atmospheric Sciences
Floyd Mann	CU, Graduate School of Public Affairs
Betty Miller	Executive Director, Department of Local Affairs
Jim Monaghan	Assistant to the Governor for Natural Resources
Dr. Anthony Robbins	Executive Director, Department of Health
Stephan Schneider	National Center for Atmospheric Research
Harris Sherman	Executive Director, Department of Natural Resources
Jim Thomas	Independent Bankers of Colorado
Lowell Watts	CSU, Extension Service
Gen. William Weller	Executive Director, Department of Military Affairs

MEMBERSHIP OF SECOND DROUGHT COUNCIL

Governor Lamm, Chairman of the full
Drought Council and Executive Committee

Full Members Appointed by the Governor

Arlo Beaman, representing the Third Congressional District and financial institutions.
Don DeDecker, representing the Second Congressional District and municipalities.
Don Beckett, representing the Fourth Congressional District and counties.
Ted Wickham, representing the Fifth Congressional District and the agricultural community.
John Carlson, representing the First Congressional District.
Dr. Henry Caulfield, representing Colorado State University faculty members.
Dr. Tom McKee, atmospheric scientist.

Associate Members Appointed by the Governor

Evan Goulding, Executive Director, Department of Agriculture (member of Drought Council Executive Committee).
Paula Herzmark, Executive Director, Department of Local Affairs.
Harris Sherman, Executive Director, Department of Natural Resources (member of Drought Council Executive Committee).
Lowell Watts, Director, Colorado State University Extension Service.
William Weller, Adjutant General, Department of Military Affairs.

Members Appointed by the Speaker of the House

Forrest Burns, State Representative, Lamar.
Robert Burford, State Representative, Grand Junction (member of Drought Council Executive Committee).
Paul Swalm, State Representative, Denver (member of Drought Council Executive Committee).

Members Appointed by the President of the Senate

Christian Wunsch, State Senator, La Junta.
Fred Anderson, State Senator, Loveland (member of Drought Council Executive Committee).
Tilman Bishop, State Senator, Grand Junction (member of Drought Council Executive Committee).

APPENDIX D

Colorado State Drought Legislation

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

contact: Charlene Belitz
892-2471

January 20, 1977

FOR IMMEDIATE RELEASE

In a letter to the legislative leadership Thursday, Governor Richard D. Lamm asked that serious consideration be given to a three-year experimental weather modification program as a means of dealing with the state's drought problem.

Accompanying the letter was a proposal drafted by the Rio Grande and Southwestern Water Conservation Districts calling for the operation of a "Wintertime Demonstration Weather Modification Program" to be conducted "in a portion of the Upper Rio Grande and San Juan River Basins."

The Governor wrote the legislators that "Colorado is currently faced with the most serious water crisis in years." He outlined the problems the ski industry and agribusiness have faced because of the current lack of precipitation, and suggested that "Colorado must realistically begin to anticipate and plan for major drought conditions."

While conceding that weather modification is a "controversial" solution to the drought problem, the Governor pointed out that "our drought conditions do not leave us with any easy answers" and said that weather modification should be considered as a possible option.

The Governor asked the Legislature to convene a special committee or a meeting of an existing committee to take testimony on the advisability, the risks and the benefits of weather modification. The Governor offered the assistance of the Administration in the hope that a joint decision could be reached on the benefits of this approach.

In concluding his letter the Governor wrote "I have asked a number of department heads to explore various approaches for dealing with the drought problem, and I will be sending the legislature a comprehensive message on this matter within the next several weeks."

An Act

HOUSE BILL NO. 1160. BY REPRESENTATIVES Burford, Baca-Barragan, Becker, Boley, Brinton, Brown, Castro, DeMoulin, DeNier, Dick, Dittemore, Hamlin, Hayes, Herzberger, Hilsmeier, Kirscht, Knox, Massari, McElderry, Orten, Smith, Strahle, Valdez, Waldow, Witherspoon, Younglund, and Zakhem; also SENATORS H. Fowler, Cooper, Anderson, Comer, L. Fowler, Kadlecek, Kogovsek, McCormick, Meiklejohn, Phelps, D. Sandoval, Soash, and Woodard.

MAKING A SUPPLEMENTAL APPROPRIATION TO THE DEPARTMENT OF NATURAL RESOURCES FOR WEATHER MODIFICATION.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Appropriation. In addition to any other appropriation heretofore made for the current fiscal year, there is hereby appropriated, to the department of natural resources for allocation to the Colorado water conservation board, for weather modification, the sum of two hundred fifty-one thousand two hundred dollars ($251,200), or so much thereof as may be necessary, to be allocated as follows:

(1) To the San Juan area, the sum of seventy-seven thousand dollars ($77,000), of which forty thousand dollars ($40,000) is from the general fund to match fifteen thousand dollars ($15,000) from local conservancy districts and twenty-two thousand dollars ($22,000) is from Bureau of Reclamation funds.

(2) To the Climax area, the sum of eighty-seven thousand dollars ($87,000), of which sixty-two thousand dollars ($62,000) is from the general fund to match twenty-five thousand dollars ($25,000) from the city of Aspen.

(3) To the North Front Range area, the sum of fifty-five thousand dollars ($55,000) from the general fund.

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

(4) To the Grand Mesa area, the sum of two thousand two hundred dollars ($2,200) from the general fund.

(5) For monitoring and evaluation of the weather modification program, the sum of thirty thousand dollars ($30,000) from the general fund.

SECTION 2. Availability of funds - reversion - report to general assembly. (1) Funds appropriated under the provisions of this act shall be made available upon the passage of this act and unexpended balances shall not revert to the general fund until July 1, 1977.

(2) The Colorado water conservation board shall make a progress report to the general assembly concerning the weather modification program by May 15, 1977, and shall, as soon as possible thereafter, make a final report to the general assembly on the completion of the program and recommendations regarding future weather modifications.

SECTION 3. Safety clause. The general assembly hereby finds, determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Ronald H. Strahle
SPEAKER OF THE HOUSE
OF REPRESENTATIVES

Fred E. Anderson
PRESIDENT OF
THE SENATE

Lorraine F. Lombardi
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES

Marjorie L. Rutenbeck
SECRETARY OF
THE SENATE

APPROVED _____

Richard D. Lamm
GOVERNOR OF THE STATE OF COLORADO

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

March 31, 1977

To The Honorable
Fifty-First General Assembly
State of Colorado
First Regular Session
State Capitol
Denver, Colorado 80203

Ladies and Gentlemen:

As you know from far reaching accounts, the State of Colorado is in the throes of a severe water shortage situation. The State's winter recreation industries and Colorado agriculture have already suffered a great deal as a result of this current drought. During the peak of the ski season in Colorado, most ski areas reported that their businesses were down by 30%, and statewide losses may run as high as $50 million. At the present time, sixteen Colorado counties have been declared emergency areas by President Carter. Losses suffered by farmers and ranchers in Colorado as a result of the drought are likely to total in the hundreds of millions of dollars.

The most important thing for the public to understand is that we are facing a serious drought which may very well last several years. Government, either at the federal, state or local level, cannot prevent the drought - a drought which will cause injury and hardship to thousands of Coloradans. And although state government does not have the means to reverse nature and to forestall the inevitable problems that will occur, we do have a multitude of resources which, if coordinated properly and applied in a timely fashion, can assist in mitigating the impacts of deficient water supplies. The purpose of this special message is to outline the present drought situation as we see it, to describe those programs currently under way to deal with the drought and to suggest for your consideration additional programs which are of the utmost necessity in allowing state government to better assist the citizens of Colorado as they face this current drought.

The Drought: The Current Situation and Prognosis for Colorado

The drought is a westwide problem which has a special impact upon the State of Colorado. In this State, it manifests itself in two critical ways. First, as has been well reported, there is a serious deficiency in Colorado's snow pack. It is the snow pack that supplies water to our reservoirs and serves as a primary source for irrigated agriculture and municipal water supplies throughout the State. As of March 1, 1977, the mountain snow pack on a statewide basis averaged only 35% - 40% normal for that time of year. This is particularly critical in light of the fact that as of March 1, 80% - 85% of Colorado's snow season was complete.

The second component of this drought appears to be a lack of moisture in the high plains which has a severe effect upon dryland farming and the recharge of underground aquifers. Last year, farmers in eastern Colorado experienced water shortage problems, and there is every indication that this summer's precipitation will also be at a very low level.

In attempting to understand the possible magnitude and duration of drought conditions, it is important to understand that weather prediction is far from an exact science and that competent meteorologists must state their predictions in terms of probabilities. The low snow pack in the State is a matter of record and will result in a draw-down of existing supplies. While it is difficult to speculate on the recurrence of snow pack deficiencies next winter, it is clear that even under the best circumstances we will be playing catch-up. In addition, there is a cyclical history for high plains droughts. These appear to have occurred in twenty-two year intervals, each experiencing a duration of from three to ten years. There are strong reasons to presume that this summer will be a moisture deficient season and that we are actually into a drought cycle. It is also important to understand that in other "drought years," Colorado's snow pack was not as deficient as is the present case.

We must then translate these observations and probabilities into management decisions. Upon the strong advice of the nation's foremost experts, I have concluded that it would be reckless if we did not presume that the drought will continue for the remainder of this year and well into the next.

Actions Already Taken by the State of Colorado

As we saw this problem developing earlier this year, a number of significant actions were initiated. In early January, I requested that the President and the Secretary of Agriculture provide emergency declarations for sixteen counties in southeastern Colorado. As you know, this action has been taken, and we have the counties included in the Federal Relief Program. Under the Emergency Livestock Feed Program, 907 applications had been made as of March 15. Of these, 781 had been approved representing just over 60 million pounds of feed. As of March 15, payments totaling $118,873 had been received by the applicants. Two applications had been received under the Livestock Transportation Program; one was pending. Other loan programs under the Agricultural Stabilization and Conservation Service, as well as the Small Business Administration, are in place and available to qualified applicants.

At my suggestion, the western governors have come together in a strong showing of unity to address the drought question. Twenty states have combined to form a Regional Drought Action Task Force. The Task Force will serve as the focal point for the West's continuing dialogue with the White House and Congress. The President has just outlined the basic parameters of an extensive drought relief program which was in good part a result from the unity of western states in this area. In addition, the Congress in considering numerous pieces of legislation which are designed to address water shortages. I am hopeful that a strong coalition of western states can render a most effective federal program to assist us in dealing with drought situations.

I have formed a state Drought Council as a policy and program advisory body. This Council can provide timely input to both the Executive and Legislative Branches of Colorado state government. Its membership includes members of the legislature, a number of my Cabinet officials, scientists from the National Center for Atmospheric Research, Colorado State University and the University of Colorado, as well as representatives from municipal and county government and other organizations. The Council has met on a number of occasions recently and has been responsible for consolidating information on the seriousness of the drought and has provided us with a good deal of advice as to what the State's response system should be.

Two months ago, I had the Department of Military Affairs prepare a quick inventory and assessment of the state agencies' capacity to address various aspects of the drought. This information has been generated as a report and will provide the State of Colorado with the basic ingredients in developing a drought response plan.

I have also appointed a Drought Coordinator in the person of George Lamb, who is on loan to the Governor's office from the Department of Agriculture. His task is to translate the drought into program elements which can be addressed by better coordinating existing state resources. He serves as the day-to-day manager of our drought effort and provides a single point of contact within state government.

March was designated as "Conserve Water Month" during which we began an intensive public awareness campaign. The response to this campaign was exciting in which we had a range of individuals from President Ford to John Denver urging people to conserve water. We also initiated the printing of 500,000 pamphlets which offer consumers numerous tips on how to save water. A number of these pamphlets are of course available to individual legislators for their distribution.

Full partnership with local government is essential in addressing drought problems. In order to establish an expeditious way of utilizing local input we made a decision to use the thirteen planning and management districts as regional points of contacts for the operational aspects of the drought program. Thus, we asked the Councils of Government throughout the State to take a lead in working with water conservancy districts in assessing drought problems in their individual areas and in suggesting sensible mitigation programs to the State. The COGs have responded to the request, and in general, are assuming either the overall responsibility for drought action or are establishing regional drought councils under their auspices.

Suggested State Drought Programs

* The success of the State's response to the drought problem will hinge in many ways upon the participation of locally elected officials through the regional mechanism that we have established. Too many times state government asks local officials to assume burdens, but we then do not follow through with sufficient support to enable them to do the job to which they were challenged. I am requesting that you appropriate a sum of $241,500 for the support of drought coordinators within each planning and management district during the period of May 1, 1977, to

June 30, 1978. It would be my intention that this person would be chosen by each respective COG and would be responsible for providing a high level of coordination at the local level and a very visible point of contact for state officials.

* As a state government addresses the drought problem, we must provide a drought impact analysis system as well as a mechanism for generating and reviewing appropriate mitigation strategies. The drought impact analysis will take the form of economic and social modeling and field investigations. The Department of Natural Resources will be responsible for generating and coordinating the raw data with respect to water supply and demand. The Department of Local Affairs, working in cooperation with the University of Colorado and Colorado State University, will coordinate the interpretation of this information into meaningful economic and social predictions resulting from water short-falls.

The projections will take the form of cash flow reductions by industry sectors as a result of reduced agricultural output, reductions in sales tax revenues by geographic area, family income projections by geographic area, reductions in local and state revenues, other economic sectors impacted and changes in employment. Changes in land use patterns and cropping practices as a result of the drought will also be considered.

The drought impact analysis will serve as a key factor in planning for drought mitigation strategies. It is important to note that a good deal of modeling capacity already exists within state departments and in state institutions, and this effort at identifying impacts resulting from drought conditions will require a modification or retooling of these systems. However, the experience gained in this economic modeling process will serve Colorado in years to come and in the overall economic area. I am requesting that the legislature appropriate $101,000 for this drought effort.

