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THE GOVERNOR'S REPORT
THE POTENTIAL FOR DROUGHT
IN MONTANA FOR
2001

The Honorable Governor Judy Martz

Prepared by
Montana Drought Advisory Committee

May 2001

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SUMMARY

The Montana Drought Advisory Committee met February 21, March 21, and April 19, 2001 to assess moisture and water supply conditions pursuant to MCA 2-15-3308. Member agencies reported that, generally, the state's projected water supply and current moisture conditions range from below to well below average. At this time, the likelihood of drought impacts in Montana, through the month of June, is *Very High* for livestock grazing and water supplies, ground water uses, and surface water uses, including irrigation and stream fisheries, and in river basins having well below average water content of mountain snowpack, low soil moisture, and without access to reservoir water. The likelihood for impacts from drought is *High* for dryland farming, wildfire on range lands, and surface water uses in river basins with below average mountain snowpack, low soil moisture, and where reservoir storage levels have yet to recover from the Drought of 2000. The committee's *Drought 2001* Internet web site can be seen at: <http://nris.state.mt.us/drought>

Mountain Snowpack

The Natural Resource Conservation Service (NRCS) reported that the snow water equivalent (SWE) of mountain snowpack ranges from *Below Average* (71 to 90 percent) to *Much Below Average* (61 to 70 percent) throughout the state. The SWE of the upper Missouri and upper Yellowstone River basins is about 25 percent below average. Snow water content of mountain snowpack west of the Continental Divide currently ranges from about 25 to 35 percent below the 30-year average for the period 1961 through 1990.

Reservoir Storage

The U.S. Geological Survey April 2, 2001 *Report of March Streamflow and Reservoir Storage* reported that four of six of the state's major hydroelectric production reservoirs had normal water storage levels for the month of March. Storage at three of four major irrigation reservoirs, remained below average for March. The U.S. Bureau of Reclamation reported that, as of April 1, 2001, four of nine water storage projects had contents within the normal to slightly above range, one was 80 percent of normal, and four were less than 65 percent of average. Fifty percent of state-owned water storage projects have contents that are below 60 percent of average, and the remaining 50 percent of state projects range between 80 and 100 percent of average for this time of year, with a few exceptions.

Precipitation

Precipitation across Montana's mountains and valleys has been below average thus far in 2001. According to the NRCS April 1, 2001 Basin Outlook Report, the period of October 1, 2000 through March 31, 2001 (Water Year, through March) brought below average precipitation (71 percent) to Montana east of the Continental Divide and well below average precipitation (60 percent) to mountains and valleys west of the Divide. However, a number of valley and plain locations, statewide remain very dry, due to last year's severe drought, and low fall and winter precipitation. March precipitation has been below normal statewide (68 percent). According to the National Weather Service, many locations in the northeast, north central, and central climate

divisions received less than 50 percent of the average monthly moisture for March. March precipitation totals for valley locations across Montana have a long-term average of between one-half and one inch of moisture. Precipitation for the month of April, was above average across most of the state and ranged between 80 and 135 percent of average. Total April precipitation for valley locations average between one inch and one and one-half inches of moisture.

Soil Moisture

Soil moisture across the state, according to the April 28, 2001 Palmer Drought Severity Index by climate division, is currently rated as *Extreme drought* in the southwest and south-central divisions, *Moderate Drought* in the western division, *Mild Drought* in the central division, and *Incipient Drought* in the north-central, northeast, and southeast divisions. Recent precipitation has brought needed moisture to dry-land farming and range regions of the state that were very dry in the summer and fall of 2000. However, moisture in the subsoil layer remains depleted.

Streamflow

The U.S. Geological Survey (USGS) reported that during April 2001, seven of eight long-term stream-gauging stations had monthly mean streamflow below the normal range, and one was in the normal range. Streamflow on the Yaak River near Troy was the lowest on record for the month of April. Streamflow for the Yellowstone River at Corwin Springs was in the normal range, due in part to a short period of unseasonably warm temperatures that brought higher than average flows to the river. The Upper Yellowstone River is expected to have streamflow of about 60 percent of average for the summer. The NRCS *Montana Basin Outlook Report, April 1, 2001* indicated that, east of the Continental Divide, streamflow is forecasted to range from 37 to 43 percent of normal and west of the Divide, between 46 and 50 percent of normal from April through July. Currently, streamflow forecasts are expected to be well to severely below average for spring and summer.

Conclusion

At this time, the probability of drought impacts in Montana through June is *Very High* for, livestock water supplies, ground water uses, and surface water supplies in river basins that have well below mountain snowpack and without reservoir storage. The potential for impacts of drought is *High* for surface water uses in river basins with below average snowpack. Water users with access to water storage facilities will likely face shortages before July. Subsoil moisture, municipalities using groundwater, stream fisheries, livestock water, and range grazing conditions, and agricultural and tourism economies are areas of serious concern. Timely and above average precipitation through the spring and summer months will be necessary to replenish sources of groundwater, to ensure normal dry-land farming production, and to maintain adequate streamflow and low wildfire danger.

INTRODUCTION

The Montana Drought Response Plan defines drought as:

Drought is an extended period of below normal precipitation that causes damage to crops and other ground cover; diminishes natural streamflow; depletes soil and subsoil moisture; and because of these effects, causes social, environmental, and economic impacts to Montana.

In 1991, Montana's Fifty-second Legislature passed House Bill 537, creating a state drought advisory committee and defining its responsibilities. The law states:

The Drought Advisory Committee shall submit a report to the governor describing the potential for drought in the coming year. If the potential for drought merits additional activity by the drought advisory committee, the report must also describe:

- (a) Activities to be taken by the drought advisory committee for informing the public about the potential for drought;*
- (b) A schedule for completing activities;*
- (c) Geographic areas for which the creation of local drought advisory committees will be suggested to local governments and citizens; and*
- (d) Requests for the use of any available state resources that may be necessary to prevent or minimize drought impacts (Section 2-15-3308 MCA 1991).*

The Report

This report is divided into two sections. The first section, *Current Water Supply and Moisture Conditions*, includes current data on the state's water storage supply, soil moisture, mountain snowpack, streamflow, weather and climate forecasts, precipitation, and wildfire potential. The second section, *Responses to Water Supply and Moisture Conditions*, provides an assessment of the probability of drought in coming months given current conditions, and the Drought Advisory Committee's response to that assessment.

