CHAPTER 3
RISK ASSESSMENT: DROUGHT

3.8 RISK ASSESSMENT: DROUGHT

DESCRIPTION
Drought is an expected phase in the climactic cycle of almost any geographical region, including the State of Idaho. Objective, quantitative definitions for drought exist, but most authorities agree that, because of the many factors contributing to it and because its onset and relief are slow and indistinct, none are entirely satisfactory. According to the National Drought Mitigation Center (NDMC), drought “originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector”. What is clear is that a condition perceived as “drought” in a given location is the result of a significant decrease in water supply relative to what is “normal” in that area. There are four generally accepted, operational definitions of drought (NDMC, 2006):

Meteorological drought is usually an expression of precipitation’s departure from “normal” over some period of time. These definitions are usually region-specific, and presumably based on a thorough understanding of regional climatology. The variety of meteorological definitions from different countries at different times illustrates why it is folly to apply a definition of drought developed in one part of the world to another:

- United States (1942): less than 2.5 mm of rainfall in 48 hours
- Great Britain (1936): 15 consecutive days with daily precipitation totals of less than 0.25 mm
- Libya (1964): annual rainfall less than 180 mm
- India (1960): actual seasonal rainfall deficient by more than twice the mean deviation
- Bali (1964): a period of 6 days without rain

Meteorological measurements are the first indicators of drought.

Agricultural drought occurs when there isn’t enough soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought happens after meteorological drought but before hydrological drought. Agriculture is usually the first economic sector to be affected by drought.

Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow and as lake, reservoir, and groundwater levels. There is a time lag between lack of rain and less water in streams, rivers, lakes, and reservoirs, so hydrological measurements are not the earliest indicators of drought. When precipitation is reduced or deficient over an extended period of time, this shortage will be reflected in declining surface and subsurface water levels.

Socioeconomic drought occurs when physical water shortage starts to affect people, individually and collectively. Or, in more abstract terms, most socioeconomic definitions of drought associate it with the supply and demand of an economic good.
It should be noted that water supply is not only controlled by precipitation (amount, frequency, and intensity), but also by other factors including evaporation (which is increased by higher than normal heat and winds), transpiration, and human use.

Drought in Idaho is generally associated with a sustained period of low winter snowfall. This results from a temporary, yet significant, change in the large-scale weather patterns in the western U.S. The limited snow packs result in reduced stream flows and groundwater recharge. Idaho’s system of reservoirs and natural storage can buffer the effects of minor events over a few years, but a series of dry winters (or an especially pronounced single low snowfall event) will result in a shortage of available water. Extended periods of above-average temperatures during the spring and summer can increase the impacts of low snow packs.

**LOCATION, EXTENT, AND MAGNITUDE**

Drought can have the broadest effect of all of Idaho’s hazards, sometimes affecting all regions of the State simultaneously. Although deaths and injuries are rarely direct results, drought can have significant impacts on the economic, environmental, and social well-being of the State (also see “Environmental Impacts” later in this section).

Idaho’s arid climate predisposes it to periodic drought. Some areas of the State, however, have a greater potential for drought than the others. The Idaho Department of Water Resources (IDWR) reports that, based on analyses of historical stream flow records, southeastern Idaho and the upper portions of the Snake River Plain appear to have the highest probability for persistent, severe stream flow deficits.

Several indices are used to measure how precipitation rates are different from historical norms. Government officials likely consult multiple indices before making decisions regarding declarations and the availability of funding. The Palmer Drought Severity Index is widely used by the U.S. Department of Agriculture for assessing large areas.

Areas with many microclimates, such as mountainous portions of Idaho, can be better served by applying a Surface Water Supply Index (SWSI), which takes such factors as snowpack into consideration. NRCS has worked with individual irrigation districts and water masters to determine the SWSI threshold where shortages of the irrigation agriculture water supply start to occur.
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SWSI is based on frequency analysis and is adapted to a particular river basin. Approximately 25 years of record are required for datasets in the SWSI. In Idaho, SWSI values range from -4.1 (extremely dry) to +4.1 (extremely wet), with zero representing average water supply conditions (Idaho NRCS, 2010). When the SWSI value is less than -1.2, water supply shortages may be expected.