* I would propose to continue and intensify the public awareness campaign that we began this month. It is my very strong belief that if we can provide Coloradans with solid information as to the severity and extent of the drought and projections as to how this will impact upon their lives, calling upon them for voluntary action, this will have a much greater effect than governmental programs designed to force water conservation. In this regard, we would propose to continue to use state resources to develop public service programs, brochures and delivery systems. And then call upon the private sector to assist in getting the message out to all Coloradans. I am therefore requesting $70,000 for this effort. I am confident that this investment will be realized four or five times over in response by the private sector.

* The variety and complexity of federal disaster and assistance programs for the agricultural sector is overwhelming. The administrators of those federal programs are working hard to do a good job, but to the people in rural Colorado who need assistance, the problems of communications and red tape are bewildering. I therefore am proposing that the legislature appropriate funds for the establishment of a disaster ombudsman who would be placed in the Department of Agriculture to deal with the problem. We anticipate the full time services of at least two persons for a six month period. While we are exploring the possibilities of the Cooperative Extension Service or a federal agency providing part of the manpower

and support for this activity, it is important that this drought budget reflect the need for at least one FTE as a disaster ombudsman. In addition to the individual for whom I am asking, I feel it is necessary for the ombudsman to have a WATS line for toll free calls so that our rural residents can be in immediate contact with somebody to expedite their requests for assistance. I am requesting the sum of $23,746 for this activity.

* In addition to the specific programs enumerated above, the State must continue to coordinate existing programs which can be brought to bear on drought problems as well as providing for the generation of specific strategies or action plans in addressing water shortage situations. One of the most important aspects of this coordination is the establishment of small working groups acting under the auspices of the Drought Council. The Council has initially identified the need for eight to ten such working groups which would be small interagency, interdisciplinary bodies comprised of state, local and federal officials as well as representation from the private sector. The key point here is that resources exist which can be assembled for the analysis of and response to the problem. The task forces will be considering such areas as fire supression, agricultural drought problems as well as agricultural credit, municipal water availability and quality and consumer water conservation.

The administration and coordination of the State's drought effort will take the time of a full time Drought Coordinator, an assistant and a secretary together with operational and travel support. I am requesting a sum of $97,245 to support this effort during the period of May 1, 1977, through June of 1978.

In summary, what I am offering you today is the projection that Colorado will likely face severe water shortage problems over the next several years. It would be inexcusable for us as public officials to assume any other scenario. We have provided a program which brings to bear existing federal and state programs. We also seek a real partnership with local government in addressing these problems. And importantly, we have designed a response which will avoid alarmism and inappropriate reaction by adding a heavy emphasis upon timely and thorough information and the structured call for voluntary actions on behalf of the people of Colorado.

I sincerely believe that we owe it to the people of Colorado to respond quickly and thoroughly in addressing this most severe problem.

Thank you.

Respectfully,

Richard D. Lamm
Governor

COLORADO DROUGHT ASSESSMENT AND MITIGATION

PROGRAM BUDGET REQUEST

FISCAL 1977 AND 1978

CATEGORY	FISCAL 1977	FISCAL 1978	TOTAL
I. State Government			
A. Staffing			
1. Drought Coordinator	7,614	31,984	39,598
2. Assistant	2,967	18,694	21,661
3. Secretary	1,571	9,652	11,223
4. Agricultural Ombudsman	3,500	7,000	10,500
Sub Total	15,652	67,330	82,982
B. Operating			
1. Drought Council Support	4,000	8,722	12,722
2. Council of Governments Support		1,800	1,800
3. Agricultural Ombudsman	3,380	6,720	10,100
Sub Total	7,380	17,242	24,622
C. Travel			
1. State, Regional and Federal Coordination	2,000	8,241	10,241
2. Agricultural Ombudsman	1,050	2,096	3,146
Sub Total	3,050	10,337	13,387
II. Regional Governments			
A. Drought Coordinators			
1. 10 Councils at $18.0/yr.	30,000	180,000	210,000
2. 3 Councils at $ 9.0/yr.	4,500	27,000	31,500
Sub Total	34,500	207,000	241,500
III. Other			
A. Public Awareness Campaign	10,000	60,000	70,000
B. Drought Impact Analyses		101,000	101,000
Sub Total	10,000	161,000	171,000
Grand Total	70,582	462,909	533,491

003394

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

May 3, 1977

The Honorable Ron H. Strahle
Speaker of the House
State Capitol
Denver, Colorado 80203

Dear Ron:

On March 31, 1977, I forwarded to the Fifty-first General Assembly my assessment of the drought and recommended for consideration a program designed to mitigate the impact of the drought. On April 13 and again on April 18, you and the others in legislative leadership positions were invited to my office for detailed briefings on the philosophy, objectives, and specifics of our proposed program. It is now May 3, and no legislative action has been taken. I am deeply concerned that insufficient consideration is being given to the possible impact of the drought, and the need to assemble a mechanism which will insure effective delivery of assistance to the people of Colorado.

Recent rains and other legislative issues have masked the drought issue, but please be assured that the drought remains of critical importance. The May 1 measurements indicate no significant improvement in the snowpack. The runoff, unless augmented by summer precipitation, will not maintain reservoir levels and will not be adequate for those sectors of our society which are dependent upon streamflow as their water sources.

In the meantime, Federal programs under the President's drought relief legislation are being put in place. In at least one instance, the Federal dollar apportionment to Colorado will be determined by the applications received during the period from May 16 through May 27. Clearly, the applicants in Colorado will be less than well served if we do not fund a well conceived and efficiently administered drought relief program.

A thoughtful study of our proposal will show that what we are suggesting is a mechanism whereby the focus of effort is retained at the local level. In addition, we have incorporated the thinking of locally elected officials and the best qualified technical people in the area. Our premise is that effective drought relief is made possible through people who are well informed and willing to work together. The State level actions in our proposal are designed to produce this productive environment.

Further delay by State government will be at the expense of those we serve. The proposal to the Assembly presents our thoughts of how to address the drought issue. Obviously we are willing to consider all responsible proposals for the enhancement of the program. Of immediate importance is your making time available for a detailed briefing by George Lamb, and then prompt action by the Late Bills Committee. Your willingness to consider the drought proposal will be greatly appreciated. I feel confident that through open debate we can find a mutually acceptable program.

Sincerely,

Richard D. Lamm
Governor

cc: Senator Ray Kogovsek
Representative Ruben A. Valdez

An Act

HOUSE BILL NO. 1722. BY REPRESENTATIVES Burford, Brown, DeNier, Dick, Gorsuch, Gustafson, Hinman, Lloyd, Strahle, Taylor, Valdez, Webb, Younglund, and Zakhem; also SENATORS Anderson, H. Fowler, L. Fowler, MacManus, Plock, and Strickland.

MAKING AN APPROPRIATION TO THE DEPARTMENT OF NATURAL RESOURCES FOR WEATHER MODIFICATION.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Appropriation. (1) In addition to any other appropriation, there is hereby appropriated out of any moneys in the state treasury not otherwise appropriated, to the department of natural resources for allocation to the Colorado water conservation board, for the fiscal year beginning July 1, 1977, the sum of three hundred thousand dollars ($300,000), or so much thereof as may be necessary, for weather modification. No expenditure of moneys appropriated by this section shall be made unless an additional amount equal to at least one-half of each such expenditure is provided from sources other than this appropriation. The moneys appropriated by this section shall be used in a program for winter snowpack augmentation and shall not be used for summer cumulus cloud seeding.

(2) In addition to any other appropriation, there is hereby appropriated out of any moneys in the state treasury not otherwise appropriated, to the department of natural resources for allocation to the Colorado water conservation board, for the fiscal year beginning July 1, 1977, the sum of fifty thousand dollars ($50,000), or so much thereof as may be necessary, to be used to evaluate the results of the program authorized by subsection (1) of this section. A preliminary report on such evaluation shall be made to the general assembly not later than March 1, 1978, and a final report on such evaluation shall be

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

made to the general assembly not later than September 1, 1978.

SECTION 2. Safety clause. The general assembly hereby finds, determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

Ronald H. Strahle
SPEAKER OF THE HOUSE
OF REPRESENTATIVES

Fred E. Anderson
PRESIDENT OF
THE SENATE

Lorraine F. Lombardi
CHIEF CLERK OF THE HOUSE
OF REPRESENTATIVES

Marjorie L. Rutenbeck
SECRETARY OF
THE SENATE

APPROVED _____

Richard D. Lamm
GOVERNOR OF THE STATE OF COLORADO

HOUSE BILL NO. 1723. BY REPRESENTATIVES Burford, Babitz, Brown, Burns, DeHerrera, DeNier, Durham, Gustafson, Hamlin, Hayes, Hinman, Lucero, Schaefer, Sears, Strahle, Taylor, Valdez, Waldow, Yost, and Zakhem; also SENATORS Bishop, Noble, Anderson, and L. Fowler.

MAKING AN APPROPRIATION TO THE OFFICE OF THE GOVERNOR.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Appropriation. (1) In addition to any other appropriation, there is hereby appropriated out of any moneys in the state treasury not otherwise appropriated, to the office of the governor, for the fiscal year beginning July 1, 1977, the sum of forty-six thousand one hundred thirty-two dollars ($46,132), or so much thereof as may be necessary, for the office of the state drought coordinator.

(2) In addition to any other appropriation, there is hereby appropriated out of any moneys in the state treasury not otherwise appropriated, to the office of the governor, for the fiscal year beginning July 1, 1977, the sum of one hundred three thousand eight hundred sixty-eight dollars ($103,868), or so much thereof as may be necessary, for expenditure as directed by the executive committee of the drought council.

(3) (a) The drought council shall consist of fourteen members as follows: One member to be appointed by the governor from each congressional district, of which one shall be from the agricultural community, one shall be from an association representing municipalities, one shall be from an association representing counties, one shall be affiliated with financial institutions, and one without regard to affiliation; one member who is an atmospheric scientist to be appointed by the governor;

Capital letters indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.

a faculty member of Colorado state university to be appointed by the governor; three members of the house of representatives, including not more than two from each major political party, to be appointed by the speaker thereof; three members of the senate, including not more than two from each major political party, to be appointed by the president thereof; and the governor, who shall act as chairman. There shall be five associate members of the drought council, who shall be appointed by the governor from appropriate state agencies.

(b) The executive committee of the drought council shall consist of the governor; four of the legislative members of the drought council, of which two shall be state representatives designated by the speaker of the house of representatives and two shall be state senators designated by the president of the senate; and two of the associate members of the drought council to be designated by the governor.

(c) This subsection (3) shall be repealed effective January 31, 1978.

SECTION 2. Safety clause. The general assembly hereby

APPENDIX E

Weekly and Monthly Reports

An example of a

- monthly status report to the OSDC prepared by a regional drought coordinator (pg. 128-133)

An example of a "Colorado Drought Coordination" report

- a weekly report to State Drought Council members, State administrators, regional administrators, and regional drought coordinators prepared by the OSDC (pg. 141-150)

An example of a "Friday Update"

- a weekly report to the regional drought coordinators prepared by the OSDC (pg. 134-140)

To: George Lamb

Date: November 15, 1977

From: Peter J. Juba
R.D.C./Region 7

Subject: List of Enclosures

1. Objective Review for the month of October, 1977.
2. Status Report for the month of October, 1977.
3. Financial Institute Survey Reports.
4. Newspaper articles from the Pueblo Chieftain.
5. Summary of Bids - St. Charles Mesa Water Association.

A MEMBER OF THE SOUTHERN COLORADO ECONOMIC DEVELOPMENT DISTRICT

pueblo area council of governments

1 CITY HALL PLACE, PUEBLO, COLORADO, 81003, TELEPHONE (303)-545-0561

A. OBJECTIVE REVIEW for Month of October, 1977 . B. DATE Submitted November 9, 1977

C. REPORTING REGION Region 7, Pueblo, Huerfano and Las Animas Counties

C/1 Peter J. Juba, Regional Drought Coordinator
(Name and Title of Person Submitting Report)

D. PROGRAM ACTIVITIES FOR REPORTING PERIOD

Obj. #	Activity	Completion Status*				Time Allocation	Comment
		On Time	Behind Time	Incom-plete	Aban-doned	Percent of Time Allocated	
1.	Complete Water Survey	x				60%	
2.	Alert Tech. Advisory Committee	x				3%	
3.	Complete Recommendations for Problem Areas	x				5%	
4.	Contact Fed. Agencies			x		2%	No ans. from Pueblo Area agencies yet
5.	Contact applicants for Progress Reports		x			5%	No comment
6.	Begin contacting survey problem areas and making actual recom-mendations	x				25%	

*Attach explanation if Behind, Incomplete, or Abandoned.

E. MILESTONES

E/1 List events/accomplishments of significance occurring during this Reporting Period.

Attended bid opening of drought funding for St. Charles Mesa (See attached report).
Surveyed Pueblo area with Coleen Murphy.
Completed Region 7 Financial Institute Survey of farm credit problem (See attached reports).

E/2 List problems/slippages/impediments occurring during this Reporting Period.

Mistrust of Fed. Agencies by area farmers and ranchers still a problem.
Sell out of farms and ranches have begun in Huerfano and Las Animas Counties.

F. PROGRAM ACTIVITIES FOR MONTH OF November, 1977

Obj. #	Activity	Target Date of Completion	Est. Percent of Time Alloc.	Comment
1.	Contact municipalities and make recommendations on problem areas Set up meetings where necessary	Nov. 25th	80%	
2.	Monitor Federal Agencies and applicants	on-going	10%	
3.	Meet with T.A.C. to plan future program	Nov. 28th	2%	
4.	Misc. Reports and action items	on-going	8%	

G. COMMENTS:

T.A.C. for Region 7 feels our present priority is to notify municipalities with problem areas and to work with them in solving their problems. T.A.C. feels that some municipalities need to take immediate action in planning and correcting their problems. Some municipalities need immediate plans for next year in case drought continues. R.D.C. will work with each needy municipality, decisions and plans from these municipalities will be forwarded to O.S.D.C. periodically.

