NOVEMBER 2010

California Drought Contingency Plan

State of California | Natural Resources Agency | California Department of Water Resources

STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY

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NOV 17 2010

To: California Water Plan Steering Committee and Interested Stakeholders

The California Drought Contingency Plan (DCP) represents the first State drought plan and was developed following the Governor's executive orders and drought proclamations in 2008 and 2009. It is a planning and implementation document which may be used to assist agencies in preparing for, responding to, and recovering from drought. The goals of the DCP are to minimize drought impacts through improved agency coordination, enhanced procedures for monitoring drought conditions and early warning capability, improved assessment drought impacts, and more effective response to drought emergencies.

The DCP has been prepared in conjunction with the California Water Plan (CWP) and will be updated every five years. As part of the development of this first plan, a number of important ideas were raised about how to further improve drought response and coordination with local agencies. The planning process for CWP Update 2013 will include the development and discussion of these important ideas.

As part of ongoing drought planning, DWR will continue to implement programs such as Integrated Regional Water Management, Water Use Efficiency and education and outreach as part of statewide drought preparedness. These programs in association with actions to address California's comprehensive water issues will ensure that the State's water needs can be met now and into the future.

Sincerely,

Mark W. Cowin
Director

CALIFORNIA DROUGHT CONTINGENCY PLAN

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Acknowledgements:

This California Drought Contingency Plan could not have been accomplished without the input and assistance from the following State Agencies:

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Becky Wagoner, Ken Worman, Rob Mead, Karma Hackney,

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EXECUTIVE SUMMARY

California's water resources have been stressed by periodic drought cycles and unprecedented restrictions in water diversions from the Sacramento-San Joaquin Delta in recent years. Climate change is expected to increase extreme weather. It is not known if the current drought will abate soon or if it will persist for many years. However, it is certain that this is not the last drought that California will face.

In response to the recent drought, Governor Arnold Schwarzenegger issued Drought Proclamations and Executive Orders in 2008 and 2009 directing State agencies to take immediate actions to manage the crisis. The Department of Water Resources (DWR) was required to provide a report on the state's drought conditions and water availability. DWR subsequently committed to developing a Drought Contingency Plan (DCP) to address the possibility of continuing dry conditions in 2010 and beyond. This DCP contains strategies and actions State agencies may take to prepare for, respond to, and recover from droughts. Some components of this plan may be applied to water shortage events that occur in the absence of a drought.

The purpose of the DCP is to minimize drought impacts by improving agency coordination; enhancing monitoring and early warning capabilities; water shortage impact assessments; and preparedness, response, and recovery programs. The plan identifies an integrated, regional approach to addressing drought, drought action levels, and appropriate agency responses as drought conditions change.

An effective DCP will need transparent coordination and clearly defined roles and responsibilities of federal, State, and local agencies, and the timely dissemination of information to decision-makers. A drought communication and coordination structure is provided as Figure 1 and represents a general framework for agency planning and coordination. An Interagency Drought Task Force (Task Force) will be convened to provide coordination among agencies.

The Task Force will be chaired by the DWR Drought Coordinator with assistance from the California Emergency Management Agency (Cal EMA) Drought Coordinator. The roles of DWR and Cal EMA are defined and key duties of the Drought Coordinators are listed in Section V. DWR will coordinate overall drought activities while Cal EMA will focus on emergency response and recovery efforts. Drought coordination will occur through the DWR Regional Offices and Cal EMA Regions, and emergency response will be implemented in accordance with the Standardized Emergency Management System. State agencies participating in the Task Force is expected to function within existing agency authorities, responsibilities, and funding.

The Task Force provides policy direction to the Drought Monitoring Committee and the Impact Assessment Work Groups. The Committee and Work Groups provide situation reports and impact assessment reports to the Task Force, respectively. The Task Force ensures accurate and timely distribution of water supply data and drought forecasts to water managers and the public. Committee members consist of representatives from agencies responsible for monitoring weather and water supply data. Work Group members include representatives who assess drought impacts on the various regions

and sectors. The situation and assessment reports will be distributed to appropriate agencies and will be posted on the DWR Drought website (www.water.ca.gov/drought).

The potential roles and responsibilities of agencies and organizations which may be involved in drought management are defined in Attachment 1. By properly defining agency roles, drought response can be more effective and successful. Action tables are included in Tables 1 through 3 of the Attachment section and list activities agencies may take before, during, and after a drought with respect to planning and coordination, monitoring, local assistance, and conservation.

Tables 1 through 3 also suggest lead and supporting agencies to carry out the potential actions, and note related documents or references. Table 2 includes five levels of drought response, with each level signifying worsening drought conditions. For example, Level 1 represents an Abnormally Dry period (Raising Awareness of Drought), Level 3 a Severe Drought (Mandatory conservation in some communities and emergency actions), and Level 5 an Exceptional Drought (Water supplies cut off and maximum response). A Governor’s emergency drought proclamation may be initiated at a Level 3 response. Drought indicators generally based on hydrologic parameters are recommended, but are not quantified to provide flexibility in drought response. Drought response actions may be unique to a particular region and not necessarily uniform statewide. Actual response may be based on evaluation of situation and/or assessment reports and observation of field impacts.

Implementation of activities or programs in Tables 1 through 3 is intended to minimize drought impacts and enhance recovery. Actions may be added or modified to these tables based on field experience and input from stakeholders. Flexibility and adaptability must be incorporated into these actions because of changing conditions and circumstances, and the inherent uncertainty in the nature of drought.

The DCP is intended to become part of the California Water Plan Update process which occurs every five years. This may require that the plan be periodically updated to best serve the needs of California. As the plan gets refined, it will include updated information, technology, and strategies.

Implementation of strategies contained in this DCP supports the comprehensive approach needed to provide clean, reliable, and sustainable water supplies to people, farms, and business in California. California's water problems do not end when the drought ends. Immediate action is needed on a comprehensive solution that includes aggressive conservation, new groundwater and surface water storage facilities, conveyance facilities and environmental restoration. California's future economic growth, quality of life and prosperity depend on it.

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I. INTRODUCTION

The 2008 and 2009 Drought Proclamations and Executive Orders directed the Department of Water Resources (DWR) and other State agencies to take specific actions to respond to droughts. The February 2009 emergency proclamation required the preparation of a March 2009 status report to the Governor's office, which updated the state's drought conditions and water availability and identified activities DWR would initiate or support to help meet our most essential water needs in 2009 and plan for the possibility of a dry 2010.

The list of drought activities in the March 2009 status report included the preparation of a Drought Contingency Plan (DCP) to address the possibility of continued dry conditions through 2010 and beyond. The DCP was developed in consultation with the California Water Plan (CWP) Steering Committee (representing 21 State government agencies with jurisdictions over different aspects of water resources) and receiving input from its Advisory Committee.

The purpose of the DCP is to minimize drought impacts by improving agency coordination; enhancing monitoring and early warning capabilities; water shortage impact assessments; and preparedness, response, and recovery programs. The DCP includes a coordinated State government strategy to prepare for, respond to, and recover from droughts and water shortages, and identifies an integrated regional approach to assessing droughts, drought action levels, and appropriate agency responses as drought severity changes. This plan may be reviewed and updated with each CWP Update or as necessary to provide current information, technology, and strategies.

To accomplish the above purpose, the Drought Contingency Plan:

1. Recommends a general framework for agency planning and coordination to facilitate drought response and management.
2. Identifies activities and strategies that may be implemented to minimize drought impacts on vulnerable regions and sectors. These activities include actions that may be implemented before, during, and after a drought with respect to planning and coordination, monitoring, local assistance, and conservation programs.
3. Identifies the State, federal, tribal, and local agencies that have the lead or supporting roles in managing the drought response activities.
4. Promotes effective use of public, private, and tribal resources to manage response and mitigation efforts.

Definition:
Drought mitigation is actions or programs agencies may implement to minimize drought impacts and enhance recovery.

Although the current drought will eventually end, the restrictions on pumping from the Sacramento-San Joaquin Delta will continue to impact California's water supply. California may continue to experience significant negative economic impacts, requiring emergency responses due to widespread and deep water shortages, even in a year of

average or above-average precipitation and snowpack. Some components of the DCP (such as the communication and coordination structure in Figure 1) could also be applied to water shortage events which may occur in the absence of a drought.