The Department of Natural Resources and Conservation (DNRC) prepares the *Water Supply and Moisture Condition Report* monthly, from February through October of each year. This report summarizes current and projected water supplies and soil moisture conditions collected by a variety of federal and state agencies. It is used by the Drought Advisory Committee (committee) to monitor water supply and moisture conditions as part of the state's drought management activities. The *Governor's Report* serves as the water supply report for the month of April, but also includes an assessment of the potential for drought and a summary of appropriate responses, considering the findings of the report and the types of impacts from drought anticipated in coming months.

Included are data from the U.S. Geological Survey (USGS), National Weather Service (NWS), U.S. Bureau of Reclamation, Natural Resources Conservation Service (NRCS), DNRC, and the Montana Agricultural Statistics Service. The NRCS generates the Surface Water Supply Index (SWSI) for 52 Montana river basins. The Palmer Drought Severity Index (PDSI), which rates soil moisture, is provided by the Climate Prediction Center for each of the seven climate divisions of the state.

CURRENT WATER SUPPLY AND MOISTURE CONDITIONS

Surface Water Supply Index

The NRCS generates the Surface Water Supply Index (SWSI) as an index of surface water availability for 52 Montana river basins based on mountain snowpack, mountain precipitation, streamflow, soil moisture, and reservoir storage. The SWSI is used to forecast surface water supply, and is best applied to mountainous areas with surface water supplies that are primarily dependent on spring runoff of mountain snowpack (**Figure 1. SWSI Values as of April 1, 2001**).

As of April 1, 32 of 48 of the state's river basins were ranked as *Extremely dry* (-3.0 to -4.0). Fourteen of the 32 river basins ranked as *Extremely dry* have values between -3.5 and -4.0. Fourteen river basins are ranked as *Moderately dry* (-2.0 to -3.0) and two river basins are ranked as *Slightly dry* (-1.0 to -2.0). (**Table 6. Montana Surface Water Supply Indices, April 1, 2001**).

Mountain Snowpack

Most of the annual streamflow in Montana originates as snowfall that accumulates high in the mountains during fall, winter, and spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Aquifers, lakes, streams, and reservoirs are largely dependent on runoff from mountain snowpack. Montana's mountain snowpack accumulates at a relatively constant rate from November through mid-April of each year. Mountain snowpack generally accounts for 80 percent of streamflow in spring and early summer in western Montana.

The NRCS Snow Survey maintains a network of automated remote gauging stations known as the SNOTEL system throughout the mountainous regions of the state. The stations in this system record snow water equivalent (SWE), total precipitation, and temperature, and transmit the data daily, via telemetry to a central data collection facility. NRCS and National Weather Service hydrologists formulate monthly streamflow forecasts for the coming spring and summer, which are summarized monthly in NRCS Montana Basin Outlook Reports. The NRCS "water year" for data collection and record keeping commences on October 1 of each year and ends September 30 of the following calendar year. The database used by NRCS is the period of record 1961-90.

According to the NRCS *Montana Basin Outlook Report April 1, 2001*, water content of the state's mountain snowpack ranged from 51 percent of average in the Kootenai River basin to 71 percent of average in the Missouri Headwaters Mainstem River basin. Almost all major river

basins in Montana currently have mountain snowpack SWEs ranging from well below average to severely below average for this time of year. Seven Montana river basins set new record low values for SWE as of April 1, 2001, the Upper Clark Fork River basin tied its record low for the date, and three basins recorded the second lowest water content of record for April 1. Thirteen of 21 Montana river basins had SWE values of less than 60 percent of average.

Mountain precipitation in April brought the snow water content for the Middle Fork of the Flathead River up about 11 percent, Hungry Horse Reservoir up 16 percent, and The Sun-Teton-Marias ten percent. As of April 16, the Missouri River headwaters were 69 percent of average with the Jefferson River basin at 71, the Madison at 65, and the Gallatin at 70 percent of average. The lower Missouri River basin, including the Sun-Teton-Marias was 79 percent and Smith-Judith-Musselshell basin was 81 percent of average. The upper Yellowstone was 69 percent and the lower Yellowstone 69 percent of average. West of the Continental Divide, the Bitterroot River basin has the least amount of snow water remaining at 61 percent of average, and the highest water content of the five west-side basins was the Flathead River basin at 75 percent of average. (See **Table 1. Remaining Montana Snowpack and Year-to-Date Precipitation**).

Reservoir Storage

Storage in the major reservoirs across the state was 121 percent of average and 122 percent of levels recorded last year at this time, according to the NRCS *April 1, 2001 Basin Outlook Report*. It should be noted, however, that reservoir operators are bringing reservoir levels up earlier than usual due to the below average water content of the snowpack remaining. West of the Continental Divide, reservoir storage was 139 percent of average and 147 percent of April 1, 2000 levels. East of the Divide, storage was 97 percent and 92 percent of storage last year.

Reclamation will continue to release water from projects to provide adequate instream flow for fisheries downstream of projects, but is gradually increasing the storage of water in anticipation of dry conditions and high demand for releases this growing season. Reclamation expects some of its projects to maintain normal storage levels through June with the exceptions of Nelson and Fresno reservoirs on the Milk River system, and Sherburne on the St. Mary river system.

At the April 19, state Drought Advisory Committee meeting, Reclamation announced that Sherburne will see storage depleted quickly and Gibson (Sun River) would fill to about 90 percent of average. Irrigation from Fresno Reservoir may be suspended until June. Canyon Ferry Reservoir will not reach its full pool unless inflows improve. (**Table 3. U.S. Bureau of Reclamation Reservoirs**).