Action on municipal problem areas must be taken if municipal survey is to function properly. The survey without recommendations and follow-up by area R.D.C.'s is of no value. Community awareness of immediate drought problems is needed.

093099

To: George Lamb

Date: November 12, 1977

From: R.D.C./Region 7
Peter J. Juba

Subject: Status Report for
October, 1977

Drought Severity:

The drought impact in Area 7 continues to have a major effect on agriculture and livestock businesses in the Trinidad to Kim areas. No additional precipitation has been noted in this area. Some "sell outs" or farms and ranches have begun in the area due to severe financial problems with local farmers and ranchers. (See Financial Institute Surveys.)

As of mid-October the water sheds and snow packs in the Sangre DeCristo Range remained dry. No significant snow fall or moisture is reported. The water shed in the upper reaches of the Arkansas River Basin has shown little change with only minor accumulation or snow fall. Continued monitoring of possible "freeze up" areas has begun with no major problems as of this date.

Precipitation:

Little or no precipitation was noted in October. In the Sangre DeCristo Range no major precipitation was noted. Some precipitation was noted in the upper reaches of the Arkansas River Basin but accumulation was very little. The area east of Trinidad had no noted precipitation.

Wind:

Wind was not a significant factor in October. Continued complaints are aired by farmers and ranchers in regards to cloud seeding operations. Most state they feel the severe winds are caused by the cloud seeding operations.

Domestic Water Systems:

Region 7's municipal water survey is now complete and recommendations have been made by Region 7's T.A.C.

Again the basic problem area as far as drought effect is the Trinidad area. Major plans have been recommended and area will be monitored closely by R.D.C.

Applicant Process:

Identification of individual applicants has been made in the Huerfano, Las Animas County areas. These are as follows:

Name	Date of Application	Status
Jack Goode	3-9-77	Holding for Financial Status Check
Tommy Like	3-15-77	Rejected
Williams Land and Cattle Co.	3-16-77	O.K. - Payment Authorized
Harry Lewis	3-30-77	Withdrew/Still Possible
Johnnie Mayhan	5-26-77	O.K. - Payment Authorized
Donald Hallock	6-21-77	Tabled-Questionable
Earl Apple	7-11-77	Withdrew
Parsons Land and Cattle Co.	7-14-77	Tabled-Questionable
Sam Barker	7-22-77	O.K. - Payment Authorized
George Wilson	7-26-77	O.K. - Payment Authorized
Eldo Foster	8-2-77	Fed. Land Bank Prospect
James Chancellor	9-7-77	Status O.K.
Homer Lawson	9-19-77	Fed. Land Bank Prospect
Loyd Hall	9-26-77	Unknown/New Applicant

The above are applicants for drought funds through the F.M.H.A. office in Trinidad.

Identifcation of applicants in Pueblo County has not been received as of this date. It is noted that Pueblo County has only a couple probable applicants according to Jim Bright, Pueblo F.M.H.A. Representative.

Persuading farmers and ranchers to use the drought funding available, is still a problem. Their independence coupled with mistrust of government agencies continues to hold some applicants back from applying for needed assistance.

Municipalities:

Recommendations are still being made to municipalities on the upgrading of their present systems and necessary drought proofing.

In checking on municipal water drought related loans, I found three loans which have been authorized by the F.M.H.A.

A loan to Cucharas Water and Sanitation District has been authorized to upgrade their present system and for installation of new transmission lines.

Pueblo Mountain Park/South Pine Drive Water District in Beulah, Colorado, has been authorized a loan through F.M.H.A. for the completion of and forming a water district, purchase of additional water rights, a new underground water systems from various streams, and the purchase of three 50,000 gallon storage tanks.

The St. Charles Mesa Water Association, Pueblo, has been authorized a loan through F.M.H.A. to construct new pipelines, a new pump station, new storage reservoirs and additional treatment facilities which will virtually drought-proof their system.

Note: Bids have been opened and all items in the bid were overbid $100,000 to $200,000 above the engineering estimate. (See enclosed copy of actual bidding.)

Due to the extremely high bids by contractors, the Mesa Water Association is working with the F.M.H.A. on a possible re-bid and possible additional grant money from the F.M.H.A. through F.M.H.A.'s regular programs.

Assessment of Local Federal Agency Activity:

All Federal Agencies in the three counties seem to be functioning well at this time. Some complaints are still coming in against actions taken by F.M.H.A. Representative Jim Bright of the Pueblo Regional Office. In talking to Mr. Bright I find him to be highly concerned about his applicants and that all applicants must qualify before he will even consider funding. Mr. Bright does not feel any extra effort should be put forth in trying to help an applicant qualify; his feeling is either they qualify or they do not, and if they do not qualify then their application is rejected. He feels that there is too much of the taxpayer's money being used wrongly now and that strict judgment of applicants is needed.

Monitoring of various applicants in the Pueblo area will be continued and if any of these applicants are rejected and the decision is questionable then as R.D.C. for Region 7 I will discuss the application with Mr. Bright. Also, if necessary and if a problem exists, the O.S.D.C. will be notified.

Conclusion:

Analyzation of the drought severity in Region 7 still shows the major problem area to be in and around this Trinidad area. Sell out of farms and ranches has begun and his is a major concern of local financial institutes in the area. If the drought continues, further sell out and repossessions are expected. (See Financial Institution Survey enclosed.)

It is the view of T.A.C. for Region 7 that the major concern in Region 7 is the municipalities who have present major problems. T.A.C. feels each of these communities should be contacted and suggestions made to them in updating their system and correcting their problem areas. It is also a major concern of T.A.C. that all communities in Region 7 have a plan of action available for 1978 if the drought continues. This plan should include a study of water availability, water conservation measures, a public awareness program, and emergency plans for system failure.

Further monitoring of water supplies, well levels, and possible freeze-up areas will be undertaken by the R.D.C., continued monitoring of the agricultural financial problem will also be a primary objective of the R.D.C. Other action items will be undertaken when problems are noted or when the O.S.D.C. recommends such items. Some public awareness programs will also be used to update residents in the three counties to the severity of the drought and its present status and possible future forecast.

State of Colorado

EXECUTIVE CHAMBERS

DENVER

RICHARD D. LAMM
Governor

77-34-102f

MEMORANDUM

TO: Regional Drought Coordinators

FROM: Colleen Murphy
Assistant State Drought Coordinator

SUBJ: Weekly Report

DATE: 18 November 1977

FmHA - funded Domestic Water Projects.

Please refer to "Exhibit A," a three-page document which includes a memo from George E. Lamb to me, a memo from George to the Governor, and a list of Colorado projects approved for grants and loans from FmHA.

I have discussed the problem covered in "Exhibit A" with several of you; i.e., across the State, bids which are now coming in are excessively high, considerably above the engineering estimate and, of course, the loan and/or grant total. It is critical that you involve yourself directly in the progress of all domestic water projects in your Region so that we can "troubleshoot" where and as necessary. As you can see from George's memo to me, the following specific actions are called for:

1. Get acquainted with the projects' consulting engineers.
2. Monitor closely the progress of each project.
3. Working with the engineers and local officials, encourage wide distribution of the Requests for Bids to facilitate as many responses as possible.
4. Attend bid openings.
5. If no acceptable bids are received, advise the OSDC immediately. We will want to know:
   - your assessment of the reasons and
   - what you believe should be the next step.

Please give this problem your personal attention.

FmHA Emergency Loans for Hail Damage.

We received word on November 15 that the following counties have been designated for emergency disaster assistance from FmHA for damage resulting from severe hail storms during May - August, 1977:

Bent	Prowers
Logan	Yuma

According to the October 5, 1977, minutes of the USDA Emergency Board (which met to consider the damage reports from the four counties), the reason for the delay of several months between the damage and the designation is that the Counties were unaware of the need to request designation through the Governor.

ASCS Emergency Feed Program.

"Exhibit B" includes copies of ASCS October reports on the Emergency Feed Program in the counties within your Region. You should look over these carefully, considering applications received by ASCS vis-a-vis your firsthand knowledge (from talking with livestockmen in the Region) of need for feed assistance. Please let us know if your Region is experiencing any problems with the Program.

Regional Drought Councils.

- Region 5. Among the many aspects of the East Central COG's drought coordination project which impressed me when I visited the area last week was Maryjo Downey's reliance on her Drought Council. The Region 5 map ("Exhibit C") is used by each Council member to show estimated drought severity in his/her geographic area. After compiling the Council's estimates, Maryjo has a visual overview of the severity of the drought in Region 5.

- Region 4. The Pikes Peak Area drought project is in the process of reorganizing their technical advisory committee and is considering relying on the Region's Rural Development Committee as a base of membership, augmented as necessary with local government and businesses representation and water experts. Those of you who are also organizing or reorganizing might consider the Rural Development Committee in your Region as a starting point. I have attached the list of members for the Committee in Region 4 so that you may see the broad representation for the agricultural sector ("Exhibit D").

Other.

- "Exhibit E" is for your amusement.

- The CDC report for week ending November 18 is enclosed for your use and information.

CC: Executive Directors

State of Colorado

EXECUTIVE CHAMBERS

DENVER

77-27-305

RICHARD D. LAMM
Governor

MEMORANDUM

TO: Colleen Murphy

FROM: George E. Lamb

SUBJ: FmHA Domestic Water Projects

DATE: November 14, 1977

Colleen:

As you can see from your copy of the attached memo to the Governor, we may be heading into trouble on many of our drought funded water projects. You are asked to take the following actions:

1. Share the list of projects with RDC's.
2. Ask that the progress of each project be monitored closely with special emphasis placed on coordination with the consulting engineer.
3. At time of request for bids every effort should be made to obtain as many bid responses as possible.
4. RDC's should be present at bid openings and form an assessment of why the project failed if no acceptable bids were received.

GEL:ag

009102

State of Colorado

EXECUTIVE CHAMBERS

DENVER

77-26-305

RICHARD D. LAMM
Governor

MEMORANDUM

TO: Governor Lamm

FROM: George E. Lamb
State Drought Coordinator

SUBJ: FmHA Domestic Water Projects

DATE: November 14, 1977

Per the attached list, we have 56 domestic water projects approved under the FmHA drought relief program. The total of $34.4 million is $9.0 million greater than that reported to you as of September 30th.

I met this morning with Bob Brooks, representing the Colorado Contractors Association, Inc., and members of the staff at the Farmers Home State Office. We discussed the emerging trend of project bids coming in well beyond available funding.

It was agreed that project bidding dates would be given to Brooks, CCA, Inc. and he would call contractors in an effort to increase competition. It was also agreed that where projects fail because of unacceptable bid returns the bids would be considered if obvious instances of attempts at unreasonable profit were evident.

Other actions were considered, all directed at completing the projects within the available funds. I emphasized that I did not want to see either additional funding or reduction in the scope of the project used as a way to overcome excessive bids. It is recognized that room exists for extenuating circumstances and I'm sure FmHA will give consideration to projects where the unexpected costs can be documented.

We will follow the issue closely and keep you advised.

GEL:ag

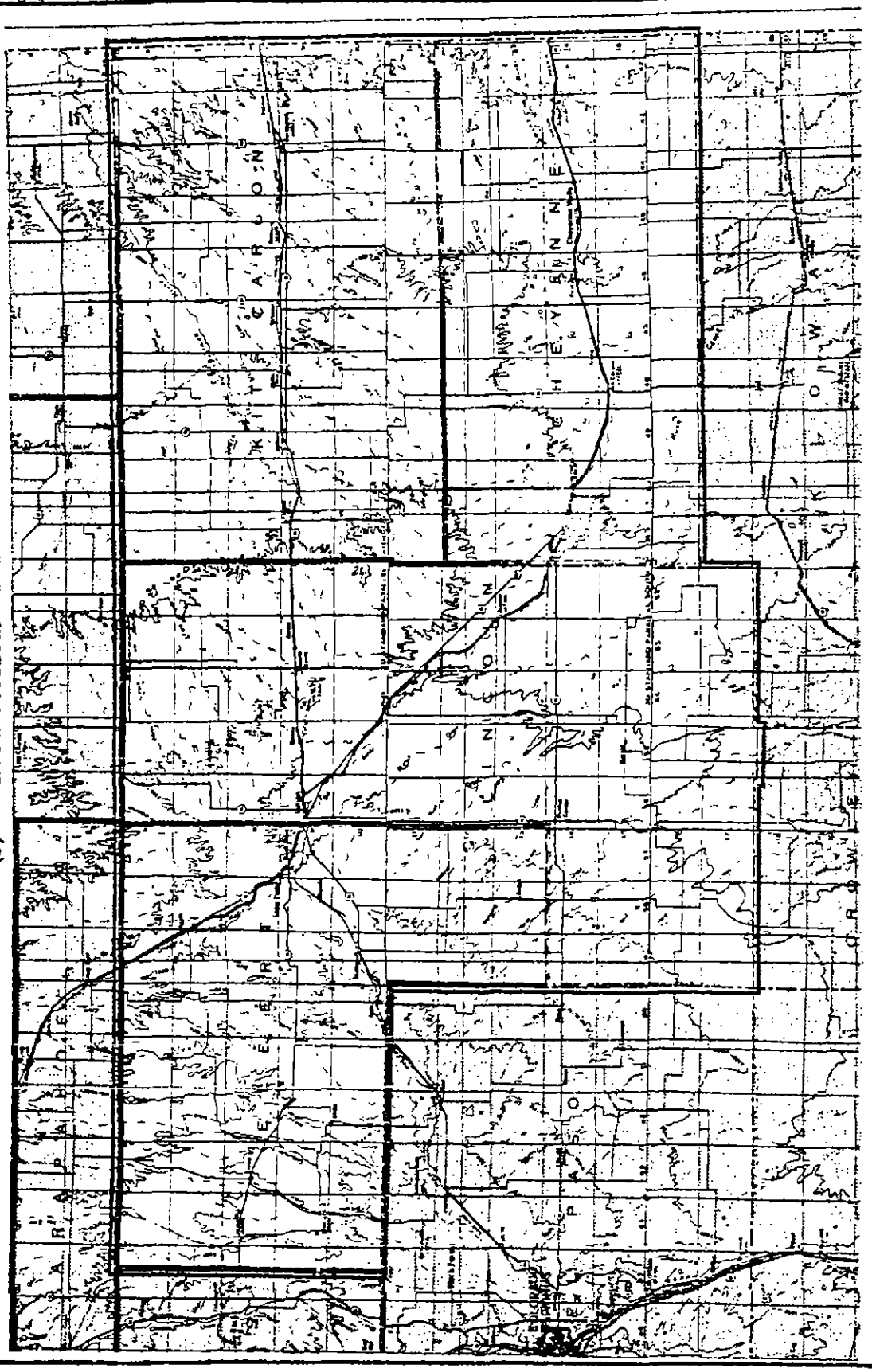
CC: Ernie Phillips -FmHA
Elwood Thueson -FmHA
Jim Monaghan
Bob Brooks
Lee Woolsey -Dept. of Local Affairs
Colleen Murphy