An effective drought response requires clear communication among State, federal, local, and tribal agencies and stakeholders and the timely dissemination of information to the public. An emergency drought response will be implemented in accordance with the Standardized Emergency Management System (SEMS) mandated for multi-agency and multi-jurisdictional responses to emergencies in California. DWR will chair the Interagency Drought Task Force (Task Force) and serve as the primary coordinator of the State's drought effort. The California Emergency Management Agency (Cal EMA) will support DWR in this function, focusing on emergency response and recovery. The Task Force will coordinate with federal, local, and tribal agencies and other stakeholders on drought management and response efforts. A general communication and coordination structure (Figure 1) is proposed for agency planning and drought response. The structure, or components of it, may be used at any phase of drought management.

Being proactive to drought management requires continuous monitoring of factors indicating the onset and severity of drought, as well as impacts to stakeholders. The DWR Drought (www.water.ca.gov/drought) and California Data Exchange Center (www.cdec.water.ca.gov) websites contain comprehensive water supply data such as precipitation, snowpack, and reservoir conditions. Drought and water shortage data will be used to assess drought and impacts, and help develop appropriate drought responses. The DWR Drought website also provides information on available emergency, technical and financial assistance programs; tips on water conservation; guidance on water transfers; and links to other State, federal, and local agency websites.

Defining when a drought occurs is commonly a function of dry conditions' impacts on water users and their responses, which may vary depending on the severity of the drought. A drought does not have a clearly defined beginning and end and it does not impact all water users equally. As a result of the variability and severity of droughts, the varying impacts experienced by different regions and sectors, and the unpredictability in the duration of droughts, this DCP must be flexible to adjust to local circumstances. Examples of State agency response actions for each drought stage are provided in Tables 1 through 3 of the Attachment; however, actual field conditions may dictate greater or lesser response actions based on evaluation of drought severity and impacts. Conditions must be evaluated as they occur and appropriate responses selected to address those specific conditions. The specific actions may need to be adapted, as conditions warrant, to the unique circumstances that may occur.

II. UNDERSTANDING DROUGHT AND WATER SHORTAGE

The onset of drought is a gradual phenomenon, whereas water shortage may be sudden, as would occur if an earthquake causes massive and cascading Delta levee failures, resulting in a shutdown of the Delta's export water pumps. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for

preparation for disaster response. With the exception of impacts to dryland farming and grazing, drought impacts may occur slowly over seasonal periods, and the effects may linger for years after the end of the event.

In California, drought is commonly associated with impacts and below normal precipitation. Drought impacts increase with the length of a drought, as water supplies in reservoirs are depleted and groundwater levels decline due to increased pumping. The extent of drought impacts is dependent on many factors including climate, water use patterns, available water supplies and geography.

More discussion related to understanding drought and drought response in California can be found in the article “Droughts Concepts and Impacts in California” (See Attachment 3). This article also describes drought impacts on different sectors in greater detail, including predicted outcomes from climate change.

III. HISTORICAL DROUGHT AND CLIMATE CHANGE

Droughts exceeding three years in California’s measured hydrologic record have been relatively rare in Northern California, which is where the majority source of the State’s water supply originates. Historical multi-year droughts include: 1912-13, 1918-20, 1923-24, 1929-34, 1947-50, 1959-61, 1976-77, 1987-92, and most recently the current drought which began in 2007. The 1929-34 Drought established the criteria commonly used in designing storage capacity and yield of large Northern California reservoirs.

In addition to historical measured data, scientists are now reconstructing historical weather conditions through analysis of tree rings (dendrochronology). Information on the thickness of annual growth rings can be used to infer historical weather and streamflow conditions. Some of the longest and best reconstructions have been developed for the Colorado River spanning more than 1,000 years. These reconstructions clearly show extended drought periods that are far more severe than anything experienced in the historical record. The recent drought and new information about drought patterns in the past 1,000 years have raised awareness of the need to address the possibility of long-term, sustained drought.

Warming temperatures due to global climate change, combined with changes in precipitation and runoff patterns, are projected to increase the frequency and intensity of droughts in California. Regions that rely heavily upon surface water (rivers, streams, and lakes) could be particularly affected as runoff becomes more variable, and more demand is placed on groundwater. Climate change and a projected increase in California’s population will also affect water demand. Warmer temperatures will likely increase evapotranspiration rates and extend growing seasons, thereby increasing the amount of water that is needed for the irrigation of many crops, urban landscaping and environmental water needs.

IV. CALIFORNIA EMERGENCY SERVICES ACT AND GOVERNOR'S EMERGENCY PROCLAMATION

The California Emergency Services Act, Government Code Sections 8550 et seq, establishes how conditions of emergency are declared and describes the authorities of public agencies to prepare for and respond to emergencies. Pursuant to this Act, an emergency may be proclaimed by the Governor or by a city or county.

The governing body of a city or county proclaims a local emergency when the conditions of disaster or extreme peril exist. The proclamation enables the city or county to use emergency funds, resources, and powers, and to promulgate emergency orders and regulations. A local proclamation is a prerequisite to requesting a gubernatorial proclamation of emergency. The Secretary of Cal EMA may issue a letter of concurrence to a city or county declaration of local emergency. Cal EMA concurrence makes financial assistance available for repair or restoration of damaged public property pursuant to the California Disaster Assistance Act.

The Governor assesses the emergency situation and may proclaim a state of emergency when local resources are insufficient to control the disaster or emergency, typically in response to a local emergency proclamation. The Governor's proclamation activates the State Emergency Plan and invokes the California Disaster and Civil Defense Master Mutual Aid Agreement facilitating the provision of mutual aid from other cities and counties and state ageny assistance, permits suspension of state statutes or regulations, allows for state reimbursement of city and county response costs associated with the emergency, and allows property tax relief for damaged private property.

V. COMMUNICATION AND COORDINATION STRUCTURE FOR DROUGHT RESPONSE OR DROUGHT MANAGEMENT

Drought management is a responsibility shared by many agencies and organizations at the federal, State, Region, and local levels. This DCP outlines the roles and responsibilities of agencies and organizations that may be involved in drought management (See Attachment 1).

State agencies will be more effective in managing and responding to drought if there is an established structure for communication and coordination. SEMS is the established structure for emergency management, preparedness, response, recovery and mitigation, communication and coordination. A drought emergency would follow the same SEMS structure as used for all other statewide emergencies and disasters. Figure 1 depicts a general structure that can be used for emergency drought response. Some components of this structure, such as the Drought Monitoring Committee and/or Impact Assessment Work Groups, may be used at any phase (Before, During, or After a drought) of drought management.