State-owned reservoir storage levels currently range from about 25 to 90 percent of normal, with a few exceptions. (**Table 4. Status of State-Owned Reservoirs, April 1, 2001**). Storage contents are markedly less than levels reported at this time last year at projects in the Musselshell, Smith, and Sun River basins. Yellow Water, Ackley, and Nilan reservoirs are well-below average. Reservoir operators have recently cut back on the release of stored water in anticipation of below average streamflow runoff from the mountain snowpack. Without average to above average spring precipitation, shortages are to be expected at a number of state-owned reservoirs by early summer.

Streamflow

The U.S. Geological Survey (USGS) operates and monitors numerous stream-gauging stations across the State of Montana. Eight long-term stream gauging stations are reported in **Table 2. April 2001 Streamflow in Montana**. For the month of April, average monthly streamflow was normal at one station and below normal at seven of the eight long-term streamflow-monitoring stations reported. Comprehensive and accurate streamflow monitoring begins in late April of each year, after rivers are clear of ice.

According to the May 1, 2001 USGS *Report of March Streamflow and Reservoir Storage*, the mean April flow for the Yaak River near Troy was 21 percent of the 1966-95 average, setting a new record low for April. Streamflows of the Clark Fork River at St. Regis, the Middle Fork of the Flathead River near West Glacier, and the Blackfoot River near Bonner were 47, 32, and 45 percent of average, respectively, for the month of April. East of the Continental Divide, the Yellowstone River at Billings was 49 percent of average. Average April streamflow for the Marias River near Shelby was 39 percent of average, and the Yellowstone River at Corwin Springs was 82 percent of average.

According to the NRCS *April 1, 2001 Montana Basin Outlook Report*, streamflows statewide are forecasted to range from well below average to severely below average for the period of April through July. Streamflow west of the Continental Divide is forecasted to range between 46 and 50 percent of average. Streamflow of the upper Clark Fork River is expected to range from 50 to 59 percent. The lower Clark Fork should range between 42 and 45 percent, the Bitterroot River will range from 47 to 51 percent, the Flathead River from 47 to 51 percent, and the Kootenai River from 42 to 45 percent of the 30-year average.

East of the Continental Divide, streamflow for the Missouri River is forecasted to range from 46 to 54 percent of average, and for the Yellowstone River, 42 to 46 percent of average for the for same period. It is very important to note that the foregoing streamflow forecasts assume average spring precipitation to occur. Water supply managers and planners are advised by NRCS to consider referencing the 70 percent exceedance figure in making risk assessments (the flow that would be exceeded in seven of ten years).

Soil Moisture

As of April 16, 2001, the Montana Agricultural Statistics Service reported that topsoil moisture across the state was rated as 5 percent surplus, 53 percent adequate, 30 percent short, and 12 percent very short. Subsoil moisture was rated at 3 percent surplus, 26 percent adequate, 32 percent short, and 39 percent very short. Table 5 lists the Palmer Drought Severity Index values for April 14, 2001, by climate division. Snow cover in grain-growing regions helped prevent wind damage to winter wheat with 46 percent of the crop rated as *none*. Winter wheat was rated 4 percent excellent, 27 percent good, 57 percent fair, 3 very poor, and 9 percent poor. Recent precipitation has improved topsoil moisture enough to plant seed and get spring grains up, but subsoil moisture remains low. Subsoil moisture has been depleted as a result of dry conditions dating to summer 1999.

Precipitation

The Weather Service reported that for the period October 1, 2000 through March 31, 2001 (Water Year), precipitation statewide ranged from below average, to average (**Figure 2. Montana Precipitation for the Water Year**). The Weather Service reported that precipitation for the period March 1-31 was average to well below average for most of Montana. The north-central division received 39 percent of average March precipitation, the northeast 12 percent, the central 48, the southwest 47, the south central 65, and the southeast division 101 percent of average. The western climate division received 73 percent of average March precipitation.

April precipitation, statewide has been near average through the end of the month. The western climate division was 135 percent of average. The southwest and north central divisions were 121 and 112 percent of average, respectively. The central, and south central divisions are at 103 and 94 percent, and the northeast and southeast divisions received 118 and 80 percent of the long-term average for moisture during the month. The following table summarizes precipitation at valley locations through April 30, 2001:

Precipitation Statewide, October 1, 2000 - April 30, 2001
Percent of Average (Preliminary)
National Weather Service

Division	10/1/00 – 4/30/01*	3/1/01 – 3/31/01	4/1/01 – 4/30/01*
Western	99	73	135
Southwest	104	47	121
Northcentral	80	39	112
Central	90	48	103
Southcentral	74	65	94
Northeast	113	12	118
Southeast	99	101	80

* Data preliminary – NWS, 5/7/01

According to the NRCS *April 1, 2001 Montana Basin Outlook Report*, mountain and valley precipitation for the period of October 2000 through March 2001 was 71 percent of average and 83 percent of last year east of the Continental Divide, and 60 percent of average and 60 percent of last year west of the Divide. March mountain and valley precipitation was 73 percent west of the Divide and 64 percent east of the Divide.

According to the *Montana Climate Atlas (Caprio and Nielsen, 1992)*: *Mountain precipitation west of the Continental Divide decreases in April but increases greatly east of the Continental Divide. The major increase shifts from the southern plains to the central and eastern plains as moisture from the Gulf of Mexico and Pacific Coast penetrates northward. In April, wet snow or rain typically leaves more than an inch of precipitation across the southern tier of the state. Drought years are notably linked with the failure of these early season storms. Mountains along the Continental Divide in the far north and south of the state normally receive more than six inches of precipitation in April.*

The Palmer Drought Severity Index

The Palmer Drought Severity Index (PDSI) indicates the long-term effects of precipitation shortfalls to soil moisture in rangeland, dryland crop areas, and timberlands. The PDSI values for April 28, 2001 indicate that severe drought conditions are present in some areas of Montana at this time. The National Weather Service's Climate Prediction Center provides a composite Palmer value for each of the seven climate divisions of the state. Values currently range from -4.26 and -4.13 (*Severe drought*) for the southwest and south central divisions to *Normal* for the southeast, northeast, and the north central divisions at -0.88, -0.69, and -0.94. The western and central divisions had PDSI values ranked at -2.34 and -1.91, respectively (*Mild drought*).