PmHA DOMESTIC WATER PROJECTS

November 14, 1977

NAME OF BORROWER	REGION	LOAN	GRANT
Archuleta Water Company	9	$	$ 101,000
Town of Bayfield	9		120,000
Town of Bennett	3	144,000	35,000
Bone Mesa Domestic Water	10	98,000	24,000
City of Brush	1	825,000	716,400
Town of Buena Vista	13	450,000	425,000
Town of Calhan	4	45,000	
Town of Cedaredge	10	513,000	487,000
Town of Collbran	11	88,000	161,0500
Cucharas San. and Water District	7	454,000	421,000
City of Delta	10		564,000
Town of Dove Creek	9	150,000	450,000
Town of Erie	3	205,000	195,000
Town of Fairplay	4	283,000	270,300
Town of Frederick	2	507,000	497,000
Fruitland Irrigation Company	10	122,000	118,000
Town of Gilcrest	2	136,000	34,000
Granada Water Association	6	28,000	25,000
Town of Grand Lake	12	189,000	178,000
Town of Grover	2	42,000	63,800
Hilltop Water Company	6	121,000	112,600
Town of Hotchkiss	10		157,000
Town of Hot Sulphur Springs	12	76,000	72,000
Town of Keenesburg	2	305,000	295,000
Town of Kremmling	12	552,000	536,000
City of Lafayette	3	476,000	450,000
City of LaJunta	6		617,500
Lake City Water and San. District	10	238,000	225,000
City of Las Animas	6	453,000	140,000
Leroux Creek Water Users Association	10	137,500	132,500
Town of Louisville	3	253,000	502,700
Town of Mancos	9	225,000	215,000
Town of Manzanola	6	275,000	225,000
Town of Marble	10	193,000	187,000
May Valley Water Association	6	110,000	104,500
Morgan County Quality Water District	1	3,100,000	2,925,000
Town of Naturita	10	129,000	186,000
North Carter Lake Water District	2	130,000	123,300
Town of Norwood	10		37,000
Town of Nucla	10		70,000
Town of Otis	1	319,000	310,000
Town of Paonia	10	767,000	733,000
Piedra Park Metro.Imp. District	9	49,000	12,100
Town of Pierce	2	66,000	64,000
Town of Rangley	11	91,000	87,000
Redstone Water and San. Dist.	12	99,000	94,000
Town of Rico	9	50,000	100,000
City of Rifle	11	337,000	517,000
City of Rocky Ford	6	1,019,000	2,369,000
St. Charles Mesa Water Association	7	1,139,000	633,000
South Pine Drive Water Association	7	304,000	290,000
City of Steamboat Springs	12		180,000
Strasburg Water and San. District	3		27,800
Town of Swink	6	186,000	326,500
Swiss Village Homes Association	12	40,000	
Town of Telluride	10	463,000	437,000
	TOTAL	$15,981,500	$18,385,600

TOTAL: LOAN AND GRANT - $34,367,100



LAND USE PLANNING BASE MAP:

EAST CENTRAL

STATE PLANNING REGION 5

SHEET TITLE:

REGIONAL BASE MAP

LEGEND:

MAPPING SYMBOLS

REGIONAL BOUNDARY

COUNTY BOUNDARY

INCORPORATED CITY & TOWN BOUNDARY

HARD SURFACE HEAVY-DUTY ROAD

HARD SURFACE MEDIUM-DUTY ROAD

IMPROVED LIGHT-DUTY ROAD

UNIMPROVED TRAIL OR DIRT ROAD

RAILROAD

NORTH

SCALE MILES

CONTOUR INTERVAL 100 FEET

PREPARED BY EAST CENTRAL COG

DATE:

SHEET NO:

WE SPENT $1,833,413 ON PLANNING, $913,830 ON COORDINATION, $416,010 ON MEETINGS AND REVIEWS. THAT LEAVES $17 TO START THE PROJECT. GOOD. LUCK.

Courtesy of
Maryjo Downey
Region 5

COLORADO DROUGHT COORDINATION

REPORT FOR NOVEMBER 28 - DECEMBER 9, 1977

DROUGHT SEVERITY.

ON DECEMBER 5 AND 6, THE OSDC RECEIVED MANY PHONE CALLS FROM THE MEDIA AND OTHER INTERESTED PERSONS WHO ASKED IF THE GOVERNOR HAD DECLARED AN OFFICIAL END TO THE DROUGHT BECAUSE OF HEAVY SNOWS IN THE MOUNTAINS. ACCORDINGLY, WE CALLED THE NATIONAL WEATHER SERVICES (NWS) AND THE STATE CLIMATOLOGIST TO OBTAIN THE LATEST INFORMATION ON DROUGHT CONDITIONS IN THE STATE. BILL TATE AND JOHN EAKIN OF NWS AND DR. TOM MCKEE, STATE CLIMATOLOGIST WERE EXTREMELY HELPFUL IN PROVIDING DATA AND CLIMATOLOGICAL OPINIONS FOR THIS REPORT.

TABLE 1 SHOWS ACTUAL PRECIPITATION FOR OCTOBER - NOVEMBER AND AVERAGE PRECIPITATION (BASED ON 20-YEAR DATA) FOR THE PERIOD. FIGURE 1 SHOWS THE DISTRIBUTION FROM "AVERAGE" FOR BROAD AREAS OF THE STATE, USING PERCENTAGES OF CUMULATIVE AVERAGES.

AS YOU CAN SEE FROM THAT DATA, GENERALLY, THE NORTHERN AND CENTRAL MOUNTAINS RECEIVED PRECIPITATION WELL ABOVE AVERAGE WHILE THE REST OF THE STATE CONTINUED RELATIVELY DRY. THE HEAVY PRECIPITATION APPEARS TO BE FALLING WHERE IT CAN DO THE MOST GOOD IN TERMS OF RUNOFF FILLING RESERVOIRS IN THE MOUNTAINS. WE'RE CERTAINLY OFF TO A GOOD START IN THOSE AREAS BUT WE REMAIN CONCERNED ABOUT THE AREA EAST OF THE MOUNTAINS, THE SOUTHERN PORTION OF THE STATE, AND THE SOUTHWEST CORNER -- PARTICULARLY THOSE AREAS NOT DEPENDENT ON SNOWPACK RUNOFF.

THE CLIMATOLOGISTS SAY WE'RE STILL IN TROUBLE IN THOSE AREAS AND THAT, OVERALL, IT IS STILL TOO EARLY TO TELL TO WHAT EXTENT THE DROUGHT WILL BE WITH US IN 1978. REMINDING US THAT THERE CAN BE DRAMATIC CHANGES IN THE MIDDLE OF WINTER, EXPERTS SAY THAT WHAT WE NEED MOST IS A CHANGE IN THE STORM TRACK. STORM TRENDS IN OCTOBER AND NOVEMBER HAVE BEEN FROM THE NORTH-NORTHWEST, DUMPING MOST OF THE MOISTURE ON THE NORTHWEST FACES OF THE COLORADO ROCKIES AT ELEVATIONS ABOVE 9,000 FEET. COLORADO HAS EXPERIENCED ONLY THE EDGE OF THOSE STORMS THAT HAVE DROPPED LARGE AMOUNTS OF PRECIPITATION IN THE STATES TO OUR NORTH AND NORTHWEST; NONE OF THOSE OCTOBER-NOVEMBER STORMS HIT US "HEAD ON." CONVERSELY, THE CLIMATOLOGISTS SAY THAT THE STATES SOUTH OF COLORADO HAVE HAD LITTLE IF ANY PRECIPITATION; THEY ARE EXPERIENCING ALMOST DESERTLIKE WEATHER. WHAT IS NEEDED IS A STORM TRACK COMING IN FROM THE SOUTHWEST TO PROVIDE NEEDED MOISTURE.

UNTIL IT CAN BE SAID WITH CERTAINTY THAT COLORADO IS NO LONGER EXPERIENCING DROUGHT CONDITIONS, DROUGHT MITIGATION EFFORTS WILL CONTINUE ACTIVELY IN THOSE AREAS OF THE STATE WHICH CONTINUE TO SUFFER FROM DROUGHT AND ITS IMPACTS. THOSE AREAS WHICH HAVE HAD SOME RELIEF FROM THE DROUGHT BUT IN WHICH THE TEST WILL BE NEXT SPRING AND SUMMER ARE CONCENTRATING ON PREPARENESS AND CONTINGENCY PLANNING.

CURRENTLY, THE REGIONAL DROUGHT COORDINATORS ARE IDENTIFYING COUNTIES FOR CONTINUED DESIGNATION AS DROUGHT EMERGENCY DISASTER AREAS (OR FOR POSSIBLE FUTURE DESIGNATION SHOULD THE DROUGHT CONTINUE AND/OR WORSEN). EACH REGION IS ASSESSING PRESENT AND POTENTIAL DROUGHT CONDITIONS/ IMPACT TO PUT IN PLACE APPROPRIATE RESPONSE PROGRAMS FOR THE MONTHS AHEAD.

THE GOVERNOR IS EMPHASIZING PREPAREDNESS UNDER THE CONVICTION THAT IT IS FAR BETTER TO ACT RATHER THAN TO REACT TO THE DROUGHT.

- PALMER INDEX. (FIGURE 2) NOTE THAT THIS LAST CHART FOR THE FALL SEASON SHOWS THAT IN MOST OF THE WEST INCLUDING WESTERN COLORADO MODERATE TO SEVERE DROUGHT PERSISTED AS OF 10-29-77. AN 11-27 DENVER POST NEWSCLIPPING AND A 12-06 REPORT ON A SPEECH BY GOVERNOR LAMM ("ATTACHMENT A") EMPHASIZE THE SEVERITY OF CONDITIONS IN COLORADO.

FEDERAL PROGRAMS.

"ATTACHMENT B" GIVES INFORMATION ON EFFORTS TO DELAY BLM'S PROPOSED INCREASE IN GRAZING FEES ON FEDERAL LAND AND ON SECRETARY BERGLAND'S RECENT DECISION TO ALLOW GRAZING ON SET-ASIDE LAND.

STATE ACTIONS.

- WEATHER MODIFICATION. "ATTACHMENT C" PROVIDES AN UPDATE ON THE STATE'S WEATHER MODIFICATION PROGRAM.

MULTISTATE RESPONSES. ON DECEMBER 1 AND 2, THE WESTERN REGION DROUGHT ACTION TASK FORCE (WRDATF) AND OTHER AGENCIES SPONSORED AN INVITATIONAL WORKSHOP IN DENVER ON DROUGHT IMPACTS. THE SESSIONS WERE INTERESTING AND WORTHWHILE. SOME OF THE HIGHLIGHTS INCLUDED:

- A PRESENTATION THE "CLIMATOLOGICAL OUTLOOK" BY DR. STEPHEN H. SCHNEIDER OF THE NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR) IN BOULDER WHO SAID THAT THE

MESSAGE OF HIS BOOK, THE GENESIS STRATEGY, IS TO "BE PREPARED FOR A NON-RAINY DAY." DR. SCHNEIDER STATED THAT SEEMINGLY SMALL CHANGES IN CLIMATE ARE AMPLIFIED IN "MARGINAL" REGIONS AND STRESSED THAT AGRICULTURAL MANAGEMENT AND TECHNOLOGY CAN DO MUCH TO OFFSET CLIMATE FACTORS. CONCERNING FORECASTS, HE DISCUSSED THE SUN-SPOT THEORY WHICH SHOWS THAT WE ARE STILL IN A DROUGHT CYCLE PHASE WHICH HAS SOME LIKELIEHOOD OF CONTINUATION; UNDER THE TREE RING ANALYSIS THEORY (BASED ON HISTORICAL PATTERNS), "A GAMBLER COULD BET THAT THIS YEAR WILL NOT BE AS BAD AS THE LAST."

- LT. GOVERNOR GEORGE HIGH (OK) STRESSED THE IMPORTANCE OF PREPAREDNESS, OF MAINTAINING STRUCTURAL RESPONSIVENESS TO DROUGHT, AND OF PRESERVING PUBLIC AND GOVERNMENTAL AWARENESS OF CURRENT AND POTENTIAL PROBLEMS.

RECOMMENDATIONS AND CONCERNS WHICH EMERGED FROM THE WORKSHOP:

- DROUGHT MITIGATION PROGRAMS AT BOTH THE FEDERAL, STATE, AND LOCAL LEVELS NEED IMPROVED COORDINATION, GREATER TIMELINESS, GREATER EMPHASIS ON CONTINGENCY PLANNING, AND LESS RED TAPE.
- A MOST CRITICAL ISSUE IN THE WEST IS WATER RESOURCE MANAGEMENT; THE MANAGEMENT, DEVELOPMENT, AND ALLOCATION OF WATER RESOURCES SHOULD BE CONSIDERED AS POLICY MATTERS.

A COMPLETE REPORT ON THE WORKSHOP WILL BE PUBLISHED AFTER THE FIRST OF THE YEAR.

INFORMATION/RESOURCES.