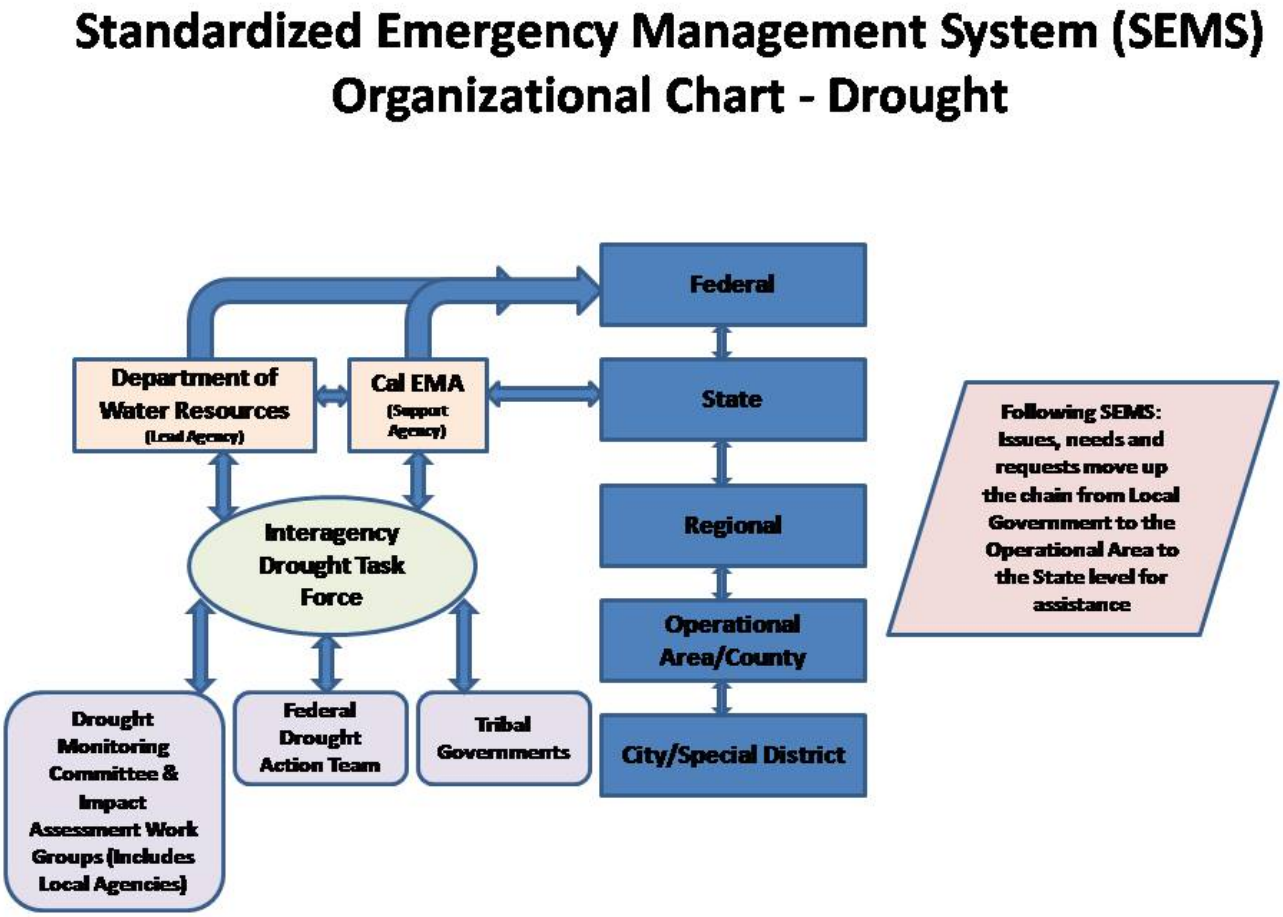

FIGURE 1: General Drought Communication and Coordination Structure

In addition, DWR's Public Affairs Office is expanding its comprehensive drought communication strategy to provide better access to water supply and drought information to a variety of audiences. The drought website, drought list serve, eNews and focused outreach to water policy managers, legislators and the media are all tools that can be used to meet drought communication needs.

Implementation of SEMS on emergency drought response and the general tasks of individuals, agencies, and working groups are described below.

Standardized Emergency Management System (SEMS)

As stated in Reference 5, SEMS is the cornerstone of California's emergency response system and the fundamental structure for the response phase of emergency management. SEMS is required by the California Emergency Services Act for managing multi-agency and multi-jurisdictional responses to emergencies in California. The

system unifies all elements of California's emergency management community into a single integrated system and standardizes key elements. State agencies are required to use SEMS and local government entities must use SEMS in order to be eligible for any reimbursement of response-related costs under the state's disaster assistance programs.

The emergency drought response component of this plan will be implemented in accordance with SEMS.

Role of DWR and Cal EMA in Drought Response

The 2009 emergency drought proclamation (see Attachment 6) required that all agencies of the State government use and employ State personnel, equipment and facilities for the performance of any and all activities consistent with the direction of the Cal EMA and the State Emergency Plan (SEP). The SEP describes State government's response to disasters, including response by all levels of government and the private sector. In accordance with the California Emergency Services Act, the SEP describes the methods for carrying out emergency operations, the process for rendering mutual aid, the emergency services of government agencies, how resources are mobilized, how the public will be informed and the process to ensure continuity of government during an emergency or disaster.

The 2009 proclamation also directed DWR to take specific actions to respond to drought. These actions included promoting water conservation, implementing the water transfers program, and providing a status report on the state's updated water conditions. During the 2009 drought response, DWR, Cal EMA and other agencies formed a committee to monitor drought impacts and help provide drought relief. In responding to future droughts or water shortage emergencies, an Interagency Drought Task Force (Task Force) will be formed with DWR acting as Chair and Cal EMA providing support. The Task Force will coordinate overall drought activities among agencies and stakeholders. Cal EMA will focus on emergency response and recovery. Both agencies will collaborate to coordinate the remaining activities of the Task Force.

Drought Coordination through DWR Regional Offices and Cal EMA Regions

Through the DWR Regional Offices and Cal EMA Regions, the State will coordinate with local agencies, regions, and operational areas to identify local drought-related impacts, assess resulting damages and costs, and determine appropriate response actions. Coordination may also occur within the State's ten hydrologic regions as identified in the CWP. State agencies may be tasked to provide technical and local assistance support on water conservation; drought preparedness; emergency response, recovery, and mitigation; and other activities. The regional coordination will serve as the link between local communities and the State and federal agencies. For Cal EMA, drought coordination and response will transfer to program areas for recovery.

DWR maintains strategically located regional offices which assist public and other entities as well as the general public with various water issues throughout the state. The

DWR Regional offices are the Northern Region in Red Bluff, North Central Region in Sacramento, South Central Region in Fresno, and Southern Region in Glendale.

Cal EMA has three administrative regions which provide coordination and assistance to the local level in all phases of emergency management. These regions are the Inland Region, headquartered in Sacramento, the Coastal Region in Oakland, and the Southern Region in Los Alamitos. Cal EMA regions have the responsibility to carry out the coordination of information and resources within the region and between the SEMS state and regional levels to ensure effective and efficient emergency responses, recovery, and communications.

DWR Statewide Drought Coordinator

The DWR Statewide Drought Coordinator (DWR Drought Coordinator) will chair the Interagency Drought Task Force. The Drought Coordinator would be assigned by DWR to coordinate drought activities among federal, State, local and tribal governments, stakeholders, and the public. The key duties may include:

- Coordinate statewide drought response activities
- Prepare for future or continuing droughts through strategic drought planning with agencies and organizations
- Implement and manage drought-preparedness programs and policies
- Help oversee the update of the DCP as part of the California Water Plan update process
- Ensure accurate and timely distribution of water supply data and drought forecasts to water managers and the public
- Activate the Drought Operations Center to serve as a central point of contact for information and emergency assistance requests
- Assess vulnerability of key sectors, regions, and groups in the state and determine possible drought response
- Provide technical assistance
- Coordinate funding to support drought relief, groundwater projects, desalinization, conservation, recycling, and other water management projects to assist regions in dealing with drought
- Enhance public awareness and drought education by providing workshops and incorporating conservation campaigns into statewide events
- Provide administrative support to the Drought Task Force, workgroups, and committees
- Advise on water issues and concerns
- Update the DWR Drought website

The DWR Drought Coordinator may also reach out to other regions in the United States and other countries experiencing severe drought such as Australia, which has experienced sustained drought for the past 10 years, to collaborate and share information. By studying how other regions and countries have responded to long-term severe drought, DWR can help shape water management and drought policies to be better prepared for droughts.

Cal EMA Drought Coordinator

Cal EMA will assist DWR in coordinating the activities of the Task Force. The Cal EMA Drought Coordinator will collaborate with DWR's Statewide Drought Coordinator on agency response and other activities. The key duties may include:

- Coordinate emergency management needs related to the drought
- Collaborate with State, regional, local, and tribal agencies on providing workshops on drought preparedness, social services and other assistance
- Coordinate resource requests for providing bottled or trucked water and mobile desalinization

Interagency Drought Task Force (Task Force)

The Task Force is convened through a joint decision by DWR and Cal EMA in coordination with the Governor's Office generally at the onset of a drought or following an emergency drought declaration by the Governor. The Task Force is chaired by the DWR Statewide Drought Coordinator with assistance by the Cal EMA Drought Coordinator. Members will be comprised of executive and policy-level managers who provide direction for drought management programs and oversee the coordination of activities. The Task Force should also include a member from the Governor's office and a public information officer to address media needs.

The Task Force will coordinate with working groups, federal agencies, tribal organizations, and stakeholders on drought management. The Task Force is expected to function within existing agency authorities, responsibilities, and funding, and where applicable facilitate access to services and assistance to reduce drought impacts. The Task Force will provide policy recommendations for plan implementation, emergency response, plan review and modification. The Task Force will provide an integral mechanism to coordinate and integrate drought planning and management for all areas in California.

During non-drought, the Task Force may meet informally and use their broad expertise and authority to plan and prepare for future droughts. The Task Force identifies pre-drought strategies, and makes recommendations for response, recovery, and mitigation plans and determines the resources necessary to provide drought assistance.

Drought Monitoring Committee and Impact Assessment Work Groups of the Interagency Drought Task Force

The Drought Monitoring Committee (DMC) and Impact Assessment Work Groups' (IAWG) primary roles are to monitor water supply and drought, and to assess drought impacts on various regions and sectors. Work groups should meet regularly and more frequently during drought periods to monitor drought. Following each meeting, situation and impact assessment reports will be prepared and disseminated to the Task Force and agency leads, and will be posted on the DWR Drought website.