It should be noted that the use of one composite Palmer value for each geographic division often fails to identify local "pockets" of low soil moisture. The committee relies on local information from cooperative observers and precipitation figures and maps to identify areas of low soil moisture average (see **Map Figure 1. Montana Precipitation for March 2001**). The PDSI is based on measured precipitation, estimated evaporation, and plant transpiration, and local climatic characteristics (**Table 5. Palmer Drought Severity Indices in Montana**).

Weather and Climate Forecasts

Climate, or long-lead, forecasting decreases in reliability as summer approaches. According to the National Climate Prediction Center (CPC) 90-day long-lead outlook, temperatures for the period of May through July are forecast to be normal with exception of the western one-third of the state, which has a 5 percent probability of being from 0 to 5 percent above average. The CPC forecasts precipitation for the period of May through July to be within the normal range, or "climatology."

The 30-day forecast for precipitation favors "relatively wet early summer conditions in the Pacific Northwest," although only extreme western Montana may be influenced by Pacific Northwest forecasts and conditions. The precipitation forecast goes on to state, "Even if above median precipitation falls in those regions, and the forecast probabilities are quite low, it is highly unlikely to be sufficient to significantly improve water supply conditions since normals are very low."

Wildfire Potential

The Montana DNRC and Northern Rockies Fire Coordination Center is currently developing the Wildland Fire Assessment Outlook for the 2001 fire season. This assessment will be available the week of May 10, 2001 on the NRCC Web Page: <http://www.fs.fed.us/r1/fire/nrcc/>

As of April 14, 2001 DNRC and the Northern Rockies Fire Coordination Center predicts the wildfire severity potential to be "*Normal*" for the Northern Rockies for the period of April 5 through the end of May, 2001. For the remainder of the season, the "Potential for Serious / Critical Fire Problems is ranked as *Above Normal*."

At the committee's April 19 meeting, concern was expressed regarding dry conditions in heavily forested northwest Montana. The DNRC committee member said that moisture in April, May, and June will set the stage for the wildfire season. With normal recent precipitation and temperatures "green-up" is just beginning at the lower elevations. Potential for large fire growth in the fine fuels continues until green-up has occurred. The 30-day climate forecasts currently call for normal precipitation and temperatures.

RESPONSES TO WATER SUPPLY AND MOISTURE CONDITIONS

At this time, the probability of drought impacts in Montana through June is *Very High* for, livestock water supplies, ground water uses, and surface water supplies in river basins that have *well below* mountain snowpack and without reservoir storage. The potential for impacts of drought is *High* for surface water uses in river basins with *below* average snowpack.

Water users with access to water storage facilities will likely face shortages, but not to the extent of users without reservoir water. Subsoil moisture, municipalities using groundwater, stream fisheries, livestock water, and range grazing conditions, and agricultural and tourism economies are areas of concern. Timely and average to above average precipitation through the spring and summer months will be necessary to replenish sources of groundwater, to ensure normal dry-land farming production, and to maintain adequate streamflow and low wildfire danger.

However, since drought conditions have carried over from 2000 and are present in a number of areas of the state, the *Drought Alert* status was announced on April 2 for all 56 Montana counties, consistent with the *Montana Drought Response Plan*. The committee will hear updates regarding water supply and moisture conditions at its scheduled May 17, June 14, and August 16, 2001 meetings. In anticipation of further progression of drought conditions and resultant impacts, meeting dates have been scheduled monthly, through the month of September.

The Montana Drought Response Plan

The drought plan's initial level of response, *Drought Alert*, was triggered by many SWSI values of -2.5 or less, and by several PDSI values of -3.0 or less. Forty of 48 river basins, or over 80 percent, had SWSI values of -2.5 or less. April 28, 2001 PDSI figures indicated two of seven climate divisions with values below -4.0. The southwest and south central divisions were -4.26 and -4.13, respectively, or *Extreme Drought*.

The *Severe Drought*, or highest level of response, is not activated before May 15 and must be accompanied by SWSI values of -3.5 or less, and/or PDSI values of -4.0 or less. Currently, there are 14 of 48 basins with SWSI values of -3.5 or less, and two climate divisions with PDSI values of -4.0 or less. The Committee will review the *Severe Drought* status on May 17.

Currently, there are eleven river basins with SWSI values of -3.7 (*Extremely Dry*) or less in Montana, including the Dearborn, Big Hole, Clarks Fork of the Yellowstone, and Powder rivers east of the Continental Divide, and the Tobacco, North and Middle Forks of the Flathead, Stillwater / Whitefish, Swan, Blackfoot, and Bitterroot rivers west of the Divide (see **Table 6. Montana Surface Water Supply Indices, April 1, 2001**).

According to the NRCS, the SWSI forecasts water supply for the coming month and assumes average precipitation for that period. NRCS has advised water supply managers and water use groups to use a conservative approach for planning purposes, suggesting that the figures for what is likely to occur in 7 of 10 years be used rather than the 50 percent, or *most likely* figure in its monthly *Montana Basin Outlook Report*. This will prepare those who depend upon surface water supplies for an outcome of below average precipitation. Surface water supply for water users is assessed by the first week of each month by NRCS and included in its *Montana Basin Outlook Report*. Mountain precipitation between April 1 and April 16, 2001 brought snow water equivalent figures up 10 to 15 percentage points, which had a positive effect on SWSI values and streamflow prospects. The surface water supply for the season will become more apparent following runoff of the mountain snowpack, over the next six weeks.