The NDMC is now also using a new index: the Standardized Precipitation Index, which can identify emerging droughts farther in advance than the Palmer Index. (NDMC, 2006). The dissemination of information on the current status and predictions of drought is addressed below, under “Future Occurrence.”

PAST OCCURRENCE


Table 3.8.A lists the droughts recorded by the IDWR since 2000 and those reported by FEMA (Presidential Disaster declarations) or the Spatial Hazard Events and Losses Database for the United States (SHELDUS) online database produced by the Hazards and Vulnerability Research Institute. Map 3.8.G, at the end of this section, shows where these major drought events have occurred.

State drought emergency declarations are made on a county-by-county basis by the IDWR and must be approved by the Governor. IDWR drought declarations apply only to the administrative processing of applications for temporary changes of water rights. They do not apply to issues such as financial or disaster support. Water right changes made under the provisions of these State declarations expire at the end of the current year, unless extended or terminated by the IDWR Director. From the start of 2000 through 2012, there were State drought emergency declarations in Idaho counties every year except 2006 and 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>Counties Affected</th>
<th>State Drought Emergency Declaration</th>
<th>Part of Federal Disaster Declaration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>Ada, Adams, Bannock, Bear Lake, Benewah, Bingham, Blaine, Boise, Bonner, Bonneville, Boundary, Butte, Camas, Canyon, Caribou, Cassia, Clark, Clearwater,</td>
<td>Unknown</td>
<td>No</td>
</tr>
</tbody>
</table>

1 Such changes to the use of water rights consist of transfers to change the point of diversion, place, and purpose of use of valid existing water rights or temporary exchanges of water authorized to be diverted under water rights, as provided in Idaho code (Idaho Statute 42-222A).
### TABLE 3.8.A: DROUGHT EVENTS IN IDAHO COUNTIES (1977-2012)

<table>
<thead>
<tr>
<th>Year</th>
<th>Counties Affected</th>
<th>State Drought Emergency Declaration</th>
<th>Part of Federal Disaster Declaration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Custer, Blaine, Butte, Lemhi, Lincoln</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2002</td>
<td>Butte, Blaine, Bonneville, Clark, Fremont, Bingham, Custer, Lincoln, Madison, Power, Bannock County, Jefferson, Elmore, Gooding, Oneida, Caribou, Bear Lake</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2003</td>
<td>Bonneville, Teton, Lemhi, Jefferson, Bear Lake, Owyhee, Cassia, Madison, Blaine, Oneida, Caribou, Bannock, Bingham, Butte, Clark, Custer, Fremont, Lincoln, Power</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2004</td>
<td>Minidoka, Bear Lake, Jerome, Cassia, Elmore, Twin Falls, Franklin, Teton, Oneida, Jefferson, Bingham, Power, Madison, Bonneville, Bannock, Gooding, Blaine, Lemhi, Custer, Fremont, Caribou, Lincoln, Clark, Butte</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Counties Affected</th>
<th>State Drought Emergency Declaration</th>
<th>Part of Federal Disaster Declaration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>Lincoln, Ada, Jerome, Gooding, Lemhi, Jefferson, Blaine, Caribou, Twin Falls, Elmore, Clark, Bannock, Power, Fremont, Madison, Canyon, Bingham, Bonneville, Custer, Butte</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2007</td>
<td>Lewis, Clearwater, Adams, Owyhee, City of Pierce, Oneida, Minidoka, Caribou, Bonneville, Bannock, Bingham, Jefferson, Lincoln, Madison, Teton, Blaine, Fremont, Lemhi, Clark, Custer, Butte</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2008</td>
<td>Lewis, Nez Perce, Custer, Butte</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2010</td>
<td>Franklin, Clark, Lincoln, Blaine, Butte, Custer, Teton, Fremont</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2012</td>
<td>Owyhee, Lemhi, Bannock, Teton, Bear Lake, Blaine, Oneida, Clark</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Source: 1 Hazards & Vulnerability Research Institute, 2009 (SHELDUS); 2 IDWR, 2010a; 3 IDWR, 2010b.