The DMC includes representatives from agencies responsible for monitoring weather and water supply conditions. The DMC assists in the development of a comprehensive monitoring network to monitor and assess drought conditions in the state where there may be data gaps. The principle objective is to develop a drought monitoring system that provides an early warning of drought by providing accurate, timely, and integrated information. Conditions to be monitored may include: precipitation, temperature, stream flows, reservoir levels, groundwater levels, snowpack, runoff, and soil moisture. Other information to be monitored may include: number of water agencies at voluntary and mandatory conservation, number of utilities with special problems, reservoir release requirements and Delta pumping restrictions, hydropower generation, areas with fire hazard potential, amount of fallowed land, and well drilling activity. Monitoring of these parameters will give an indication of water supply conditions and the extent of drought impacts.

A key task of this committee is to monitor information such as climate assessment, weather outlook, stream flow/runoff forecast, and reservoir and aquifer storage assessment. This information helps State and local water agencies manage the water supply needed for local communities, agriculture, environmental uses, and other needs of the state.

The IAWGs include members who represent groups who may be at risk from drought. The groups are created by the Task Force as needed and may include representatives from the following areas, organizations or disciplines:

a. Public Health
b. Biodiversity and Habitat
c. Agriculture
d. Recreation
e. Forestry and Fire
f. Infrastructure and Energy
g. Economics
h. Tribal governments

The IAWGs may assess impacts on vulnerable regions, sectors, and groups throughout the State. Members may include local agency representatives such as county emergency managers (identified in accordance with SEMS) and water agency officials, and other stakeholders who will work with the State to assess or respond to drought impacts. The IAWGs will assist the DMC and provide regional input on impending or current drought. These work groups will assess drought impacts and help develop appropriate response and mitigation strategies.

Federal Government

Generally drought emergency response activities follow a government hierarchy which starts with local and tribal governments, then Region, State and finally federal, with each level of response being exhausted or overwhelmed before proceeding to the next level. Local, tribal, State, and federal officials may work together in both planning for and responding to drought and water shortages.

Federal agencies provide a wide range of drought relief assistance primarily through the USDA. See Attachment 2 of the Appendix for key federal drought relief programs. Federal agencies have collaborated with State agencies on public forums to discuss strategies to address a range of water supply challenges facing California, including ongoing and future drought. In addition, DWR and U.S. Bureau of Reclamation (USBR) coordinate on water transfers activities and hold workshops to help urban water suppliers plan for drought conditions.

Tribal Government

Droughts in California may impact California Native American Tribes and tribal areas. State and federal agencies have primary responsibility for communicating with California Native American Tribes in affected areas, gathering information and, when possible, coordinating on drought relief assistance. For the purposes of this DCP, the term “California Native American Tribe” signifies all Indigenous Communities of California, including those that are federally non-recognized and federally recognized, and those with allotment lands, regardless of whether they own those lands. Responsible State and federal agencies may collaborate with Tribal governments to identify impacts of drought on Tribal lands, coordinate monitoring and forecasting, and identify ways in which State government might assist Tribal governments in responding to drought. This assistance would complement, not replace, existing Tribal relations with federal government programs, including those provided through the U.S. Bureau of Indian Affairs.

VI. PREPARING FOR A DROUGHT

California’s water resources have been stressed by a number of factors including a growing population, groundwater overdraft, limitations on extraction of water from the Sacramento-San Joaquin Delta for the protection of fish, and increased competition for available water. Any additional stress from climate change will only intensify the competition for water resources. Warming temperatures, combined with changes in precipitation and runoff patterns, are expected to increase the frequency and intensity of droughts. For these reasons, drought preparedness should be considered in the overall management of the State’s water resources.

California Water Plan Strategies for Preparing for a Drought

The California Water Plan (CWP) includes resource management strategies for water management in California. Of the 28 resource management strategies in the 2009 CWP Update, 18 address improving drought preparedness. The reader is directed to the CWP Update 2009, Volume 2 Resource Management Strategies (See www.waterplan.water.ca.gov/cwpu2009/index.cfm#volume2) for more detailed discussion of these strategies. The following includes a brief description of each strategy and how it may relate to water management or drought preparedness in California.

Agricultural Lands Stewardship

Agricultural lands stewardship broadly means the conservation of natural agricultural resources and protection of the environment on agricultural lands. Land managers practice stewardship by conserving and improving land for food, fiber and biofuels production, watershed functions, soil, air, energy, plant and animal and other conservation purposes. Agricultural lands stewardship also protects open space and the traditional characteristics of rural communities. Moreover, it helps landowners maintain their farms and ranches rather than being forced to sell their land because of pressure from urban development.

As defined in this strategy soil-building fallowing can be used as a drought management tool at the water district or farm level, especially where linked to drought payments that could be used on farm-related investments, purchases and debt repayments. Such expenditures would improve sustainability of the farm, and help support rural communities.

Agricultural Water Use Efficiency

The Agricultural Water Use Efficiency Strategy describes the use and application of scientific processes to control agricultural water deliveries and use, and achieve beneficial outcomes. The Strategy includes: 1) an estimation of net water savings resulting from implementation of efficiency measures as expressed by the ratio of water output to water input; 2) resulting benefits; and 3) strategies to achieve water use efficiency and its benefits. However, with increased agricultural water use efficiency, there is a corresponding potential for decrease in groundwater recharge that surface water irrigations provide in some areas.

The estimation of net water savings is the reduction in the amount of water used that becomes available for other purposes, while maintaining or improving crop yield. Net water savings recognizes: 1) uptake and transpiration of water for crop water use, 2) the role, benefits, and quantity of applied water that is recoverable and reusable in the agricultural setting, and 3) the quantity of irrecoverable applied water that flows to salt sinks, such as the ocean and inaccessible or degraded saline aquifers, or evaporates to the atmosphere, and is unavailable for reuse. The benefits, in addition to water savings, may include water quality improvements, environmental benefits, improved flow and timing, and often increased energy efficiency.

See the Agricultural Water Management Plans section on page 19 as an example of application of agricultural water use efficiency.

Conveyance – Delta

Conveyance infrastructure provides for the movement of water from one location to another. Conveyance infrastructure includes natural watercourses as well as constructed facilities such as canals and pipelines, including control structures such as weirs.

Conveyance through the Delta, located at the confluence of the Sacramento and San Joaquin rivers, naturally carries water westward from the upstream water drainage basins to the bays connected to the Pacific Ocean. The Delta, however, is also a highly manipulated network of natural streams and sloughs as well as constructed channels bordered by levees to prevent flooding of adjacent islands. The Delta is a critical element of both regional (e.g., Folsom South Canal) and interregional (Central Valley Project and State Water Project) water conveyance systems and is essential to sustaining the state's economy.

Redundancy (having more than one way to convey water) in the Delta conveyance system will provide increases in resiliency. This may, therefore, ensure some continuation of services during extreme events such as a long-term drought or following a catastrophic seismic event which damages the Delta levees and impacts the State Water Project operations, and allows for alternative operations to adjust to changing conditions. Additional discussion of this topic can be found in the CWP Update 2000, Volume 2, Chapter 4, Delta Conveyance Resource Management Strategy and in Volume 3, Sacramento-San Joaquin Delta Regional Report.

Conveyance - Regional/Local

An extensive system of regional and interregional conveyance facilities in the state moves water from a source location to an area where it is needed and/or conveys excess water safely to protect existing resources and infrastructure. Broad water management objectives and evaluations usually do not include specific regional or interregional conveyance options. Analyses must be made at project-specific levels to determine if improvements to conveyance facilities can provide system benefits or the ability to increase water supply and deliveries.

Increases in resiliency to extreme events by employing interconnected conveyance systems can provide some redundancy to ensure continuation of services during a long-term drought or short-term water shortage emergency.

Conjunctive Management and Groundwater Storage

Conjunctive groundwater management refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. Surface water and groundwater resources typically differ significantly in their availability, quality, management needs, development and use costs. Managing both resources together, rather than in isolation, allows water managers to use the advantages of both resources for maximum benefit.

Drought relief for urban and agricultural water users and potential induced groundwater recharge could be gained through groundwater substitution transfer and agricultural water transfers.

Desalination – Brackish and Seawater

Desalination comprises various water treatment processes for the removal of salt from water for beneficial use. Desalination is used to treat seawater as well as brackish water (water with a salinity that exceeds normally acceptable standards for municipal, domestic, and irrigation uses, but less than that of seawater).

Desalination, when adopted as part of a diversified water supply portfolio, can offer several benefits including increase in water supply, reclamation and beneficial use of impaired waters, and increased water supply reliability during drought periods.