Support For Watershed Groups and Local Drought Committees

In the last week of March, a letter was mailed from Drought Committee Chairman Lieutenant Governor Karl Ohs to all 56 Montana county commissions advising commissioners of the activated *Drought Alert* status. Copies of the letter were also sent to all of the state's conservation districts and to each county disaster and emergency services official. The letter strongly encouraged the convening of local drought committees to begin the process of local drought planning and provided the phone and e-mail address of the committee staff as a contact point for inquiries. The letter also identified the *Drought 2001* Internet web site, <http://nris.state.mt.us/drought> as a source of planning assistance. Located under the title, *What You Can Do – What Communities are Doing*, is a list of both watershed groups and county local drought committees with materials such as membership lists, agendas, and meeting minutes to provide direction for newly formed local drought committees.

Drought committee staff has been in contact with a number of county commissions over the last several weeks including Stillwater, Garfield, Teton, Liberty, Toole, Butte–Silver Bow, Lewis and Clark, and Cascade counties to provide planning support and advice. Some local drought committees have met two or three times already this year. The state's conservation districts are playing an active role in promoting awareness of the potential for irrigation water supply shortages in coming months. A number of the state's more than 50 watershed groups are actively engaged in planning for anticipated surface water shortages in the coming months as well.

Technical Assistance

DNRC has notified water users in river basins with state-owned water storage projects concerning the water supply for the irrigation season. A number of projects are projected to have abbreviated irrigation seasons for local water users. Projects located in the Musselshell, Milk, Smith, and Sun River basins currently have water supplies that may not meet demand over the course of the summer without receiving well above average precipitation.

Drought Advisory Committee member agencies DNRC and FWP are actively providing technical support personnel to assist watershed groups with water measurement, water supply management, and fishery needs assessments. Agencies have also directed regional office personnel to attend watershed group and local drought meetings to answer questions regarding

water rights and sources of financial and technical assistance. Local groups have been requested to provide the Governor's Drought Advisory Committee with regular reports on local drought conditions and any needs for technical support. Reports from local committees and watershed groups will be posted on the Drought 2001 Internet site with their permission. For drought planning technical assistance call (406) 444-6628.

Financial Assistance

In the wake of the Drought of 2000, added emphasis has been placed on early season preparation of sources of funding for the mitigation of drought impacts to municipal water supplies, irrigation water supplies, stream fisheries, and agriculture. The following listing of state and federal assistance programs is not all-inclusive. While some USDA assistance programs are open for applications continuously, others require approval by the Farm Service Agency based upon guidelines and criteria that must be met before the agricultural producers in a county become eligible to apply. Likewise, a number of grants and loans that could fund projects that are brought to bear as drought mitigation measures are available on a regular basis through state government. The *Drought 2001* Internet web site has a section dedicated to assistance programs labeled *Resources and Assistance*. Call (406) 444-6628 for more information.

U.S. Bureau of Reclamation

Reclamation States Drought Relief Assistance Act of 1991 Public Law 102-250

The Bureau of Reclamation is authorized to provide funding assistance under the Reclamation States Drought Relief Act of 1991 to mitigate effects of drought in a number of areas, including environmental issues, wetlands, instream flow, and municipal water supplies. For 2001, Reclamation has about \$3 Million for all Reclamation states. Eligible projects include construction projects that manage limited supplies of water and instream flow lease proposals that result in a significant amount of water left instream that can be monitored. Proposals for projects requiring modest amounts of funding (\$5,000 to \$20,000) are preferable since Reclamation would like to "spread" the funding over a number of projects (and states).

The law requires that only "temporary" construction projects be funded, except for well development. Reclamation cannot fund projects such as the raising of a small dam or the building of a new canal. Reclamation can purchase water from a willing seller to augment instream flow, or "construct" a temporary diversion canal which would have to be removed after the drought is over, or purchase material to line an irrigation canal to prevent water loss. Reclamation can drill new wells but cannot fund a water distribution system. Last year, water purchases were approved for Bowdoin National Wildlife Refuge and Benton Lakes Wildlife Area.

Any entity, including Tribes or state agencies can submit a request for funding. Please submit a short description of the proposed project, a cost associated with the project, any cost-sharing, and a project justification, including benefits provided and/or impacts mitigated. This proposal should be limited to one page in length. Requests and questions can be directed to Mr. Kim

McCartney at Reclamation's Montana Area Office in Billings at (406) 247-7306, or to Mr. Jess Aber at Montana Department of Natural Resources and Conservation at (406) 444-6628.

**USDA Farm Service Agency
Livestock Assistance Program**

Deadline extended to May 4, 2001

Signup for the 2000 Livestock Assistance Program (LAP) began January 18, 2001. LAP provides direct payments to eligible livestock producers who suffered grazing losses due to natural disasters during calendar year 2000. LAP assistance will be provided to eligible producers in approved counties. To be approved, a county must have suffered a 40 percent or greater loss of available grazing for at least three consecutive months as a result of damage due to drought, hot weather, disease, insect infestation, flood, fire, hurricane, earthquake, severe storms, or other disasters during the 2000-crop year. See <http://www.fsa.usda.gov/> for more information on LAP and other assistance programs.

**Montana Department of Commerce
House Bill 11**

House Bill-11 provides *“emergency grants to local governments for infrastructure projects that are required to remedy threats to the public health or safety.”* The Act allocated \$100,000 for the biennium, fiscal year 2002-2003 (beginning July 1, 2001) for use on relatively short notice to direct funding to communities that have an urgent public health, safety or welfare need. Typical proposals would include a project to address imminent threats to meeting minimum demands for potable water during periods of drought, a bridge replacement, or other unanticipated emergencies. The account is administered by the Montana Department of Commerce. Contact Mr. Jim Edgcomb at (406) 444-5284 for more information.