The most prolonged drought in Idaho was during the 1930s. For most of the State, this drought lasted for 11 years (1929-41), despite greater than average stream flows in 1932 and 1938. In northern Idaho, the drought was interrupted by greater than average stream flows from 1932 until 1937, but then resumed until 1946. Southern and central Idaho experienced a mild drought from 1959 to 1961. During the early 1960s, several areas in the State also experienced water shortages.

Of all the statewide drought emergency declarations, only one was also a Federal disaster: 1977, the worst single year on record. This event was part of a more widespread water shortage faced by the United States. In Idaho, a lack of winter snowfall resulted in the lowest runoff of record at most gages in the State. Ski resorts were closed for much of the ski season. Irrigation ditches were closed well before the end of the growing season, and crop yields were below normal. Domestic wells in the Big and Little Wood River basins became dry early in April 1977, and many shallow wells in six western Idaho counties became dry in June.

Stream flows were below normal from 1979 to 1981. From 1987 through 1992, water supplies were much below normal throughout the State. In southwestern and central Idaho, this six-year drought was more severe than the 1930s drought. Low winter snowpack and prolonged periods of greater than average temperatures resulted in unseasonable early snow melt, high water demands, and the lowest stream flows since 1977. In 1987, the water supply ranged from 10 to 50 percent below normal in many areas of the State. According to the National Oceanographic and Atmospheric Agency (NOAA) National
Climactic Data Center (NCDC), much of the State of Idaho most recently experienced moderate to extreme drought conditions from the years 2000 through 2005.

USDA produces a regularly updated Idaho Drought Declarations map for Idaho. A recent example from the Fall of 2012 can be seen in Figure 3.8.B.

**FUTURE OCCURRENCE**

Despite its long agricultural history, Idaho is correctly classified as an arid area with periods of drought. Although defined as “abnormally” dry weather, drought is a normal part of Idaho’s climate and can be expected to reoccur periodically. Since the 1920s, and possibly before, the State has dealt with drought conditions for at least one year each decade and usually for more prolonged periods. Southeastern Idaho and the upper portions of the Snake River Plain are most susceptible to persistent, severe stream flow deficit conditions.

NOAA does issue a weekly drought assessment called the U.S. Drought Monitor and a monthly assessment called the U.S. Seasonal Drought Outlook. Examples of these taken during the 2010 plan update and the current 2013 update may help to provide clues as possible trends for future drought conditions. Care should be taken to understand that drought conditions do naturally vary between different seasons, but the data does seem to point towards a possible pattern of increased drought occurrences.

**RELATIONSHIPS TO OTHER HAZARDS**

Droughts can have a large influence on the risks posed by other hazards faced by the State. Locations impacted by drought can have an increased susceptibility to flash flooding, as soils impacted by drought cannot absorb water as efficiently. An increased wildfire risk is naturally associated with drought events, as drier conditions foster fuel loads that are more combustible and prone to catching. The risk of lightning initiating a wildfire event is also increased during dry times. Extended period of drought could also lead to reductions in food and water availability, a situation that would increase the chance of civil disturbances, from a human-caused hazard viewpoint.
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ENVIRONMENTAL IMPACTS
The impacts to vegetation and wildlife can include death from dehydration and the spread of invasive species or disease because of stressed conditions. Invasive species pose problems for the ecosystems in which they are introduced. Like many hazards that affect Idaho's environment, invasive species have both direct and indirect impacts. If introduced to Idaho, quagga mussels, for example, would collapse the microscopic food supply that is vital to the existing fisheries. Further, the mussels attach to water intake pipes and screens used for drinking water and industrial plants. Not only would these pests cause environmental problems, but they would also cause secondary economic impacts to communities.

However, drought is a natural part of the environment in Idaho, and native species are likely to be adapted to surviving periodic drought conditions. It is unlikely that drought would jeopardize the existence of rare species or vegetative communities. Environmental impacts are more likely at the interface of the human and natural world. The loss of crops or livestock due to drought can have far-reaching economic effects (detailed more under “Vulnerability”). Wind and water erosion can alter the visual landscape, and dust can damage property. Water-based recreational resources are affected by drought conditions. Indirect impacts from drought arise from wildfire, which may have additional effects on the landscape and sensitive resources such as historic or archeological sites; wildfire is discussed in another section of this Plan.