See website (www.water.ca.gov/desalination) for more information on desalinization in California.

Economic Incentives

Economic incentives include financial assistance, water pricing, and water market policies intended to influence water management. Economic incentives can influence the amount of use, time of use, wastewater volume, and source of supply. They can help local agencies and water districts respond to droughts and water shortages.

Incentives can be created or enhanced by facilitating water market transfers, by creating market opportunities where they didn't exist, by expanding opportunities where they currently exist, or by reducing market transaction costs.

Water market policies such as dry year water purchase programs and operation of a drought water bank to coordinate water transfers between willing sellers and buyers are part of this strategy as well as water cost incentives. Drought rate structures where unit water costs are increased during a drought gives customers a choice of paying the higher water rates or finding ways to use less water.

Ecosystem Restoration

Ecosystem restoration improves the condition of our modified natural landscapes and biological communities to provide for their sustainability and for their use by current and future generations. Successful restoration increases the diversity of native species and biological communities and the abundance and connectivity of habitats. This can include reproducing natural flows in streams and rivers, curtailing the discharge of waste and toxic contaminants into water bodies, controlling non-native invasive plant and animal species, removing barriers to fish migration in rivers and streams, and recovering wetlands so that they store floodwater, recharge aquifers, filter pollutants, and provide habitat.

As ecosystem restoration actions help recover the abundance of endangered species, there should be fewer Endangered Species Act conflicts, particularly in the Delta. These conflicts repeatedly disrupt water supplies often during droughts. Thus, one result of ecosystem restoration activities could be a more reliable water supply.

Flood Risk Management

Flood Risk Management is a strategy specifically intended to enhance flood protection. This strategy includes projects and programs that assist individuals and communities to manage floodflows and to prepare for, respond to, and recover from a flood. This strategy is a key element of integrated flood management, a process that promotes a comprehensive approach that considers land and water resources at a watershed scale within the context of integrated regional water management. The aim of this strategy is to maximize the benefits of floodplains, minimize the loss of life and damage to property from flooding, and recognize the benefits to ecosystems from periodic flood events.

This resource management strategy recognizes the potential benefits to water supply and drought preparedness. Detention of floodwaters with both structural and non structural methods could provide benefits to the extent that they result in additional water storage or groundwater infiltration and increased protection of water supply conveyance systems.

Land Use Planning & Management

Integrating land use and water management consists of planning for the housing and economic development needs of a growing population while providing for the efficient use of water, water quality, energy, and other resources. The way in which we use land—the pattern and type of land use and transportation and the level of development intensity—has a direct relationship to water supply and quality, flood management, and other water issues.

Land use resource management strategy brings together many concepts which if adopted together will make existing and future land development more efficient in use of water and hence makes communities more sustainable and resilient to the effects of drought.

Recharge Area Protection

Recharge areas are those areas that provide the primary means of replenishing groundwater. Good natural recharge areas are those where good quality surface water is able to percolate unimpeded to groundwater. If recharge areas cease functioning properly, there may not be sufficient groundwater for storage or use. Protection of recharge areas requires a number of actions based on two primary goals. These goals are (1) ensuring that areas suitable for recharge continue to be capable of adequate recharge rather than covered by urban infrastructure, such as buildings and roads; and, (2) preventing pollutants from entering groundwater in order to avoid expensive treatment that may be needed prior to potable, agricultural, or industrial beneficial uses.

The primary benefit of protecting recharge areas is that those recharge areas can be used by water managers to store water in aquifers as part of a program to provide a sustainable and reliable water supply of good quality, thereby reducing impacts due to drought.

Recycled Municipal Water

In 2009, DWR developed dual plumbing standards, in consultation with the California Department of Public Health and other agencies, to safely plumb certain buildings and commercial properties with both potable and recycled water systems. On November 18, 2009, the Building Standards Commission unanimously voted to approve the California Dual Plumbing Code and building codes were codified in January 2010. The code was published on July 4, 2010 which began the statutory 180-day period between publishing and the effective date of the code. The Dual Plumbing Code effective date is January 11, 2011.

In May 2009, the State Water Resources Control Board adopted the Recycled Water Policy (Recycled Policy) which is intended to support their Strategic Plan priority of promoting sustainable local water supplies. Increasing the acceptance and promoting the use of recycled water is a means towards achieving sustainable local water supplies and can result in reduction in greenhouse gases by reducing some of the need for imported water, a significant driver of climate change. The Recycled Policy is also intended to encourage beneficial use of, rather than solely disposal of, recycled water. To the extent water recycling provides additional water supply it provides additional resilience to drought.

In July 2009, the State Water Resources Control Board adopted General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water (General Permit). The Landscape General Permit is consistent with the Recycled Water Policy, State and Federal water quality laws, including the statewide water quality standards established by the California Department of Public Health. The General Permit facilitates the streamlining of the permitting process to reduce the overall costs normally incurred by producer, distributors, and users of recycled water.

See website (www.water.ca.gov/recycling/) for more information on the water recycling and the California Water Plan Update 2009, Volume 2, Chapter 11 Recycled Water Management Resource Management Strategy.

Surface Storage – CALFED

The CALFED Record of Decision (2000) identified five potential surface storage reservoirs that are being investigated by the California Department of Water Resources, US Bureau of Reclamation, and local water interests.

- Shasta Lake Water Resources Investigation (SLWRI)
- North-of-the-Delta Offstream Storage (NODOS)
- In-Delta Storage Project (IDSP)
- Los Vaqueros Reservoir Expansion (LVE)
- Upper San Joaquin River Basin Storage Investigation (USJRBSI)

California’s water resources future has become increasingly uncertain. Consequently, these proposed projects would need to perform well under a number of potential future

conditions including climate change, alternative Delta conveyance and management, and disaster / emergency response.

Performance of the CALFED surface storage projects is measured using an operations simulation of the Central Valley Project and State Water Project systems. Results are often reported with both average annual values and dry period (1928-34, 1976-77, and 1987-92) average annual values, reflecting the importance of performance under drought.

Surface Storage Regional/Local

Surface storage uses reservoirs to collect water for later release and use. Surface storage has played an important role in California where the pattern, timing and location of water use does not always match the natural runoff pattern. Many California water agencies rely on surface storage as a part of their water systems. These reservoirs also play an important role in flood control and hydropower generation. Similarly, surface storage is often necessary for, or can increase the benefits from other water management strategies such as water transfers, conjunctive management and conveyance improvements. Some reservoirs contribute to water deliveries across several regions of the state while others only provide local water deliveries within the same watershed. There are two general categories of surface reservoirs: those formed by building a dam across an active river, and a second type called off-stream reservoir storage where the actual reservoir is in a separate geographic location away from the river supply, with water diverted or pumped into storage.

Additional surface storage capacity can also be developed by enlarging, reoperating or modifying existing reservoirs and their outlet structures. Smaller reservoirs typically store water annually in the winter season for use in summer months, while larger reservoirs also hold stored water over several years as a reserve for droughts or other emergencies.

System Reoperation

System reoperation means changing existing operation and management procedures for existing reservoirs and conveyance facilities to increase water related benefits from these facilities. System reoperation may improve the efficiency of existing water uses (e.g., irrigation) or it may increase the emphasis of one use over another. Although reoperation is generally regarded as an alternative to construction of major new water facilities, physical modifications to existing facilities may be needed in some cases to expand the reoperation capability. Legal changes also may be needed. Changes in water demands and the changing climate are the primary reasons to consider reoperation of existing facilities to increase project yield or address climate change impacts.

One operational concept is Forecast-Based Operations (FBO) used to operate a multi-purpose dam and its associated reservoir for flood control and water supply. FBO utilizes advanced forecasts of reservoirs inflows to reduce uncertainty and improve risk management in reservoir system operations. FBO allows dynamic flood storage rule

curve used in reservoir operation for better flood protection and greater water supply potential. One example of FBO based reoperation is currently being developed at Folsom Dam and Reservoir. The potential benefits include increased water supply and improved operational flexibility and efficiency, drought preparedness and water quality.

Urban Water Use Efficiency

Water use efficiency is a strategy to reduce water demand and part of the roadmap to sustainable water uses and reliable water supplies. Urban water use efficiency involves technological (such as stormwater capture) or behavioral improvements in indoor and outdoor residential, commercial, industrial, and institutional water use that lowers demand and per capita water use which results in benefits to water supply and water quality. This strategy has multiple benefits to citizens, the economy, and the environment.