**Montana Fish, Wildlife, and Parks
Future Fisheries Program**

Montana FWP provided a special grant review period for Spring 2001 to consider proposals that would provide an increase or preservation of instream flow on key streams or rivers during periods of low flow associated with drought conditions. Any individual or group with a project designed to restore or enhance instream flow may apply. The program funding can be used to drill stock water wells to replace diversion of streamflow for stock water, thereby leaving additional streamflow instream. Another example would be any improvement to an existing irrigation system where the water saved through an efficiency improvement would be left instream. Or a senior water right holder could enter into a lease agreement to forgo diverting water, leaving it instream.

Projects should result in significant benefits to stream fisheries on a long-term basis and the subject water must remain instream for a significant distance of the stream. Leased water will be monitored to ensure that the water is protected instream and not diverted by another user. The deadline for the special review was April 20. However, another grant cycle with a deadline of July 1 is now open for applications. Contact Mr. Glenn Phillips at (406) 444-5334, or Mr. Mark Lere at (406) 444-2432 at Fish, Wildlife, and Parks for more information.

Governor's Emergency Environmental Contingency Account Department of Natural Resources and Conservation

The Governor's Emergency Environmental Contingency Account is funding reserved for unforeseeable impacts unrelated to wildfire events. The account is only accessible with the approval of the Office of the Governor. The account has been used to address drought impacts related to municipal water supply problems and for the purchase of water for wildlife. For more information call DNRC's Conservation and Resource Development Division at (406) 444-6667.

State Agency Response and Preparation

Department of Environmental Quality

DEQ recently mailed a letter with attached information regarding drought preparation and management to 650 commercial and municipal water suppliers statewide with information on water conservation, water-use restrictions, and water reclamation.

DEQ has assisted the City of Conrad in its application for a portion of \$1.25M to the U.S. Bureau of Reclamation's Drought Relief Assistance Program and is also in touch with a number of municipalities that may have problems with water supplies in coming months.

Disaster and Emergency Services (Military Affairs)

The letter from the Committee Chairman informing all county commissioners that a Drought Alert status is in effect was forwarded to all county disaster officials encouraging them to play an active role in local drought response.

Department of Livestock

Livestock is pursuing the opening of CRP lands for grazing in Montana as soon as possible to relieve feeding short hay supplies to livestock while green-up is underway and until livestock have new grass upon which to feed. Health of livestock is currently below average as a result of stress from last year's drought and consumption of older hay from 1999 as feed. Hay is being brought in from locations about 500 miles away to support continued feeding until grass is up.

Department of Agriculture

Agriculture has provided support for the opening of CRP lands for grazing in recent weeks. The Hay Hot Line is organized by county and a press release was issued for neighboring states to encourage out-of-state hay suppliers to sell hay here in Montana. An Internet link to the Hay Hot Line is available on the Drought 2001 web site.

Department of Fish, Wildlife, and Parks

FWP posts monthly assessments of statewide stream and lake fishery conditions on the Drought 2001 Internet site. FWP is also reviewing applications received for the special April 20 Future Fisheries Program grant cycle deadline for potential benefits of proposals for improvement of instream flow for fisheries. FWP invites proposals after April 20 to be reviewed for the June review cycle of the program. FWP is participating in a dialog with power producers and sellers to determine if buy-back programs for irrigators have good potential for instream flow improvement.

FWP is also actively participating in watershed group meetings in a number of river basins to support local drought plans with technical staff support and fisheries science used to determine appropriate streamflow levels for triggering actions to mitigate impacts to fisheries. FWP has mailed out letters to water right holders on streams where the department holds instream flow rights senior in priority to the recipients of the letter. The letter provides warning that streamflow prospects are poor and that the Department will likely assert its flow rights as streamflow declines in streams with important fisheries.

Department of Commerce

Commerce will administer House Bill 11 funding earmarked from the Treasure State Endowment Program this legislative session for municipalities that suffer an unforeseen impact from drought for which emergency funds are needed. Commerce will also continue to apprise guides and outfitters, which it licenses, on drought conditions as they develop.

Department of Natural Resources and Conservation Water Resources Division

The State Water Projects Bureau is working with water user groups that are associated with state-owned water storage projects. The seven Regional Water Rights Offices have been directed to participate in and provide technical support to watershed groups and local drought committees within their districts. The Water Rights Bureau is prepared for applications for changes in place of use and points of diversion associated with drought water management strategies used by water users. The Water Operations Bureau is providing water measurement technical support to several watershed groups and assisting in development and implementation of drought plans.

The Water Management Bureau has staffing responsibility for the Governor's Drought Advisory Committee and is actively engaged in support of local drought planning initiatives. DNRC staff is listed as point of contact in correspondence from the Committee advising counties to initiate local drought planning. Staff has communicated with over ten local drought committees and watershed groups, providing information on forming local drought committees and directing inquiries to support materials on the Drought 2001 Internet site and sources of funding assistance.

Staff is also reviewing proposals for grant applications to Reclamation's funding program. The Water Management Bureau is in the field characterizing river basin water supplies for planning

and conservation purposes and reporting findings to several river basin groups as part of long-range water management objectives. Results of these ongoing studies will form the basis for water availability analyses and eventually, planning for periods of low streamflow. Water Management is also providing facilitation and technical support to watershed groups. Groups are being informed of funding opportunities and provided with assistance in applying for funds.

On March 27, about 40 irrigators attended an irrigation seminar with an emphasis on water management during drought in the Jefferson Valley in conjunction with Montana State University and the National Center for Appropriate Technology in Butte. Water Management also recently offered a course in water commissioner training. Additionally, watershed drought planning materials are being developed for watershed support during drought.

Recommendations for Drought Preparation and Response

The impacts of drought can be minimized at different scales by identifying measures that can be taken individually and collectively, recording them in a plan, ensuring implementation, and monitoring effectiveness by measuring savings in water.