DEVELOPMENT TREND IMPACTS
Drought affects the entire State, but particularly southeastern Idaho and the upper portions of the Snake River Plain. These areas of highest risk include 12 of the 16 major cities in the State and some of the largest population growth areas. This trend poses the threat of increasing potential losses, since a larger population equates to a higher risk of increased losses. Drought conditions and development are interrelated – as water is drawn down from increased rates of use, drought can occur more readily than from lack of precipitation alone. A substantial impact from drought in Idaho is stress on the utilities that rely on hydropower, which could result in increases in power costs to citizens. Planning for power sources is an important part of development. Another impact to consider is how drought could negatively affect the State's agricultural economy. Drought can also lead
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to reduced quality of living conditions and poverty. Mitigating the effects of drought is a significant consideration in planning for future water use.

CRITICAL INFRASTRUCTURE AND STATE FACILITY IMPACTS
Critical facilities are less at risk than private, noncritical facilities. An indirect impact of drought is wildfire, which may have a greater effect on critical and State facilities.

VULNERABILITY ASSESSMENT
IDWR produced the Idaho Drought Plan, revised in 2001, “to provide current and historical information, guidance and a framework for managing water shortage situations in Idaho.” The efforts put forth to assemble the plan and the historical information contained therein are indicative of the State’s awareness of its vulnerabilities. The State is vulnerable to drought because it is already in an arid region of the country. However, the southeastern and upper Snake River Plain counties have the highest probability for persistent stream flow deficits. Idaho’s dependence on resource-based industries also make the State economically vulnerable to drought. Losses ripple through the economy and may result in serious long-term consequences.

Economic impacts may include:

- Losses from crop, dairy and livestock, timber, and fishery production and associated businesses.
- Losses from recreation providers and associated businesses.
- Losses related to the increased costs resulting from increased energy demand and from shortages caused by reduced hydroelectric generation capacity.
- Revenue losses for Federal, State, and local governments from a reduced tax base and for financial institutions from defaults and postponed payments.
- Losses from impaired navigability of streams, rivers, and canals.
- Long-term loss of economic growth and development.

Local Hazard Mitigation Plan Vulnerability Assessments
One local plan, that of Twin Falls, ranked drought as one of its region’s major hazards (see Map 3.8.H at the end of this section). This is the same result as was seen during the 2010 plan update. Gooding County also reported drought as a major hazard that could be considered to tie with severe weather and floods for the second most damaging hazard after wildfire, based on its risk matrix. However, Gooding County devoted many more mitigation strategies to the other top-ranking hazards than to drought. Detailed information related to local vulnerabilities may be found in local hazard mitigation plans.

The fact that more local plans do not consider drought to be one of their major hazards faced is interesting to note. There are many reasons that this may be the case, one of which being that drought does not produce the immediate impacts and losses that a majority of other hazards do. With the limited resources available for local communities to devote to hazard mitigation, many currently seem
to be focusing on those hazards that get the most attention. Another consideration is that drought vulnerability tends to be regional, so many localities may feel that their focus should be on those hazards whose risk they can have the most impact on. These types of observations are important to consider from a statewide perspective and are helpful in identifying hazards to possibly focus more state efforts towards.

LOSS ESTIMATION
No specific, statewide loss estimation exists for the hazard of drought. Historical drought losses tend to be related to temporary and permanent losses of property, particularly agricultural damages, rather than loss of life.

Critical facilities are less at risk than private, noncritical facilities. Transportation facilities do not tend to be impacted by drought. One risk associated with drought is the increased occurrence of wildfire, which is addressed in its own section of this Plan. Another indirect loss from drought is increased hydropower costs.

Local Hazard Mitigation Plan Loss Estimations
One local plan, that of Twin Falls, ranked drought as one of its region’s major hazards. In the Twin Falls plan, the loss was reported to be “major sheltering effort or major business and economic loss.” Gooding County also reported Drought as a major hazard that could be considered to tie with severe weather and floods for the second most damaging hazard after wildfire. However, Gooding County devoted many more mitigation strategies to the other top-ranking hazards than to drought. Detailed information related to local loss estimates may be found in local hazard mitigation plans.