Drought responses under this resource management strategy include water agencies providing educational and motivational programs to inform their customers and provide incentives for water conservation practices during drought.

Specific examples of urban water use efficiency programs and activities are described under the “Additional Strategies and Activities for Preparing for a Drought” below.

Watershed Management

Watershed management is the process of creating and implementing plans, programs, projects and activities to restore, sustain and enhance watershed functions.

A primary objective of watershed management is to increase and sustain a watershed’s ability to provide for the diverse needs of the communities that depend on it, from local to regional to state and federal stakeholders. Resource management using watersheds as an organizing unit has proven to be an effective scale for natural resource management.

A healthy watershed works like a sponge to store and release water to both streams and groundwater. In California, healthy watersheds increase the residence time of water, and tend to store and release water longer into the dry season leading to added resilience to drought.

Water Transfers

Water transfers are the sale of water from areas with excess water to areas in need of water. This voluntary change in the way water is usually distributed among water users is often in response to water scarcity. Many water transfers become a form of flexible system reoperation linked to many other water management strategies including surface water and groundwater storage, conjunctive water management, improved conveyance efficiency, water use efficiency, water quality improvements, and planned crop shifting or farmland fallowing. These linkages often result in increased beneficial use and reuse of water overall and are among the most valuable aspects of water

transfers. Transfers also provide a flexible approach to distributing available water supplies for environmental purposes.

The 2009 DWR Drought Water Bank is an example of the use of transfers in responding to drought (see below section for further discussion on water transfers).

Please see the recently released 2009 California Water Plan update for additional information on the above strategies (www.waterplan.water.ca.gov/cwpu2009/index.cfm).

Highlighted Strategies and Activities for Preparing for a Drought

The State has taken or planned a number of actions and programs to prepare for the possibility of an extended drought and to minimize its impacts. These strategies and programs (described below) highlight some of the activities needed to respond to a potential long-term decrease in water supplies. Also, see Table 1 of the Appendix for potential actions agencies may take in preparing for a drought.

Drought Response Workshops and Planning

In 2009, DWR, Cal EMA, and Department of Public Health hosted a series of workshops throughout California to share updates on drought impacts and response activities, and to discuss local groundwater conditions and planning for Integrated Regional Water Management (IRWM) grants. Projects and programs that urban and agricultural agencies have been putting in place (often with state financial assistance) to improve local water supply reliability also help with drought preparedness. Implementation of IRWM over time could help improve planning for water supply reliability and drought preparedness at the regional scale, particularly in the context of local capital improvement planning for water infrastructure.

Preparing for droughts entails having in place an institutional framework that addresses not only actions that are directly related to provision of water supplies, but also provides for the information collection and expertise to support emergency services response. In some sectors (such as wildfire response) institutional capabilities are well developed in terms of mutual aid agreements and the state's incident command system. Development of institutional frameworks remains to be worked out in other sectors, including methodologies for quantifying and dealing with socioeconomic impacts.

Drought Monitoring And Forecasting

Monitoring and forecasting are essential to support effective drought responses. The ability to assess and predict drought require an extensive, long-term monitoring and data collection effort. Being proactive to drought management requires continuous monitoring of indicators to help predict the onset and extent of drought, as well as to help determine when to relax restrictions and return to normal operations. Real-time weather water supply data will be compared with historical records to evaluate drought.

DWR has already developed a drought website (www.water.ca.gov/drought) containing links to water supply data such as snowpack, precipitation, runoff, and reservoir storage to help evaluate current water supply. Also, the California Data Exchange Center

(www://cdec.water.ca.gov/) installs, maintains, and operates an extensive hydrologic data collection network including automatic snow reporting gages for the Cooperative Snow Surveys Program and precipitation and river stage sensors for flood forecasting.

This information may be supplemented by a network of comprehensive data maintained by other State, federal, and local agencies or organizations to provide accurate and current information to guide management decisions. For example, the National Integrated Drought Information System (NIDIS) is a drought information system that brings together a variety of observations, analysis techniques, and forecasting methods in an integrated system to support drought assessment and decision-making (Reference 13). Opportunities for collaboration with NIDIS to supplement data or integrate activities should be explored in future DCP updates.

Also, DWR is finalizing upgrades to the California Irrigation Management Information System (CIMIS) including an increased number of weather stations and improved system maintenance that will provide important water saving irrigation information. This information, along with other drought data, is incorporated into drought impact reports and bulletins to provide current information on water supply conditions.

In addition, beginning in 2008, DWR began hosting Winter Outlook Workshops which brings together nationally known scientists to provide state water managers with the most accurate prediction possible for the water year that runs from October 1 through September 30. An accurate, long-range forecast for water year precipitation is a critical tool for water managers throughout the state.

Water Conservation

Water conservation refers to reducing water usage which helps lower water demand. A conservation measure is an action, behavioral change, technology, or improved design or process implemented to reduce water loss, waste, or use. Conservation should be a priority in all water management decisions because there is often not enough lead time during emergencies to undertake significant water saving improvements. The key to water conservation is public education.

In 2009, DWR partnered with the Association of California Water Agencies (ACWA) to launch a statewide water conservation campaign aimed to reduce water use and educate the public. The multi-year program aims to create a habit of saving water as a component of the comprehensive solutions to our water challenges. In May 2010, the campaign was re-launched under the title “Real People, Real Savings”, featuring real-life Californians and their water-saving stories to help encourage Californians to conserve water. DWR continues to incorporate the campaign into statewide events. Please visit the campaign website (www.saveourh2o.org) which contains conservation tips, videos, and tools on saving water.

In 2009, The Department of General Services mandated water conservation best management practices (BMP) for all state-owned facilities and requested owners of state-leased facilities to also implement BMP for water conservation. These

conservation programs should be reviewed and updated periodically to incorporate improvements in technology and methodology.

20 by 2020 Water Conservation Plan

DWR has worked with other agencies and the legislature to develop a comprehensive plan to permanently reduce urban per capita water use 20% by 2020. The plan concludes that California can implement a range of activities designed to achieve 20% per capita reduction in urban water demand by 2020. These activities include improving an understanding of the variation in water use across California, promoting legislative initiatives that provide incentives to water agencies to promote water conservation, and creating evaluation and enforcement mechanisms to assure regional and statewide goals are met.

The Final 20x2020 water conservation plan was released in February 2010 (See www.swrcb.ca.gov/water_issues/hot_topics/20x2020/docs/20x2020plan.pdf).

DWR Water Transfers Program

Water transfers are a common tool for responding to drought impacts. The 2008 Executive Order directed DWR to implement a dry year purchasing program (which became the 2009 drought water bank) to assist water users if conditions were dry.

In 2009, DWR established a new Office of Water Transfers to coordinate all activities for the Department's transfer program and to develop the long-term water transfers program (This office subsequently has been restructured within DWR). DWR and USBR have also provided assistance with environmental compliance and endangered species coverage for water transfers. DWR and USBR have committed to the development of an ongoing, long-term water transfer program to provide ongoing flexibility in water management, and have begun the process for environmental compliance permitting for the program. Even though the need for water transfers may vary from year to year, external factors including climate change and challenges facing the Delta are increasing the frequency of need for water transfer to meet local water supplies demands.

In 2009, DWR implemented the Drought Water Bank (DWB) in response to a third year of drought. The DWB provided 74,100 acre feet (AF) of water for through Delta transfers for use in the San Joaquin Valley and Southern California. In addition to the water provided by the DWB, another 200,185 AF of water was transferred through the Delta through separate transfer agreements. Of this amount, 172,685 AF were provided through agreements resulting from the Yuba Accord.

More information regarding the DWR Water Transfers Program can be found at: www.water.ca.gov/drought/transfers/#

Model Landscape Ordinance

Many of the local agency water conservation campaigns are targeting reductions in outdoor water use. In September 2009, DWR adopted an updated model water efficient landscape ordinance. As required by AB 1881 of 2006, DWR distributed the ordinance

to all local agencies. Not later than January 31, 2010, each agency was required to notify DWR that it has adopted the model ordinance or a local ordinance. Most local agencies have notified DWR whether they are enforcing the model ordinance or enforcing a local water efficient landscape ordinance. Numerous agencies are going a step further by making some provisions of their local ordinances more rigorous than the model ordinance. Many agencies view this as an opportunity to address limited water supply conditions, improve water quality and complement their existing water conservation programs.

In 2009, DWR partnered with the California Urban Water Conservation Council and various organizations throughout the state to conduct nine workshops on the model ordinance. The intention of the workshops was to assist local governments and urban water suppliers in adopting and implementing the model ordinance, or a local ordinance that is at least as effective as the model ordinance.