On an Household Scale:

- Consult the Internet, Cooperative Extension Service, and the Montana Department of Natural Resources and Conservation for sources of information on water conservation in the home.
- Have a family meeting to discuss and identify ways to save water and record them.
- Try to reuse "gray" water for other uses in and outside the home.
- Be conscientious with lawn watering by irrigating less often, in early morning or late evening, and for slightly longer periods to promote a drought-resistant lawn. Use a pan and a timer to gauge use.
- Monitor your monthly water bill to see if your conservation measures are working.

On a Ranch or Farm Scale:

- Learn more about irrigation scheduling to save surface water and lower energy expenses.
- Consider installing inexpensive soil moisture probes to be scientific about application.
- Consider installing a stock water well to replace a surface water diversion for livestock.
- Inventory condition of irrigation pumps, lines, and nozzles for wear and leaks.
- Inquire to state and federal agencies regarding sources of grant funding for on-ranch improvements in water management and efficiency.
- Consider alternative cropping patterns and crops.
- Consult Extension Service for water conservation information.

On a Neighborhood Scale:

- Discuss water conservation with homeowners association members.
- Agree on voluntary water use restrictions to protect your local ground water supply.
- Inform a neighbor that they have left water running – it may be unintentional.
- Report excessive and chronic waste of water by users if it continues to go addressed.

On a Community Scale:

- Help organize and participate on a voluntary board for water conservation.
- Encourage local government to implement voluntary water use restrictions.
- Educate young people about water conservation in the schools and award achievement.
- Encourage local media to get behind the community water conservation effort with complementary public service announcements to promote awareness.
- Participate on a local drought committee during drought years.

On a Watershed Scale:

- Help organize and participate on a local watershed committee or attend meetings.
- Get involved with your county conservation district and its water conservation efforts.
- Participate in a watershed approach for sharing limited water supplies.
- Promote awareness of water problems that are common to all watershed inhabitants.
- Consider sharing water shortages as part of a watershed plan even though you have a senior water right.
- Team-up with neighbors on applying for grant funding to improve water conveyance efficiency or to develop a community well.
- Attend Montana Watershed Coordination Council meetings and share information about conservation.

On Any and All Scales:

- Use the Internet, the Extension Service, and your local conservation district to locate and identify sources of water conservation information and share it with your family, community, and local government.
- Engage other civic groups within the community and watershed to sponsor water conservation projects and share awareness of the projects using the local media.

Monitoring and Reporting

Each month, the drought monitoring data and SWSI water supply maps are posted on the *Drought 2001* Internet site and on the Natural Resource Information System (NRIS) Home Page. Links are provided to real-time snowpack, reservoir, and streamflow data. The drought committee staff can be contacted at (406) 444-6628. The *Drought 2001* NRIS Internet address is: <http://nris.state.mt.us/drought>.

Current conditions warrant close monitoring and reporting by the Montana Governor's Drought Advisory Committee through the spring and summer months. The next meetings have been scheduled for May 17, June 14, July 19, and August 16. The committee will continue to monitor and report conditions over the coming months, assessing the potential for drought. If appropriate, the committee will take action consistent with the Montana Drought Response Plan.

The Montana Department of Agriculture Internet address: <http://agr.state.mt.us/>

Montana Agricultural Statistics Service Internet address: <http://www.nass.usda.gov/>

Montana DNRC Internet address: <http://www.dnrc.state.mt.us/>

TABLES

<i>TABLE 1</i>		
Remaining Montana Snowpack and Year-to-Date Precipitation⁽¹⁾		
Based on Mountain Data from NRCS SNOTEL Sites As of Monday, April 16, 2001		
River Basin	Remaining Snow Water Equivalents⁽²⁾ (% of average)⁽³⁾	Year-to-Date⁽⁴⁾ Precipitation (% of average)
Kootenai River	63	51
Flathead River	75	65
Upper Clark Fork	73	73
Bitterroot River	61	64
Lower Clark Fork	66	59
Jefferson River	71	73
Madison River	65	66
Gallatin River	70	67
Missouri Headwaters	69	70
Headwaters Missouri Mainstem	83	75
Smith, Judith, & Musselshell Rivers	81	73
Sun, Teton, & Marias Rivers	72	67
Missouri Mainstem	79	71
St. Mary and Milk Rivers	73	57
Upper Yellowstone	69	69
Bighorn River (Wyoming)	71	78
Tongue River (Wyoming)	75	76
Powder River (Wyoming)	72	73
Lower Yellowstone	69	71

Notes

(1) Information provided by Natural Resource Conservation Service, Snow Survey.

(2) A "snow water equivalent" is the depth of snow equivalent to one inch of water.

(3) Reference period for average conditions is 1961-90

(4) October 1, 2000 to present.

<i>TABLE 2</i>			
April 2001 Streamflow in Montana⁽⁴⁾			
Station Name	Monthly⁽⁵⁾ Mean flow (cfs)	1971-00 Average Monthly April flow (cfs)	% of average flow
Yaak River near Troy	404 (*1)	1,960	21
Blackfoot River near Bonner	966	2,140	45
Clark Fork River at St. Regis	4,260	9,000	47
Middle Fork of Flathead near West Glacier	1,070	3,300	32
Marias River near Shelby	390	1,000	39
Rock Creek below Horse Creek, nr Int I Bndry	25.9	75.4	34
Yellowstone River at Corwin Springs	1,410	1,730	82
Yellowstone River at Billings	2,170	4,440	49

Notes

- (1) Record low mean April flow. Previous record low flow was 643 cfs, in 1977.
- (2) Information is provided by the U.S. Geological Survey (USGS). According to the (USGS), the eight gaging sites in Table 2 are representative of streamflow conditions throughout Montana.
- (3) Data is provisional and subject to revision.