- DISEASE AND DRINKING WATER. "ATTACHMENT D" REPORTS ON A RECENT STUDY WHICH FOUND THAT OUTBREAKS OF WATERBORNE DISEASE "ARE NO LONGER ON THE DECLINE IN THE UNITED STATES." IN AREAS OF PERSISTENT DROUGHT, WHERE LOW FLOW CAN BE ACCOMPANIED BY CONTAMINATION, OFFICIALS NEED TO BE INCREASINGLY ALERT TO THE POSSIBILITY OF WATERBORNE DISEASE.
- WATER ISSUES. "ATTACHMENT E" REPORTS ON A RECENT COLORADO SUPREME COURT DECISION ALLOWING THE RIVERSIDE IRRIGATION DISTRICT TO CONDEMN PRIVATELY OWNED LAND TO DRILL GOUNDWATER WELLS; APPARENTLY A KEY POINT IN THE DECISION WAS THE STATUS OF THE DISTRICT AS A "MUNICIPAL CORPORATION." "ATTACHMENT F" INCLUDES A NEWS ARTICLE ON A WATER CONTROVERSY WHICH WILL BE HEARD BEFORE THE U. S. SUPREME COURT CONCERNING CALIFORNIA'S CONTENTION THAT THE "WESTERN STATES SHOULD BE ABLE TO IMPOSE WATER-USE CONDITIONS ON FEDERAL RECLAMATION PROJECTS." THE COURT'S DECISION WILL HAVE CONSIDERABLE EFFECT IN THE WEST.

ATTACHMENTS

STATE OF COLORADO
OFFICE OF THE GOVERNOR
OSDC
DENVER, CO 80203
DECEMBER 9, 1977

TABLE 1

PRECIPITATION DATA: OCTOBER and NOVEMBER 1977

(November data are "water equivalency" figures.)

LOCATION	AMOUNT OF PRECIPITATION IN INCHES			20-YEAR AVERAGE FOR PERIOD			
	November	October	Cumulative	November	October	Cumulative	Cumulative Percent of Average
Allenspark	2.80	--	--	1.02	--	--	--
Alamosa	.63	.08	.71	.30	.67	.97	73%
Antero	.10	--	--	--	--	--	--
Aspen	1.43	--	--	1.59	--	--	--
Bailey	1.20	--	--	.56	--	--	--
Berthod	4.80	--	--	3.24	--	--	--
Boulder	.61	.40	1.01	.97	1.25	2.22	45%
Breckenridge	1.60	1.99	3.59	1.23	1.13	2.36	152%
Byers	.60	.02	.62	.48	.10	.58	107%
Bedrock	.95	--	--	--	--	--	--
Cheeseman Res.	1.15	.16	1.31	.72	1.07	1.79	73%
Climax	2.61	1.33	3.94	1.68	1.25	2.93	134%
Cheyenne Wells	.20	--	--	.43	--	--	--
Colorado Springs	.60	.18	.78	.51	.86	1.37	57%
Creede	.63	--	--	--	--	--	--
Delta	.42	.51	.93	.54	.55	1.09	85%
Del Norte	1.06	.17	1.23	.51	1.00	1.51	81%
Denver	.59	.48	1.07	.76	1.07	1.83	58%
Dillon Res.	.64	.89	1.53	.96	.88	1.84	83%
Eads	.87	.03	.90	.48	1.00	1.48	61%
Estes	.49	.37	.86	.50	.73	1.23	70%
Evergreen	.97	--	--	--	--	--	--
Ft. Collins	.45	.14	.59	.55	1.12	1.67	35%
Ft. Morgan	.43	.02	.45	.35	.67	1.02	44%
Florence	.93	--	--	--	--	--	--
Gateway	1.16	.59	1.75	.85	1.20	2.05	85%
Georgetown	.81	.90	1.71	.73	.95	1.68	102%
Grand Junction	.70	.50	1.20	.62	.88	1.50	80%
Grand Lake	--	--	--	--	--	--	--
Great Sand Dunes	1.48	.68	2.16	.33	.76	1.09	198%

Table 1
Precipitation Data
Page two

LOCATION	AMOUNT OF PRECIPITATION			20-YEAR AVERAGE FOR PERIOD			
	November	October	Cumulative	November	October	Cumulative	Cumulative Percent of Average
Greeley	.42	.10	.52	.39	.77	1.16	45%
Gunnison	.39	1.21	1.60	.82	.81	1.63	98%
Gross Res.	.92	--	--	--	--	--	--
Kassler	.86	.61	1.47	.94	1.39	2.33	63%
Lavita Pass	2.05	--	--	--	--	--	--
Lake George	.68	--	--	--	--	--	--
Lake Mariane	1.50	--	--	--	--	--	--
Lakewood	.70	--	--	--	--	--	---
Lamar	.58	.08	.66	.46	.73	1.19	55%
Leadville	3.12	.59	3.71	1.05	1.05	2.10	177%
Lemon Dam	1.62	--	--	--	--	--	--
Limon	.27	.43	.70	.47	.74	1.15	61%
Longmont	.14	.13	.27	.52	1.00	1.52	18%
Loveland	1.00	--	--	--	--	--	--
Meeker	Est. 2.00	--	--	1.14	--	--	--
Monte Vista	.82	0	.82	.29	.80	1.09	75%
Montrose	.36	.49	.85	.69	1.04	1.73	49%
Ouray	2.86	2.01	4.87	1.69	2.14	3.83	127%
Parker	.57	0	.57	.46	1.45	1.91	30%
Pueblo	.14	0	.14	.44	.98	1.42	10%
Rye	2.04	.20	2.24	1.25	1.67	2.92	77%
Salida	.27	0	.27	.64	1.24	1.88	22%
Silver Lake	2.35	--	--	--	--	--	--
Spicer	1.09	--	--	.91	--	--	--
Steamboat Springs	2.71	1.44	4.15	1.85	1.71	3.56	117%
Sterling	.79	0	.79	.38	1.00	1.38	57%
South Platte	1.28	--	--	--	--	--	--
Square Mt.	2.20	--	--	--	--	--	--
Telluride	2.11	2.55	4.66	1.41	1.98	3.39	137%
Trinidad	.53	.06	.59	.51	.86	1.37	43%
Walden	.77	.98	1.75	.54	.75	1.29	136%
Walsenburg	1.40	.06	1.46	.75	1.20	1.95	75%
Waterdale	.33	.11	.44	.55	1.22	1.77	25%

Table 1
Precipitation Data
Page three

LOCATION	AMOUNT OF PRECIPITATION			20-YEAR AVERAGE FOR PERIOD			Cumulative Percent of Average
	November	October	Cumulative	November	October	Cumulative	
Westcliffe	.83	.08	.92	.85	1.33	2.18	42%
Windsor	.18	--	--	.42	--	--	--
Winter Park	2.60	2.70	5.30	1.97	1.89	3.86	137%
Wray	.23	.22	.45	.47	.92	1.39	32%
Durango	1.04	.91	1.95	1.32	1.82	3.14	62%
Cortez	.63	.56	1.19	.91	1.33	2.24	53%
Rico	1.97	1.32	3.29	2.09	1.06	3.15	104%

PRECIPITATION DATA: NOVEMBER 1977

Location	Snow: Cum. on ground as of 12-05-77 a.m.
A-Basin	68"
Aspen	26"
Copper Mountain	44"
Crested Butte	42"
Dillon	14"
Eldora	38"
Geneva Basin	74"
Keystone	48"
Leadville	15"
Loveland Pass	50"
Maryjane	38"
Rico	3"
Steamboat	20"
Vail	39"
Wolf Creek Pass	22"

FIGURE 1
CUMULATIVE PRECIPITATION FOR OCTOBER-NOVEMBER 1977
EXPRESSED AS A PERCENTAGE OF THE 20-YEAR AVERAGE FOR THE PERIOD
DISTRIBUTION BY GEOGRAPHIC AREA

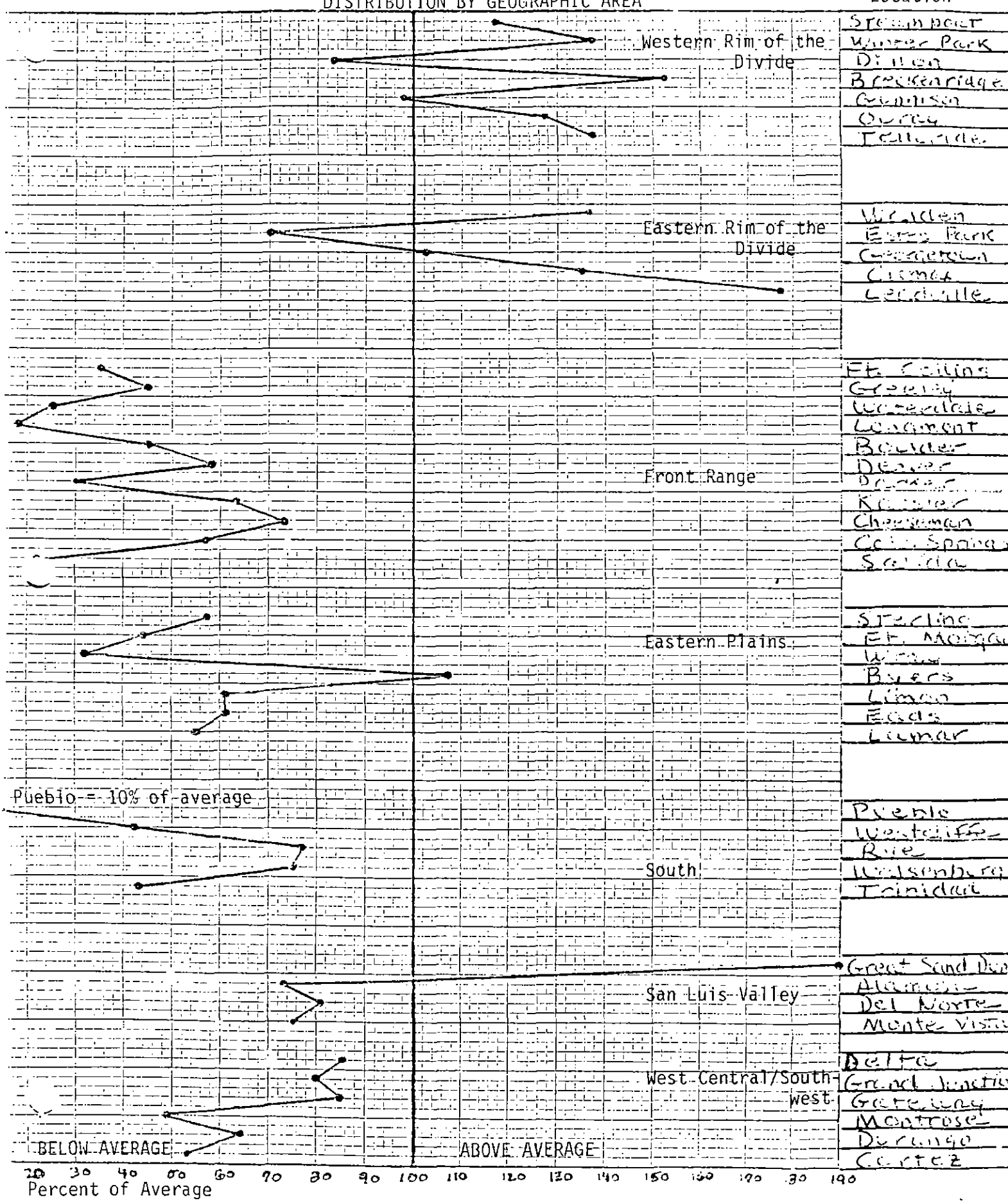
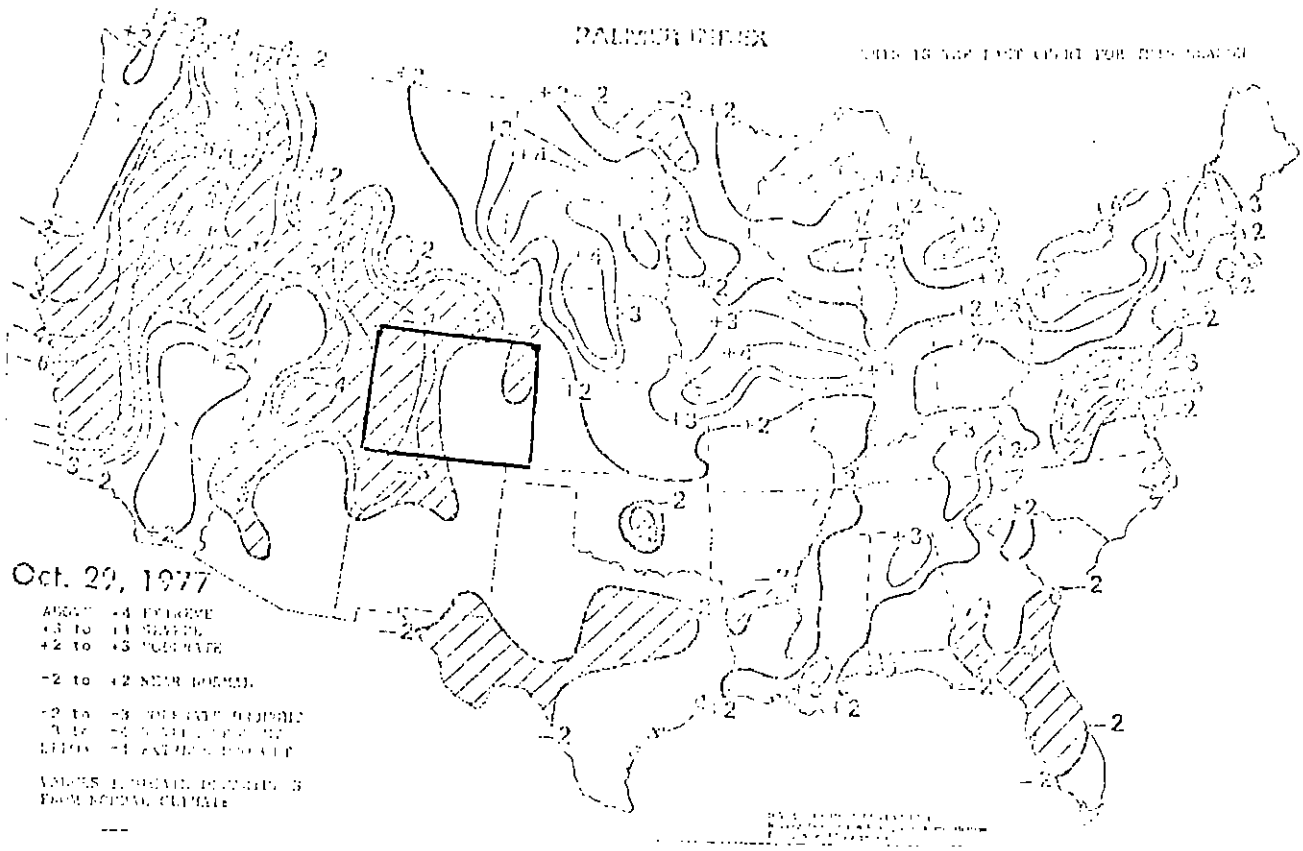
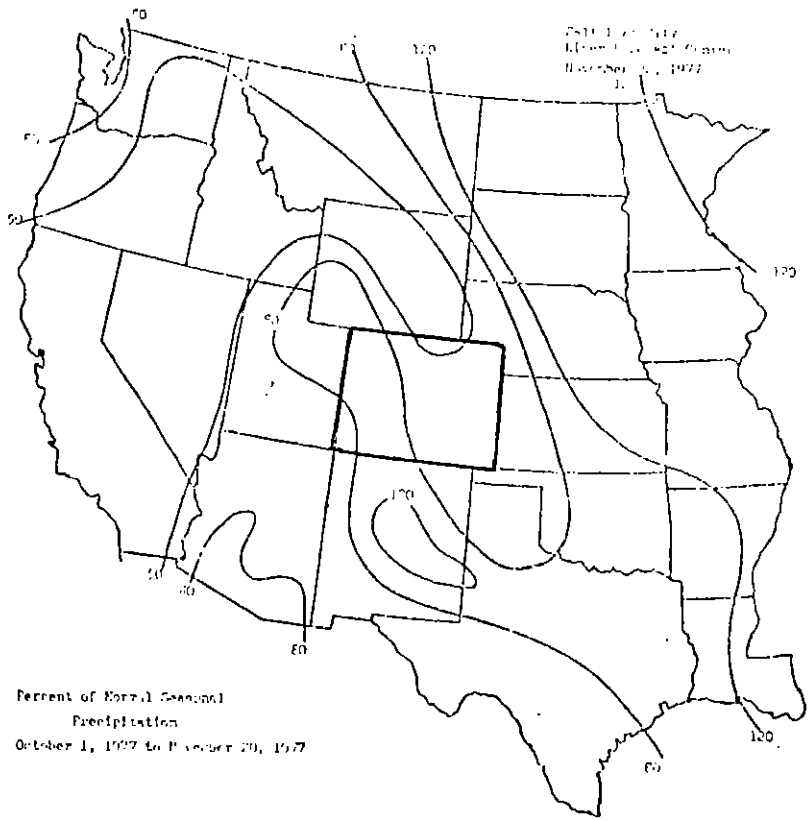