See website (www.water.ca.gov/wateruseefficiency/landscapeordinance)for more information on the water efficient landscape ordinance.

Urban Water Management Plans (UWMPs)

As a condition to receiving state drought financial assistance or water transfers provided in response to the drought emergency, urban water suppliers in California are generally required to implement a water shortage contingency analysis, as required by California Water Code section 10632. The analysis must address how they would respond to supply reductions of up to 50%, and must estimate supplies available to their systems in a single dry year and in multiple dry years. UWMPs must also address systems' responses to catastrophic interruptions of their supplies, such as those caused by earthquakes or power shortages.

The latest updates of UWMPs were due to DWR in 2005. DWR estimates that 453 suppliers were required to file plans in 2005; 410 plans have been received to date. The next set of updates is due in 2010. Beginning in 2007, DWR has held 18 UWMP workshops in response to the current drought, to encourage water systems to review and update their water contingency plans, and additionally has funded preparation of an updated urban drought guidebook in coordination with USBR and the California Urban Water Conservation Council.

See website (www.water.ca.gov/urbanwatermanagement) for more information on urban water management.

Agricultural Water Management Plans (AWMPs)

Under AB 3616, DWR, in cooperation with agricultural water suppliers, environmental interest groups, and other interested parties, developed a list of efficient water management practices for agricultural water suppliers in California, leading to development of a Memorandum of Understanding regarding development of AWMPs and Implementation of Efficient Water Management Practices, or EWMP (1996). Subsequently, DWR and agricultural and environmental signatories to the MOU formed

the Agricultural Water Management (AWM) Council to oversee development of AWMPs and implementation of EWMP's. To date, there are 80 agricultural water suppliers constituting over 5.8 million acres of irrigated land. DWR provides technical and financial assistance to the AWM Council to help agricultural water suppliers develop water management plans. In addition, DWR provides technical review for each AWMP identifying its strengths and weaknesses. Based on DWR review along with AWM review, the AWM Council endorses the AWMP or takes no action. DWR is currently working with the AWM Council to expand drought contingency sections of the AWMPs.

See website (www.water.ca.gov/wateruseefficiency/agricultural/agmgmt.cfm) for more information on agricultural water management.

Mobile Desalinization

Mobile water desalination units are water treatment units (generally, Reverse Osmosis mobile desalination units) that can be truck-mounted or air-lifted, enabling the provision of short-term emergency water supply as well as supplemental supply for drought stricken or disaster areas. These units can be rapidly deployed to water stressed localities to generate potable water from contaminated local sources or from ocean water in coastal communities. They can also be quickly and easily decommissioned or moved to other locations should drought ease.

See website www.water.ca.gov/pubs/surfacewater/logistics_for_deploying_mobile_water_desalination_units/mobile_desalination.pdf for more information on mobile desalinization.

VII. RESPONDING TO A DROUGHT

Local government, water agency, and individual actions are usually the first line of drought response before impacts become severe and reach emergency level. Cities and water agencies may call for voluntary or mandatory water use restrictions. Counties may impose burning bans or take other emergency steps. State assistance may become necessary if drought persists and impacts exceed the local capacity to respond. If state resources are exhausted or inadequate to respond to a drought or water shortage, the Governor may next request a presidential declaration for federal assistance.

The following describes local, utility, and State agency drought response.

Local Agency Response

Local governments and water suppliers are responsible for managing their water system to ensure an adequate and safe water supply. Drought response at the local level is commonly voluntary or mandatory conservation imposed under local ordinances. The governing body of a city or county may proclaim a local emergency when the conditions of disaster or extreme peril exist. The proclamation enables the city or county to use emergency funds, resources, powers, and to promulgate emergency orders and regulations.

Many counties in California submitted drought-related emergency proclamations between 2007-2009. A common theme among the majority of the proclamations was related to agricultural water shortages. Additional impacts mentioned in the proclamations include the Fresno County unemployment food crisis, potential water shortages for the community of Redwood Valley in Mendocino County due to the low level of Lake Mendocino on the Russian River, and wildfire risks.

Water Agency Response

Implementing enhanced water conservation programs and calling for customers to achieve either voluntary or mandatory water conservation goals or targets are common urban water supplier actions. Increases in customers' water rates – either to encourage conservation or to react to increased costs associated with acquiring supplemental water sources or implementing conservation programs – are common drought outcomes. These rate increases in California appear to be widespread in 2009 and appear to be effective in reducing water use.

Table 4 of the Appendix, compiled from information collected by the ACWA, summarizes conservation actions and water use reduction targets of its member agencies.

State Agency Response

Following the 2009 emergency drought proclamation, Cal EMA and DWR convened a "Cabinet Drought Steering Committee" to monitor the social and economic impacts of the drought and to provide drought relief to impacted communities primarily located in the San Joaquin Valley where many agricultural-related job losses occurred. The Committee was comprised of various State agencies which coordinated with local and non-profit agencies on drought relief (see Attachment 1). Bi-monthly food distributions were held for months in various cities and towns in Fresno County. A drought brochure was created listing available social, employment, and other assistance programs for individuals (see Attachment 4). The Committee also coordinated strategic meetings with local agencies to listen to the needs of each county and to provide information on available assistance programs.

Economic drought impacts were most severe in the west side of the San Joaquin Valley where many agricultural-related job losses occurred. At the same time, the national economic crisis had exacerbated the impacts as farmers and businesses faced a downturn in the economy and tighter credit markets. Drought-related impacts were forecasted and estimated using available models such as the Statewide Agricultural Production Model, a regional Input/Output Model, and other tools.

In responding to future droughts or water shortages, the Interagency Drought Task Force will be called upon by DWR and Cal EMA to coordinate with working groups, federal agencies, tribal organizations, and others. The diagram depicted by Figure 1 may serve as a protocol for general agency communication and coordination. Drought assistance programs listed in the drought brochure may be re-initiated and/or administered by responsible agencies. Initial drought response actions may be to issue

a Drought Advisory and press release to inform the public of impending drought and to increase water conservation activities and cut back on unnecessary water use. DWR may also activate the Drought Operations Center to serve as a central point of contact for information and emergency assistance requests.

The Task Force will work with local agencies to identify impacts and appropriate responses, recognizing that local agencies will be most familiar with conditions and practices that are impacted by drought. Actions may include coordinating drought relief programs; monitoring the impacts to at-risk small public water systems; scheduling drought workshops and providing technical assistance; seeking funding to provide assistance to water systems in need of infrastructure improvements (for example, well deepening or intake extension); and collecting unemployment, economic, and agricultural impact data to monitor impacts and to support emergency declarations.

Monitoring of drought conditions may increase in frequency during dry periods or if drought conditions worsen significantly. The Drought Monitoring Committee is responsible for providing updated water supply and other information which will be posted on the DWR website. Monthly drought reports and periodic summary reports containing updated water supply data, local assessments and impacts, and mitigation strategies will be provided. Other State agencies may be required to produce their own drought response and impact reports for the Governor's office (see 2009 Drought Proclamation, Attachment 6 of Appendix).

See Table 2 of the Appendix for potential actions agencies may take in responding to a drought. This table contains examples of agency response actions at varying stages of drought; the higher the drought stage, the more intense the drought response would be. Five levels of drought stages are suggested ranging from Level 1 (Abnormally Dry) to Level 5 (Exceptional Drought). Water supply conditions and other indicators that may serve as guidelines to move from one stage to another are also suggested. The Task Force would make a recommendation about advancing to the next stage of drought based on input from the Drought Monitoring Committee and Impact Assessment Work Groups and other stakeholders.

VIII. RECOVERING FROM A DROUGHT

The actions in this phase are intended to provide early recovery from, not long-term mitigation, of drought impacts. These actions sometimes overlap those for drought response because drought impacts often linger long after an end of a drought. Some agency drought response activities may continue to occur as well as continuous monitoring of drought indicators.

State agency actions may include post drought evaluation, replenishment of water supplies, and economic and natural resources recovery. The State and federal government may continue to assist with implementation of State and federal relief programs (for example, food distributions, USDA programs, etc.) for individuals, farmers, and others impacted by the drought until the programs phase out or are called to an end. Follow-up with drought-impacted community water systems may be needed

to restore operations and ensure system improvements and modifications are in compliance with applicable standards.

A final meeting of the Task Force (or After Action Debriefing/Report) is needed for debriefing and identifying success, lessons learned, and recommended improvements. Appropriate amendments to legislation will be noted and a debriefing to the Governor's office is required. A final drought report summarizing the agency actions and experience and recommended next steps will be produced by the Task Force.