TABLE 3⁽¹⁾

U.S. Bureau of Reclamation Reservoirs					
Reservoir	Drainage	April 1, 2001		Year Ago (4/01/2000)	
		Contents ⁽²⁾ (ac-ft)	% of Avg.	Contents (ac-ft)	% of Avg.
Clark Canyon	Beaverhead	121,100	80	169,100	111
Canyon Ferry	Missouri	1,500,000	103	1,447,800	100
Gibson	Sun River	24,600	51	50,100	105
Lake Elwell	Marias River	715,200	101	786,400	111
Sherburne	St. Mary & Milk Rivers	15,800	64	19,900	80
Fresno ⁽³⁾	Milk River	16,500	31	45,800	74
Nelson	Milk River	31,000	57	55,000	101
Bighorn Lake	Bighorn River	870,100	105	928,000	112
Hungry Horse	South Fork Flathead River	2,043,000	108	2,226,000	117

Notes

(1) Information from U.S. Bureau of Reclamation (USBR).

(2) "Content" refers to active contents only (dead storage not included).

(3) Fresno average storage revised according to sediment study results.

TABLE 4

Status of State-Owned Reservoirs¹
April 1, 2001

Reservoir	Drainage	April 1, 2001			Year Ago (4/01/2000)	
		Contents (ac-ft) ⁽²⁾	% of Avg.	% of Capacity ⁽³⁾	Storage (ac-ft)	% of Average
Missouri River Basin						
Ackley Lake	Judith River	1,970	55	34	3,470	98
Bair	Musselshell	1,810	38	26	2,510	52
Deadman's Basin	Musselshell	25,500	48	35	35,840	102
Martinsdale	Musselshell	2,370	24	10	9,920	100
Middle Creek (Hyalite)	Gallatin	7,440	130	73	5,900	103
Nilan	Sun River	2,600	36	26	3,480	48
North Fork of Smith	Smith River	2,760	38	24	5,570	76
Ruby River	Ruby River	31,000	99	85	30,400	98
Yellowstone River Basin						
Cooney	Rock Creek	22,250	106	79	19,790	96
Tongue River	Tongue River	40,870	105	52	36,870	95
Clark Fork River Basin						
East Fork Rock Creek	Rock Creek	5,320	54	33	11,210	113
Nevada Lake	Blackfoot	6,130	79	48	8,080	105
Painted Rocks	Bitterroot	11,000	91	35	10,780	89

Notes

- (1) Information from Montana Department of Natural Resources and Conservation, State Water Projects Bureau.
- (2) 'Ac-ft' is an abbreviation for acre-feet, a measure of volume. An acre-foot covers one acre of land one foot deep.
- (3) Greater than 100 percent of capacity indicates reservoir is spilling.

TABLE 5.

Palmer Drought Severity Indices (PDSI) in Montana⁽¹⁾

District	PDSI 4/28/2001	PDSI 4/08/2000	Cumulative Precip. Deficit (inches)	
			4/28/2001	4/08/2000
Northwest	-2.34	+4.99	2.07	0.00
Southwest	- 4.26	+2.19	4.17	0.00
Northcentral	- 0.94	+0.65	0.88	0.00
Central	-1.91	- 0.97	1.22	0.37
Southcentral	- 4.13	+0.25	5.17	0.00
Northeast	- 0.69	- 1.33	0.64	0.70
Southeast	- 0.88	- 0.48	0.94	0.00

Explanation: The Palmer Drought Severity Index describes the intensity of prolonged wet or dry periods as shown below.

Range	Description
+4.0 and greater	Extremely moist spell
+3.0 through +3.99	Very moist spell
+2.0 through +2.99	Unusually moist spell
+1.0 through +1.99	Moist spell
+0.5 through +0.99	Incipient moist spell
-0.49 through +0.49	Normal
-0.5 through -0.99	Incipient Drought
-1.0 through -1.99	Mild drought
-2.0 through -2.99	Moderate drought
-3.0 through -3.99	Severe drought
-4.0 and less	Extreme drought

Notes

- (1) Palmer Drought Severity Indices provided by Climate Prediction Center, Wash., D.C.

Table 6.

**Montana Surface Water Supply Indices (SWSI's)
April 1, 2001**

Basin	SWSI	Basin	SWSI
Tobacco River	- 3.9	Gallatin River	-2.9
Kootenai River below Libby Dam	- 2.3	Missouri River above Canyon Ferry	-2.8
Fisher River	- 3.1	Missouri River below Canyon Ferry	-2.4
Yaak River	- 3.4	Smith River	-3.0
North Fork Flathead River	- 3.8	Sun River	-3.0
Middle Fork Flathead River	- 3.8	Teton River	-3.6
South Fork Flathead River	- 2.4	Birch/Dupuyer Creeks	-3.5
Flathead River at Columbia Falls	- 3.3	Marias River	-2.4
Stillwater/Whitefish Rivers	- 3.7	Musselshell River	-3.1
Swan River	- 3.9	Missouri above Fort Peck Reservoir	-1.6
Flathead River at Polson	- 3.0	Missouri River below Fort Peck	-1.7
Mission Valley	- 3.1	Milk River	-3.0
Little Bitterroot River	- 2.6	Yellowstone River above Livingston	-3.1
Blackfoot River	- 3.8	Shields River	-2.7
Clark Fork River above Missoula	- 3.4	Boulder River (Yellowstone)	-3.4
Bitterroot River	- 3.7	Stillwater River	-3.6
Clark Fork River below Bitterroot River	- 3.5	Rock/Red Lodge Creeks	-3.1
Clark Fork River below Flathead River	- 2.9	Clarks Fork Yellowstone River	-3.8
Beaverhead River	- 2.4	Yellowstone above Bighorn River	-3.3
Ruby River	- 2.6	Bighorn River	-2.7
Big Hole River	- 3.8	Little Bighorn River	-3.3
Boulder River (Jefferson Basin)	- 2.9	Yellowstone R. below Bighorn River	-3.0
Jefferson River	- 3.3	Tongue River	-3.0
Madison River	- 2.1	Powder River	-3.8

Note: The Surface Water Supply Index (SWSI) is an indicator describing predicted surface water availability. The April 1, 2001 SWSI describes surface water supply conditions near the start of the 2001-growing season. SWSI values are further illustrated on the Map Figure following this table.