MITIGATION RATIONALE
As detailed above, drought is a major natural hazard in the State with respect to its economic impact and land area extent. With respect to number of deaths, drought is not a major hazard. Mitigation for this hazard focuses on individual preparedness. The National Drought Mitigation Center http://drought.unl.edu/ provides drought education materials on prevention through water conservation, water recycling, protecting water supplies, and storage. Because the Idaho Drought Plan falls under the Idaho Department of Water Resources (IDWR), reliance is given to that agency for both response and mitigation planning.

Policy Framework
Mitigation of drought is established, generally, in the Idaho Disaster Preparedness Act of 1975 as amended (Idaho State Code Chapter 10, Title 46) and, more specifically, in the Governor’s Executive Order, 2000-04. The Executive Order also assigns the following responsibilities:

- Department of Agriculture – Primary support agency for mitigation activities pertaining to agricultural issues.
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- Department of Commerce – Primary support agency for mitigation activities pertaining to economic injury/losses that result from disasters.
- Department of Water Resources – Develops drought mitigation programs in concert with BHS.

The Idaho Drought Plan (IDWR, 2001) provides historical information, guidance, and a framework for managing water shortage situations in Idaho. The information presented in the Idaho Drought Plan outlines and describes technical issues and documents activities accomplished during recent water shortages. It is also designed as a resource and educational tool to be used during future water shortages.

The Idaho State Water Plan, prepared by the Idaho Water Resource Board with assistance from IDWR, establishes the statewide water policy plan and component plans for individual basins or other geographic designations. These plans may be reviewed and re-evaluated on a periodic basis and may address drought issues if warranted.

The issue of whether to formally declare a drought statewide is both controversial and important. Most public agencies approach formal declaration with caution. Formal designations may not bring additional Federal support or minimize economic impacts and they can have a serious economic impact on tourism, agriculture, financing and many other related industries. Unless a water shortage situation is of extreme magnitude, the safest approach is to let county and local governments determine their own response. There is an existing and effective network of public agencies, water system managers, and experts who can assess their particular needs. If necessary, additional technical assistance can be provided by the Idaho Water Supply Committee.

Source: ThinkStock.com
Existing Mitigation Planning Programs

State Government

Drought-related resource management is intimately intertwined with general water supply management. Consequently, drought mitigation is to a large degree an extension of normal water management procedures.

The Idaho Department of Water Resources serves as the lead State agency in coordinating drought-related activities. IDWR has two major responsibilities related to drought:

- Administration of all water rights.
- Inventory, monitoring, and planning of the State’s water resources.

IDWR analyzes water supply data early in the water year to determine the probability of shortages. If a drought becomes likely, the interagency Water Supply Committee, chaired by IDWR, coordinates the State’s drought-related activities. Idaho’s Water Supply Committee was created as an action element of the Idaho Drought Plan first prepared in 1990, when Idaho was in a period of sustained drought. The committee, composed of State, Federal, and private agency representatives, performs a number of tasks:

- Compiles drought-related data;
- Coordinates State agency actions;
- Provides public information; and
- Promotes water and energy conservation.

At the end of the 1992 water year, the Idaho Water Resource Board offered financial assistance in the form of one-time cost-share grants to assist regional entities in establishing winter cloud seeding projects. Projects were initiated in the Upper Snake, Bear, and Boise River basins during the winter of 1992-93. Subsequently, the legislature gave IDWR authority to coordinate weather modification projects designed to increase water supplies. The legislature also approved funding for IDWR to provide financial assistance to local or regional entities that are funding winter-season weather modification programs.

The Water Quality Division of the Department of Environmental Quality has oversight for the safety of drinking water, groundwater protection, non-point and point source pollution, and municipal facilities construction. By maintaining the public water supply in good quality, shortages are mitigated. The Division contracts with the seven health districts for oversight of small community and non-community drinking water systems, addressing source protection and safe delivery for more than 2,080 community and non-community water systems statewide. The Division also administers State and Federal construction grants programs intended to provide financial assistance to Idaho communities needing new wastewater treatment systems or improvements to existing systems in order to protect public health and comply with water quality standards.
In 2010, IDWR partnered with the NDMC and the USDA Risk Management Agency (RMA) to sponsor a workshop on the Vegetation Drought Response Index (VegDRI) and the more experimental product, Vegetation Outlook (VegOut). The workshop helped inform the agricultural community about new means to prevent losses from drought.