Figure 2.


PALMER INDEX
Oct. 29, 1977


Percent of Normal Seasonal
Precipitation

ATTACHMENT A.

THE DENVER POST Tues., Dec. 6, 1977

'Triple Threat' Mars Outlook For Colo. Economy, Lamm Says

By WILLARD HASELBUSH
Denver Post Business Editor

Colorado's governor says the bright 1978 outlook for the state's economy could be misleading.

"It's like sleeping with an elephant; it might roll over on you." Gov. Dick Lamm told more than 1,000 business leaders gathered at the Brown Palace Hotel late Monday for a business-economic outlook forum.

The governor said the state's economy faces a triple threat. He listed the "dark clouds": statewide drought may continue despite current heavy mountain snowfall; federal preemption of power may cause disruption, and opposition by President Carter may wipe out "desperately needed" western water-storage projects, and the state's agriculture "is near the edge of disaster."

LAMM'S STATEMENTS jolted a throng which was there to hear a report that "the Colorado economy looks healthy for next year . . . unemployment will decline . . . real personal income (purchasing power) will be up . . . and consumer spending will be high."

The report of a 60-member committee of business and government executives was delivered by the business college of the University of Colorado and the state division of commerce and development.

But before the report was read, Lamm told the forum that it is "easy and popular" to say that Colorado's economy "is in healthy shape." He added, "I'm going to talk about problems and challenges as well as promises."

THE GOVERNOR said he is concerned "that the 1977 drought may continue." He said there is evidence dating back to the 1500s—through tree-ring sectors—of drought which lasted 40 years." He said "you can't count on this one ending in two or three years." He also spelled out "dangers of federal preemption" in land control and oil-shale development and said farmers are going broke.

The forum session was told business will be good in all sectors in 1978 by Gordon G. Barnewall, associate dean of the CU business school, and Jack F. Chandler, vice president-marketing of United Bank of Colorado Springs.

They said every sector registered net gains in employment in 1977—the first year this has happened since 1973.

They said the state's population will stand at 2,719,000 by the end of 1978 for a gain of 2.6 percent—well over a national gain of 0.8 percent. The labor force, they forecast, will reach 1,293,400 in late 1978 with an additional 34,200 jobs added for a gain of 2.7 percent.

Unemployment in Colorado, they said, will ease slightly to 5.4 percent.

And they forecast a Colorado increase of 10.1 percent is total personal income—"purchasing power." Total personal income in the state, they said, will increase by $1.9 billion in 1978 to a new high of $20.2 billion.

The ski industry will zoom back from last year's snow drought, they said, "and value of coal production will increase by 16 percent while manufacturing continues to provide a major stimulus to the Colorado economy."

42 *THE DENVER POST Sun., Nov. 27, 1977

Need for Heavy Snowfall Cited

Colorado "will be facing a most difficult time in 1978 unless winter snowfall is above average," the Soil Conservation Service reported in its 1977 Fall Water Supply Summary.

Because of the drought, the service said, soil moisture is poor, and the state's carry-over water storage is only about 60 per cent of normal.

Available figures indicate stream flows in Colorado were 30-40 per cent of normal. The flow of the South Platte and its northern tributaries generally was less than 50 per cent of normal, and Colorado River Basin stream flows were about 40 per cent of normal, the summary reported.

STORAGE IN THE South Platte and its northern tributaries "was greatly depleted," the Service reported, and storage in the Colorado-Big Thompson Project dropped from 378,000 acre-feet in October 1976 to 257,000 acre-feet this year.

The Colorado Basin reported poor soil moisture conditions in all sub-basins and reduced storage as did the Rio Grande Basin in Colorado where carry-over storage was reported at only 54 per cent of normal.

The Arkansas drainage in Colorado reported poor to fair soil moisture conditions and carry-over storage was described in the summary as "practically non-existent."

ATTACHMENT D.

8 THE DENVER POST Tues., Dec. 6, 1977

NOT DECLINING

Waterborne Illness Cited

WASHINGTON —(UPI)—Diseases related to drinking water controlled and reduced for more than 20 years—are no longer declining in the United States, says a report to the U.S. National Committee on Vital and Health Statistics.

Outbreaks of such diseases in the four years 1971-74 were nearly double the number of outbreaks for the years 1966-70 and earlier such periods dating back to 1951-55.

But the type of disease is changing. While typhoid fever generally decreased, infectious hepatitis was on the rise.

The report, on statistics needed for determining the effects of the environment on health, recommends that certain statistics be collected on environmental contaminants. It was commissioned by the government's National Center for Health Statistics.

WATERBORNE DISEASE IS one of several environmental causes of illness discussed in the report, which is essentially a survey of previous studie with recommendations to fill statistical gaps.

"Although there is increasing public awareness of the importance of the environment on the health status of the U.S. population, there has been no systematic national effort to assess the problems," said chairman Dr. Kerr While in a foreword.

The average annual number of outbreaks of disease for all water systems was 38 in the 1938-45 period, 23 for 1946-50, 10 for 1951-55, 12 for 1956-60, 11 for 1961-65, 14 for 1966-70 and 25 for 1971-74, one study cited in the report found.

"Waterborne disease outbreaks are no longer on the decline in the United States," the report concluded.

ONE WELL-DOCUMENTED infectious hepatitis outbreak involving 90 cases resulted from a series of events including a cross-connection and reduced pressure in the water mains caused by a fire, the report said.

"Clustering of multiple sclerosis patients in Mansfield, Mass., suggested that the etiologic agent was probably the water supply," the report said, citing a 1973 report in the New England Journal of Medicine.

"It was hypothesized that exposure had occurred when the patients were about 14 years old, and the incubation period was estimated to be about 23 years."

Gastroenteritis was the most frequently reported type of waterborne illness in one study.

*THE DENVER POST
Mon., Dec. 5, 1977 3

Condemnation for Water OK'd

An irrigation district may condemn land to drill groundwater wells, the Colorado Supreme Court said Monday.

The high court reversed a ruling by Judge Hugh Arnold of Greeley District Court. Arnold had decided that the Riverside Irrigation Dsitrict didn't have the power to drill on ranch land owned by James D., George and Agnes Lamont in Weld County.

The irrigation district was organized in 1907 and in 1909 obtained a 50-foot right-of-way from the federal government along a side of the canal through what became the Lamont ranch.

THE LAMONTS' title to the land came from a government grant issued in 1915, the court said.

The irrigation district now wants to acquire a 200-foot right-of-way along the canal to drill wells but has been unable to agree with the Lamonts on a price, the court said.

The Lamonts argued condemnation powers must be expressly granted for an irrigation district to use the power of eminent domain for wells. They also argued that federal laws prohibited the condemnation.

Justice Paul Hodges, writing for a 6-0 opinion, said irrigation districts are given the right by a 1905 state law under certain circumstances to use the power of eminent domain.

THE DISTRICT—considered to be a municipal corporation—was formed to provide its members with water for irrigation of arid land, Hodges wrote. The drilling of wells would conform to the purpose of the district, the court concluded.

The directors of irrigation districts also appear to have been granted the power of eminent domain withint status as municipal corporations, the court concluded.

The federal statute cited by the Lamonts applies only to acquisition of public lands, not private land, the court said.

Justice James K. Groves didn't participate.

In other action Monday, the Supreme Court:

—Decided that under Montana and Colorado law, an employee who had collected workmen's compensation for an accident in Montana couldn't collect from his employer in an injury lawsuit in Colorado. The decision reversed a ruling by the Colorado Court of Appeals in a lawsuit between Holly Sugar Corp. and Union Supply Co.

—Reaffirmed a 1976 ruling which held that the categories of penalties declared for accumulation of various points on a driver's record are constitutional as applied. The ruling affirmed a decision against Arthur Keegan made by Judge William Ela of district court in Mesa County.

—Upheld a Court of Appeals ruling that evidence against Ernesto Apodaca Jr. and Frank Perez, convicted of second-degree burglary and theft, should have been suppressed because of an illegal search. Policemen had no reason to suspect a crime had been committed when they conducted a flashlight search of the defendant's car, the high court said.

APPENDIX F

Survey Forms Administered in the Regions

- An example of an agricultural credit survey
- An example of a municipal water systems survey
- An example of a fire suppression survey

Farm Credit Survey

The lending institutions are doing their best to stay with the agriculture people of the Region during this period of low prices and drought.

From the survey, several things were noted. The first is that those farmers and ranchers, especially the cattle rancher who has his operation out of debt and does not live "high on the hog," is probably making a little money and paying the lender back every year. Anyone who owes much money and would like to have the standard of living that his city "cousins" enjoy, is going to have a rough time.

Secondly, the farmers raising brewing barley will probably pay back operating loans this year. Those who grow feed grains and potatoes will have a harder time and most cattle operations will again have carryovers. Satisfying the bank examiners may be difficult to do, especially for the cattlemen. Those banks with a large percentage of livestock loans are more optimistic about 1978 than in previous years.

A good number of operating loans have been extended for a short period of time for two reasons. The first being that cash crops have moved slowly and secondly, with the moisture situation the way it is, no one knows how to plan for next year. Last growing season, some operators cut back 20% and their expenses stayed the same.

Those lenders who serve borrowers in the Conejos River area and Saguache Creek area and extending to Poncha Pass, are quite concerned about the lack of an adequate runoff in these areas. The people depend entirely on surface water for the most part and another year of 20 to 30% hay crops will be very tough for them to handle.

Most commercial banks will not take on new borrowers. This results from the fact that as farmers and ranchers make money, they have a little more in checking accounts and invest in savings on one form or another. As these savings are drawn out to meet operating expenses, the banks deposits go down resulting in less money to loan. Therefore, most commercial banks look for credit to get tighter earlier this year.

No one lender has said that it was going to be necessary to sell anyone out this year. Only a few borrowers will be asked to refinance their real estate to pay down their operating loan. I am sure that a lot of livestock and machinery are financed at 100% since one comment was made that a few farm sales would be good to find out what used machinery was really worth. One banker noted that his borrowers were in good shape, i.e., their debt to asset ratio was good, but they owed "tons" on their land. It makes one wonder just how good the risk is if the borrower is paying all of that interest. A cash flow problem could arise.

As one can see, one more dry year with low farm prices and even slightly better cattle prices could be devastating to the Region since it is agriculturally oriented.

In summary, I would say that most cattlemen are in trouble. Right now, beer barley is holding up the other end for the farmer who has both potatoes and grain since it has been three (3) years since potato farmers have had a good year. See Attachments.

FARM CREDIT SURVEY

Agricultural Loans

Percent Livestock	65
Percent Grain	5
Percent Potato	0
Percent combination grain and potato	30
Percent combination livestock and farm	

Do you plan to use FmHA guaranteed loans for operating capital? No

If yes, how many? _____

Will you recommend that your borrowers refinance their real estate? Yes

If yes, how many? Two (2)

Do you plan to foreclose on any borrowers? No

Comments:

Most livestock loans in good shape for another year providing water is available. Very particular on loans—margins must be good. Those whose margins get close will refer to FmHA. Some carryover on operating loans but not too much yet. Optimistic for next year on livestock.

Since farmers have been slow selling brew barley and hay, it is hard to tell yet what position they are in.

Another year of drought would be tough on all.

Some people own a "ton" on their land.

FARM CREDIT SURVEY

Agricultural Loans

Percent Livestock	18
Percent Grain	16
Percent Potato	
Percent combination grain and potato	37
Percent combination livestock and farm	29

Do you plan to use FmHA guaranteed loans for operating capital? No

If yes, how many? _____

Will you recommend that your borrowers refinance their real estate? No

If yes, how many? _____

Do you plan to foreclose on any borrowers? No

Comments:

Some people have made more money selling hay the last few years than on livestock or grain and potatoes.

No operating carryovers on livestock.

Grain pay backs are slow coming in because the barley has been slow to move.

003111

FARM CREDIT SURVEY

Agricultural Loans

Percent Livestock	60
Percent Grain	20
Percent Potato	10
Percent combination grain and potato	10
Percent combination livestock and farm	

Do you plan to use FmHA guaranteed loans for operating capital? No

If yes, how many? _____

Will you recommend that your borrowers refinance their real estate? Yes

If yes, how many? As needed

Do you plan to foreclose on any borrowers? No

Comments:

This particular bank has ridden 4 years with his livestock people and will go another year, if bank examiners are not too tough. Many places have been paid off so not too tough for them. Young fellow who bought in high is a tough situation. More optimistic for cattle in 1978. Not committing operating loans yet because of lack of moisture in the mountains. Are working with some carryovers.

Because of need for increased capital for agriculture, the lending limits on small banks are too low and too much money must be participated out to other banks. When over 50% of a loan is participated, local control is lost. Banking laws could force more farm and ranch people to P.C.A.'s.

FARM CREDIT SURVEY

Agricultural Loans

Percent Livestock 3
Percent Grain 20
Percent Potato
Percent combination grain and potato 77
Percent combination livestock and farm

Do you plan to use FmHA guaranteed loans for operating capital? None

If yes, how many? _____ too much hassle

Will you recommend that your borrowers refinance their real estate? Yes

If yes, how many? One (1)

Do you plan to foreclose on any borrowers? Two (2) may be in trouble

Comments:

This particular bank anticipates working with carryovers this next year. Too early to tell yet as not enough hay, grain and potatoes have been marketed yet.

Very tough to figure out an operating loan because expenses seem to go up so fast, especially repairs and supplies.

Most potato and grain farmers can exist on 250/cwt/acre yield at $2.50/cwt and 100/bu brew barley at $5.00/cwt. These prices don't leave room to expand or live "high on the hog."

Farm borrowers are probably 100.

If the drought continues and water tables drop more, then there could be serious problems due to the extensive use of center pivot sprinklers.

003112

MUNICIPAL WATER SUPPLIES

System Description

1. City and County : ROCKVALE FREMONT COUNTY
2. Population Served
   a. Within city limits 359
   b. Total service area 359
3. Water Rights (use a separate page for each right)
   a. Source: Stream X, Spring _____, Well 1.
   b. Source Name: W.H. May Ditch and Oak Creek
   c. Basin Rank: Priorities 1 and 2 on Oak Creek
   d. Appropriation Date: May 31, 1867 and December 30, 1875
   e. Adjudication Date: Earliest 1867 Latest 1916: (See attachments.)
   f. Amount in cfs: Conditional 2.96 cfs and 1.60 cfs.
      Absolute _____
   g. Use: Municipal X, Fire X, Domestic X.
4. Water System
   a. Raw water quality: Additional treatment may be required. Generally Good.
   b. Raw water transmission system: 6" transmission line and 6 infiltration galleries Gravity Flow
   c. Raw water storage volume 1,120,000 gallons capacity.
   d. Treatment plant type Chlorination
   e. Finished water storage volume 1,000,000 gallons: chlorinated in 3 reservoirs
   f. Distribution system: Original system dates back to 1900.
      1. Main sizes & types 8200 of 6" lines and 1700' of 4" pipe.
      2. Leakage rate -0-
   g. Usage statistics
      1. Maximum day (MG) 0.135 MG/day
      2. Maximum hour (MG) 0.00225 MG/day
      3. Average day (MG) 0.054 MG/Day
   h. Service connections
      1. Total 148
      2. Number metered 148
5. Financial
   a. Tap fee $1,000.00
   b. Usage fees First 6,000 gal. is $6.50: typical monthly charge is $12.50 for 12,000 gallons.
   c. Bonded indebtedness -0- (E.M.)
6. Fire Flow Adequacy : Very poor.
   a. Fire insurance classification Class 10
   b. System condition State of very bad repair.
7. General Comments
   a. Anticipated impact of the drought Severe
   b. Actions taken to obtain financial assistance

Dropped out of federal grant application. Residents may attempt to develop new well on their own.

NORTHWEST COLORADO COUNCIL OF GOVERNMENTS

Region XII

FIRE PROTECTION SURVEY FORM

PART A - FIRE DEPARTMENTS Date Information Provided 6/26/75

1. Name of Department Aspen Val fire Dept
2. Name of Department Chief Willard C Clapper
3. Department Phone Number 925-3500
4. Type of Department (Check One)

   A. Municipal
      1. Volunteer ____
      2. Full-Time ____
      3. Combination ____

   B. Fire District
      1. Volunteer X
      2. Full-Time ____
      3. Combination ____

   C. Other
      1. Volunteer ____
      2. Full-Time ____
      3. Combination ____

5. Number of Men in Department

   A. Officers 7

   B. Full-Time ____

   C. Call Men (Paid per call)
      1. Number ____
      2. Amount paid per call ____

   D. Volunteers 34

6. Training

   A. Is local (departmental or on-the job) training available
      1. Yes X
      2. No ____

   B. What other training programs are offered or taken advantage of?

Any special from state or the that we have people who are able to attend.

-1-

7. Fire Station Status

A. Number manned 24 hours _____

B. Number manned Part-Time _____

C. Number unmanned _____

8. Fire Station Conditions

A. Inadequate room for storage and work Good

B. Inadequate room for training and meetings Good

C. Any physical structure deficiencies (Bad floors, walls, etc.) None

D. Other _____

9. Water Supply

A. Central Most

B. Community Cistern _____

C. Tanker Supplied _____

D. Other (Specify) Drafting

10. Fire Hydrants

A. Yes X No _____

B. Size
1. Number 2½ All
2. Number 4½ 50
3. Other(Indicate size _____

C. Age of System (Pipes, Hydrants, Etc.)

Most of our system is under 15 yr old.

11. Is Adequate Hose Available
    A. Yes X No ____

    B. Amount
    1. 1½" 3000 feet
    2. 2½" 15000 feet
    3. 3" none feet
    4. Other none feet

12. Equipment

    A. Aerial(s)
    1. Number 1
    2. Reach(feet) 55

    B. Pumpers
    1. Number 6
    2. Pumping Capacity 5000 (Gal. per minute)

    C. Brush Trucks
    1. Number 0
    2. Pumping Capacity — (Gal. per minute)

    D. Tankers
    1. Tank Capacity —0
    2. Pumping Capacity — (Gal. per minute)

    E. Ambulance(fire department owned)
    1. Available
    (a) Yes —
    (b) No X

13. Radio Equipment

    A. Age 5 yr

    B. Condition Good.

14. Community Fire Insurance Classification 8

15. Department expenditure for last year if information is available.

    A. Year 1977

    B. Amount $ ____

16. Is separate Fire Department tax levied and collected?

    A. Yes V
    1. Rate 1.145 mill.
    2. Amount and year for last year if information is available $ 70,000.00 1977 (year)

    B. No ____

17. Is an appropriation from the general fund made annually from your local taxing government (city, village, district)?

A. Yes ✓
1. Amount $ 6,000.00
2. Year 1977

B. No _____

18. Is money raised for the Department by any other method?

A. Yes
1. Method Yes Lad Clifford fund Raisin 4th July. Turkey Shoot + Movie Special

2. Amount usually raised $ 4,000.00

B. No _____

19. Number of fire calls last year

A. Total Calls 133

B. Fire calls within primary area of responsibility all

C. Fire calls outside limits —

D. Emergency calls (Other than fire calls) 63

20. Annual fire loss for last year if available.

A. Year 1977

B. Amount $ 180,000.00

21. Is contract fire protection available to areas outside the primary areas of responsibility.

A. Yes _____ Where _____

B. No 770

C. On what basis (special arrangement, charge, etc.,) _____

22. What geographic area does the department cover(special district boundaries, city, etc.) 14 mi Weston Hyway 82 from aspen 4 mile East on Hyway 82 from aspen

23. Any areas covered that are over 10 miles distant?_____. (Please indicate on map)

24. Method of notifying firemen of a fire if not at station.

A. Telephone _____

B. Siren X

C. C. B. _____

C. Other X

Pagers

25. Any buildings, structures or locations of special hazard for which adequate equipment, training, or protection is not available.

Airport if large aircraft comes in

26. What improvements are planned for the Department?

More training & upgrade of present Equip.

27. What are the needs of the Department or area in terms of physical needs or changes in present law, political organization and finances, or other needed improvements. Include all problems. obstacles to their solution, and recommendations.

PART B - For areas not located within any Fire District.

Date Information Provided 6/26/78

1. Name of person contacted _____

2. Organization _____

3. Fire Authority for Area _____

4. Size of Area _____ sq. miles (Indicate on Map)

PART B - Continued

5. Population of area _____

6. Are contracted services with a fire district available? NO

7. Number of fires in 1977.

A. House _____ D. Commercial Est. _____

B. Farm Building _____ E. Other(Specify) _____

C. Grass _____ _____

8. Estimated average dollar loss per fire $ _____

9. Number of injuries _____ Fatalities _____

10. Are any trained firefighters available in the area?

A. Yes _____ Number _____

B. No _____

11. Are any firefighting vehicles available in the area?

A. Yes X Kind State forester Number ?

_____ _____

_____ _____

B. No _____

12. What are the major structures, businesses, industries or major fire hazards located in the area? No

_____

_____

_____

13. What is done if a fire begins in the area for:

A. Structural _____

B. Non Structural _____

14. Has any attempt been made in the past to provide fire protection in other than the present form: _____

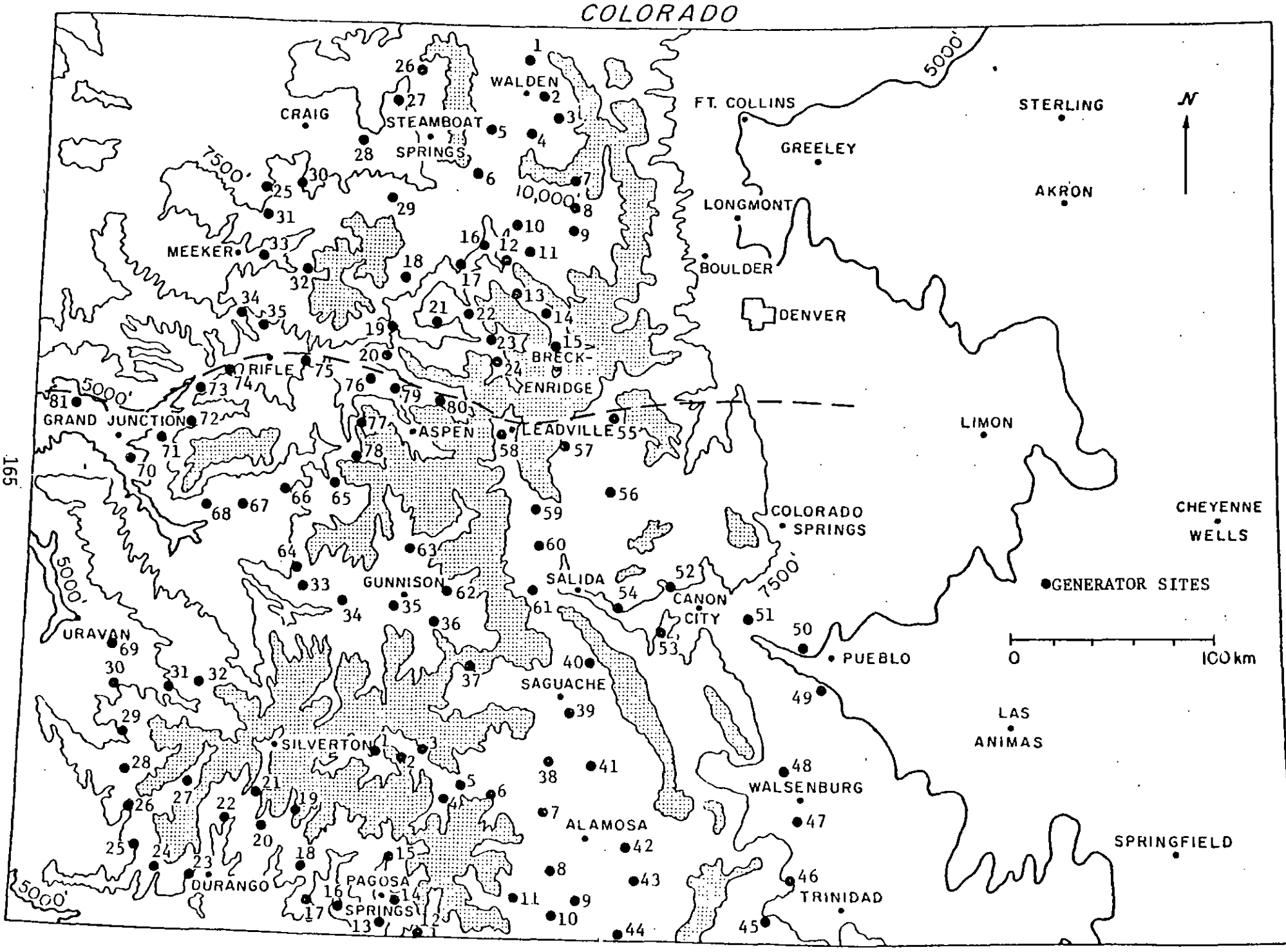
A. What type _____

B. What form of financing was proposed _____

APPENDIX G

Maps Showing Generator Placements During Colorado's Two Winter Weather Modification Programs