Federal Government
The Bureau of Reclamation modifies its resource management and technical functions to reduce the adverse impacts of periodic water shortages. Drought mitigation is possible through four mechanisms:

- **Project Sizing** – projects are designed to limit the impact of water shortages.
- **Water Conservation and Efficiency Improvement** – conservation and efficiency measures are incorporated into new projects and retrofitted into older projects; assistance is available to other agencies.
- **Technical Assistance in Water Conservation Planning** – Technical assistance is provided for the development and implementation of water conservation plans.

Project (Dam) Operations – Projects are operated, to the extent feasible and permitted by law, to use the water resource in an efficient manner.

The NRCS monitors and reports the snow pack in the western United States. This information is used to make volumetric stream flow forecasts for major rivers in the State (in conjunction with the NWS). This early warning allows for water-use adjustments and possible avoidance of a drought situation. The Water Resources Division of the USGS also collects, interprets, and disseminates hydrologic information.

NOAA, with the U.S. Department of Agriculture and the NDMC in Lincoln, Nebraska, issues a weekly drought assessment called the U.S. Drought Monitor and a monthly assessment called the U.S. Seasonal Drought Outlook. Examples are provided in Figures 3.8.C – 3.8.F, below. These represent compilations of drought indicators and field reports.
Figure 3.8.C: Example of “U.S. Seasonal Drought Outlook” from the National Weather Service, Climate Prediction Center (2010) / Source: National Oceanic and Atmospheric Administration
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U.S. Drought Monitor
Idaho

August 3, 2010
Valid 7 a.m. EST

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

Released Thursday, August 5, 2010
Author: D. Miskus, CPC/NOAA

Figure 3.8.E: “U.S. Drought Monitor: Idaho” / Source: National Drought Mitigation Center (2010)
The Idaho branch of USDA’s NRCS is working with IDWR and BHS on drought monitoring and proactively predicting drought. It is also working with the USDA’s Risk Management Agency to improve crop insurance participation in order to reduce costs.

GENERAL MITIGATION APPROACHES

Hazard Management

Hazard management of drought involves the long-term reduction of the probable gap between water supply and demand. Supply can be addressed through the development of storage and delivery capacity (construction of reservoirs and associated facilities), improved operation of existing facilities, and weather modification. Demand can be addressed through various forms of conservation.

Weather modification is designed to increase the amounts of moisture realized from storms. Any weather modification program with the goal of increasing basin-wide winter snow packs should be a...
multiyear commitment. Analyses indicate that a 5- to 20-percent seasonal precipitation increase can be achieved for climatic situations such as those in Idaho.

Water conservation efforts may include:

- Administering conjunctive use of surface and ground water;
- Implementing water quality management and wastewater reuse;
- Reducing water conveyance losses; and
- Reducing consumptive use by changing the type of water application system or incremental pricing for water use.

**Information/Outreach and Public Education**

Drought-related educational efforts geared towards conservation both increase the effective water supply (by reducing demand) and build “drought resistance” by demonstrating how to withstand the effects of a prolonged drought. Drought-education materials should be designed to help residents and businesses learn methods of water conservation and instill these methods in their everyday lifestyles.

Early information is vitally important to the agricultural community, allowing farmers to make important seed ordering and planting decisions.

NOAA’s National Weather Service has recently produced a Drought Fact Sheet. This informational flysheet provides useful information for the public regarding drought monitoring, forecasting, and links to other drought-related resources.
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PAST OCCURRENCE DROUGHT

Note: 'Major' events are defined by the reporting source and do vary somewhat. Generally, these are events that produced losses or fatalities. Additional details concerning source data can be found in Appendix A of this document.

NUMBER OF MAJOR EVENTS
- 1 - 3
- 4 - 6
- 7 - 9
- 10 - 12

Map 3.8.G: Past Drought Occurrences
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Map 3.8.H: Drought Identified as Local Plan Major Hazard

Note: The Top 3 'Major' hazards, as identified within all Local Hazard Mitigation Plans, were compiled for this map.