Source: Department of Atmospheric Science,
Colorado State University



Generator Locations during Second Weather Modification Program

Generator and Monitoring Locations during First Weather Modification Program

APPENDIX H

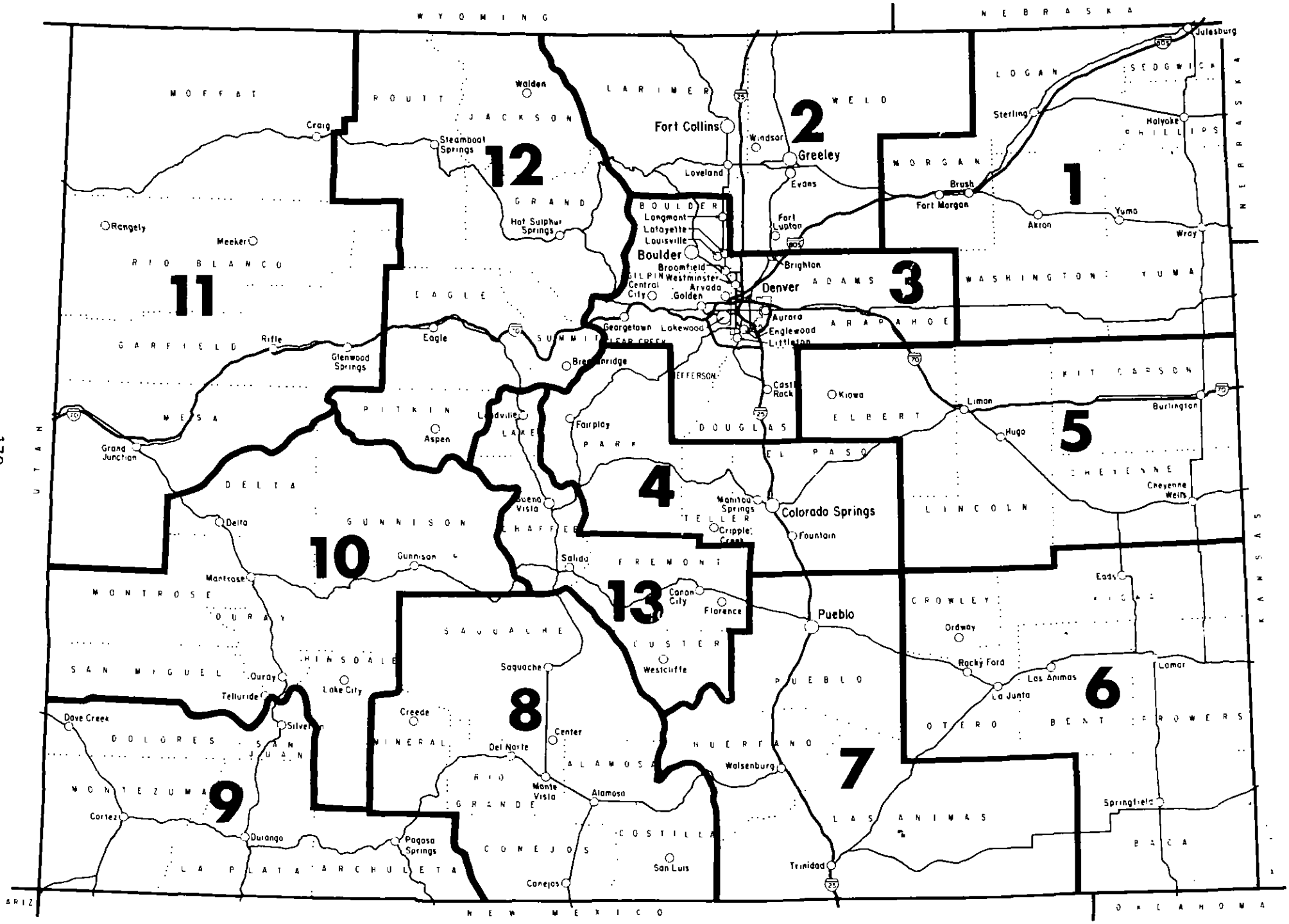
Statement of Environmental Considerations

Statement of Environmental Considerations

The purpose of the Colorado Drought Coordination Project was to coordinate the drought efforts of federal, state, and local jurisdictions within the State of Colorado and to assure the delivery of technical assistance to individuals and municipalities through substate organizations within the State's 13 planning and management districts. The activities associated with fulfilling the purpose of the Colorado Drought Coordination Project were primarily the dissemination of information and the coordination of drought mitigation activities. Accordingly, the activities assumed within the context of the Colorado Drought Coordination Project had no direct impact on the physical environment anywhere in the State of Colorado.

It is necessary to provide a brief explanation of, first, the differences between the regional substate organizations and, secondly, the constraints upon their management jurisdictions. The State of Colorado is divided into 13 planning and management regions. (See accompanying figure on page 172.) Although the planning and management regions are multijurisdictional areas which exist independently of the substate regional organization, the boundaries of the managerial jurisdictions of each substate regional organization utilized correspond identically to the boundaries of the planning and management regions. Eleven of the planning and management regions are served by Regional Councils of Governments, one is served by a Regional Planning Commission (Region 10), and one is served by a Regional Commission (Region 9). Although the statutory basis of the Regional Councils of Government, Regional Planning Commission, and Regional Commission are somewhat divergent, they were able, functionally, to perform all the drought activities for which they contracted with the State. Another common factor among them is that they are all voluntary associations of local governments, organized to perform a variety of functions ranging from regional planning to various deliveries of services. Each regional substate organization is organized under a framework whereby each county and municipality within a planning and management region may choose to participate in its substate regional organization. Although some local entities choose not to participate, most do. The regional substate organization may not carry out any of its management activities within the boundaries of those local jurisdictions which do not choose to participate. The mode among those jurisdictions which do choose to participate is one in which each county within a planning and management region selects an individual to represent it as a voting member on

the governing board of the substate regional organization. Also, all participating municipalities within each county are represented by one voting member per county. Representatives to the regional organizations are usually elected officials, although in some instances heads of special districts have served. The membership, upon approving program proposals, then, lends its sanction to the substate regional organization to administer programs within its local, participating jurisdictions.


WYOMING
NEBRASKA
MOFFAT
ROUTT
JACKSON
LARIMER
WELD
LOGAN
SEDGWICK
PHILLIPS
Julesburg
Sterling
Holyoke
Craig
Walden
Steamboat Springs
Fort Collins
Windsor
Greeley
Loveland
Evans
MORGAN
Brush
Fort Morgan
Akron
Yuma
Wray
NEBRASKA
12
2
1
GRAND
BOULDER
Longmont
Lafayette
Louisville
Boulder
Broomfield
Westminster
Arvada
Golden
Central City
GILPIN
Fort Lupton
Brighton
Denver
ADAMS
ARAPAHOE
WASHINGTON
YUMA
Rangely
Meeker
RIO BLANCO
11
3
EAGLE
Georgetown
Lakewood
Aurora
Englewood
Littleton
CLEAR CREEK
SUMMIT
GARFIELD
Rifle
Eagle
Glenwood Springs
Breckenridge
JEFFERSON
Castle Rock
Kiowa
Limon
KIT CARSON
Burlington
MESA
PITKIN
Aspen
Leadville
LAKE
Fairplay
PARK
DOUGLAS
ELBERT
Hugo
5
Grand Junction
DELTA
Buena Vista
CHAFFEE
EL PASO
4
Manitou Springs
Colorado Springs
Cripple Creek
TELLER
Fountain
CHEYENNE
Cheyenne Wells
LINCOLN
Delta
GUNNISON
10
Gunnison
Salida
FREMONT
Montrose
MONTROSE
OURAY
Canon City
Florence
13
Pueblo
CROWLEY
Ordway
Eads
SAGUACHE
CUSTER
Westcliffe
SAN MIGUEL
Ouray
HINSDALE
Lake City
Telluride
Saguache
PUEBLO
Rocky Ford
Las Animas
La Junta
Lamar
6
Dove Creek
Silverton
Creede
8
Center
OTERO
BENT
PROWERS
DOLORES
SAN JUAN
MINERAL
Del Norte
HUERFANO
Walsenburg
ALAMOSA
RIO GRANDE
Monte Vista
Alamosa
7
MONTEZUMA
9
Cortez
Durango
Springfield
LAS ANIMAS
COSTILLA
CONEJOS
Pagosa Springs
San Luis
Trinidad
BACA
LA PLATA
ARCHULETA
Conejos
ARIZONA
NEW MEXICO
OKLAHOMA
UTAH
KANSAS

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APPENDIX J

Distribution Lists

Distribution List
Draft Report

George Del Fuoco	Economic Development Administration
Paula Herzmark	Colorado Department of Local Affairs
Harris Sherman	Colorado Department of Natural Resources
James Monaghan	Colorado Office of the Governor
Morgan Smith	Colorado Department of Agriculture
General William Weller	Colorado Department of Military Affairs
C. J. Kuiper	Colorado Division of Water Resources
Felix Sparks	Colorado Water Conservation Board
Ron Zeleny	Colorado State Forest Service
Dr. Tom McKee	Colorado Climatology Office
Lowell Watts	Colorado State Extension Service
Dr. Henry Caulfield	Colorado State University
Jack Truby	Colorado Division of Disaster Emergency Services
Dr. Craig Liske	Western Governor's Policy Office
George Lamb	Colorado Department of Agriculture
Colleen Murphy	Colorado Division of Local Government
Maryjo Downey	East Central Council of Government
Senator Fred Anderson	Colorado State Senate
Senator Tilman Bishop	Colorado State Senate
Representative Robert Burford	Colorado House of Representatives
Representative Forrest Burns	Colorado House of Representatives
Christian Wunsch	Former Member, Colorado State Senate
Paul Swalm	Former Member, Colorado House of Representatives

Distribution List
Final Report

Governor Richard D. Lamm	
James Monaghan	Colorado Governor's Office
Lee White	Colorado Department of Administration
Morgan Smith	Colorado Department of Agriculture
Robert Ore	Colorado Department of Labor
Paula Herzmark	Colorado Department of Local Affairs
Harris Sherman	Colorado Department of Natural Resources
General John France	Colorado Department of Military Affairs
David Foote	Colorado Office of State Planning and Budgeting
George Lamb	Colorado Department of Agriculture
Colleen Murphy	Colorado Division of Commerce and Development
Dr. Philip Burgess	Western Governor's Policy Office
Dr. Craig Liske	Bonneville Associates
C. J. Kuiper	Colorado Division of Water Resources
J. William McDonald	Colorado Water Conservation Board
John Byrne	Colorado Division of Disaster Emergency Services
Dr. Jack Truby	Colorado Division of Disaster Emergency Services
Thomas Borden	Colorado State Forest Service
Ron Zeleny	Colorado State Forest Service
Lowell Watts	Colorado State Extension Service
Dr. Tom McKee	Colorado Climatology Office
Dr. Henry Caulfield	Colorado State University
Lewis Grant	Colorado State University
George Del Fuoco	Economic Development Administration
Arlo Beaman	United Bank of Pueblo
Ken Bueche	Colorado Municipal League
Don Beckett	Former Moffat County Commissioner
Representative Forrest Burns	Colorado House of Representatives
Representative Robert Burford	Colorado House of Representatives
Paul Swalm	Former Member, Colorado House of Representatives
Senator Fred Anderson	Colorado State Senate
Senator Tilman Bishop	Colorado State Senate
Christian Wunsch	Former Member, Colorado State Senate
Ted Wickham	Kit Carson County Commissioner
Earl Phipps	Northern Colorado Water Conservation District
Bud Bishopp	Agricultural Stabilization and Conservation Service
Gary Bennett	Colorado State University
Ernie Phillips	Farmers Home Administration
Doug Graves	Small Business Administration
Richard Mullins	Northeastern Colorado Council of Governments
Jonathan M. Rutstein	Larimer-Weld Regional Council of Governments

Robert Farley	Denver Regional Council of Governments
Roland Gow	Pikes Peak Area Council of Governments
Maryjo Downey	East Central Council of Governments
Lou McVey	Lower Arkansas Valley Council of Governments
Howard Whitlock	Pueblo Water Board
Randall Phillips	San Luis Valley Council of Governments
Richard Korbely	San Juan Regional Commission
Stephen Pratt	District 10 Regional Planning Commission
Robert Demos	Colorado West Area Council of Governments
Thomas Gloss	Northwest Colorado Council of Governments
Frank Cervi	Upper Arkansas Area Council of Governments
Frederick Caruso	Colorado Water Congress
Jack Barnett	Western States Water Council
Dr. Gilbert White	Natural Hazards Research and Applications Information Center
Don Eddy	Federal Emergency Management Agency
Franklin Eddy	Rio Grande Water Conservancy District
Dr. Barry Crawford	National Science Foundation
Harry Bower	Colorado Counties, Inc.
Norman Evans	Colorado State University
Senator William Armstrong	United States Senate
Senator Gary Hart	United States Senate
Representative James Johnson	United States House of Representatives
Representative Ray Kogovsek	United States House of Representatives
Representative Kenneth Kramer	United States House of Representatives
Representative Patricia Schroeder	United States House of Representatives
Representative Tim Wirth	United States House of Representatives
Colorado State Library	Denver, Colorado
EPA Region VIII Library	Denver, Colorado