Table 3 of the Appendix contains potential actions agency may take in recovering from a drought.

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Table 1 – Potential Actions by Agencies in Preparing for a Drought

Drought Indicators – Current Water Conditions throughout the State are at normal levels. No drastic water conservation measures are necessary, although water conservation should always be practiced. The state's reservoirs are full or nearly full and runoff across the state is at normal levels.

Action	Agencies with expertise or authority (Lead-L)	Related Documents or References
Monitoring		
Work with local agencies and tribal representatives to develop drought metrics (indicators) with the goal of providing early detection and determination of drought severity	DWR (L), CDFA, NOAA	CWP-DCP
Improve monitoring of key Indicators of drought and drought impacts.	DWR (L), CDFA, NOAA	CWP-DCP
Improve system of stream gaging for the purpose of managing water resources in low flow conditions and improving the accuracy of seasonal runoff and water supply forecasts.	DWR (L), USGS , SWRCB	
Augment real-time monitoring of groundwater data with additional wells statewide.	DWR (L), USGS , SWRCB	DWR Bulletin 118, DWR Groundwater Information Center (website)
Improve wildlife and habitat monitoring and develop an accessible and standardized database for reporting habitat conditions, populations, and human-wildlife contact incidents.	CDFG (L), DWR, CDF, USFWS, USFS	
Improve groundwater monitoring and assessment	DWR (L), USGS, SWRCB, NOAA	DWR Bulletin 118, DWR Groundwater Information Center (website)
Develop reporting method for collection of regional drought impacts data and information.	CDFA (L), DWR(S), Cal EMA, CDPH – Drinking Water	CWP-DCP
Communication/Coordination and Planning		
Update Drought Contingency Plan	DWR (L), Cal EMA, CDFA, CDFG, SWRCB, DPH, Tribal Representatives	CWP-DCP
Develop a "California Drought Status" public information strategy that communicates current drought to the public and decision-makers. Investigate most appropriate mechanism to communicate information, e.g. newspaper, mail, radio, website etc.	DWR (L), Cal EMA	DWR Drought Website, DWR "Save Our Water " campaign
Educate water users & agencies on how to use climate information to plan for mitigation and drought response .	DWR (L), CARB, CEC, SWRCB, DPH	CWP-DCP, CA Emergency Plan
Develop an internet site for California Drought Contingency Plan.	DWR (L)	DWR Drought Website,

Action	Agencies with expertise or authority (Lead-L)	Related Documents or References
Provide public general information on drought as it relates to wildfire issues.	Cal Fire (L), USFS, USBLM	
Provide ranchers and farmers with workshops on coping with drought.	CDFA (L), UCCE, USDA, Tribal Representatives	
Provide public with information on wildlife issues – especially how to deal with increased interactions.	CDFG (L), USFWS, USFS, CDOF	
Conduct drought preparedness regional workshops for the purpose of : Developing proper indicators for each region Assess potential needs for regional assistance Determine relative risk of regions Capturing Drought component of Urban Water Management Plans	DWR (L), Cal EMA, CDFA, CDPH , Tribal Representatives	Multi Hazards Mitigation Plan, State of CA Emergency Plan, CWP-DCP
Provide public with information on impacts to recreation. Inform public of ways to enjoy recreation with less impact to drought stressed environment.	CDSP (L), DBW, DWR, ACOE, USFS, CSLC, CDPR	CWP_DCP
Prepare and update informational brochure on drought for general public.	DWR (L), Cal EMA, IRWM	DWR "Save Our Water" campaign
Determine precise needs of water providers for information on drought; what types of information are most relevant. This will vary by region and system. Set up system of indicators with triggers to inform decision makers and public on status and severity of drought.	DWR (L), IRWMs, CDFA, Water Contractors and Purveyors	CWP-DCP, DWR Programmatic EIR/EIS for Water Transfers office.
Develop coordination and communication protocol between federal, State and Local, (County, etc) and Tribal entities.	DWR (L), USBR, ACOE, CDFG, USFWS, CDFA, IRWMs, Tribal Representatives	CWP-DCP
Clarify emergency response procedures with State Agencies	Cal EMA (L), DWR, IRWMs	Multi Hazards Mitigation Plan, State of CA Emergency Plan, CWP-DCP
Prepare a handbook or checklist on procedures to expedite needed permits for response to drought.	DWR (L), SWRCB, CDFG, USFWS, USBR, ACOE, DPH	Multi Hazards Mitigation Plan, State of CA Emergency Plan, CWP-DCP
Arrange for funding to support drought relief, groundwater projects, desalination, conservation, recycling and other water management projects to assist regions in dealing with drought.	DWR (L), CDPH	CWP-DCP

Action	Agencies with expertise or authority (Lead-L)	Related Documents or References
Facilitate watershed and local planning for drought		
Develop risk-based vulnerability assessment for each basin /watershed.	DWR (L), IRWMs, CDFG, CDFA, USBR, USGS, NOAA, SWRCB, DPH	CWP-DCP
Prepare a "Map of Drought Vulnerability" showing areas where drought is more likely to upset water supplies.	DWR (L), IRWMs, CDFG, CDFA, USBR, USGS, NOAA,SWRCB, DPH	Multi Hazards Mitigation Plan, State of CA Emergency Plan, CWP-DCP
Develop a water budget for each watershed/basin – integrating inflows and outflows to meet all needs including quantification of carrying capacity.	DWR (L), IRWMs, CDFG, CDFA, USBR, USGS, NOAA, SWRCB	CWP-DCP
Investigate opportunities for regional drought planning through IRWM to facilitate drought response and assist IRWM planning efforts in developing regional responses to drought.	DWR (L), SWRCB, USBR, IRWMs	CWP-DCP
Explore Coordinated Management of Wildlife and Livestock.	CDFA (L), CDFG, DWR, USFS, BLM, USDA	
Direct state resource managers to develop drought plans for State Lands and State Parks	Natural Resources Agency (NRA), DWR, CDSP, CSLC	
Develop program for temporary transfers of water for instream flows to protect native fish and sports fisheries	DWR (L), SWRCB, USBR, ACOE, CDFG, USFWS, (Potential Partnerships with Cal WARN, CUEA, and/or CRWA)	DWR Water Transfers Office Documents and Programmatic EIR/EIS
Initiate partnerships with local water users and regulatory agencies to develop emergency alternative water supplies to habitat for critical species. Look to Urban Water Management Plans for existing information.	DWR (L), SWRCB, USBR, ACOE, CDFG, USFWS	DWR Water Transfers Office Documents and Programmatic EIR/EIS
Evaluate improvements to the institutional mechanism for temporary and voluntary drought related water transfers.	DWR (L), SWRCB, USBR, ACOE, CDFG, USFWS	DWR Water Transfers Office Documents and Programmatic EIR/EIS
Provide plan template and guidance to assist water providers in the development of drought plans and initiate a reporting and review program.	DWR (L), Cal EMA, CDPH, IRWMs	
Provide incentives and funding for comprehensive leak detection efforts.	DWR (L), CDPH	
Local Assistance		
Develop relative risk of regions to drought and the best indicators of droughts and water shortages.	DWR (L), IRWMs, USBR, NOAA, CDFA, CDFG, CDF, USFS, BLM	CWP-DCP
Conduct regional workshops on the best metrics for monitoring droughts.	DWR (L), IRWMs, USBR, NOAA, CDFA, CDFG, CDF,	CWP-DCP

Action	Agencies with expertise or authority (Lead-L)	Related Documents or References
	USFS, BLM	
Negotiate and obtain necessary permits and approvals for both short and long term water transfers.	DWR (L), SWRCB, USBR, ACOE, CDFG, USFWS	DWR Water Transfers Office Documents and Programmatic EIR/EIS
Negotiate contracts for drought contingency water supplies.	DWR (L), SWRCB, USBR ACOE, CDFG, USFWS, IRWM	DWR Water Transfers Office Documents and Programmatic EIR/EIS
Encourage water system interconnections and agreements between agencies	DWR (L), SWRCB, IRWM	DWR Water Transfers Office
Seek funding to provide assistance to water systems in need of developing storage and infrastructure improvements (e.g., well deepening) only if communities have submitted a drought/conservation plan.	DWR (L), SWRCB, USBR, USFWS, IRWM	
Conservation		
Provide incentives and funding for comprehensive leak detection efforts.	DWR (L), IRWMs, USBR, SWRCB, CDOC, CDPH (Potential Partnerships with Cal WARN, CUEA, and/or CRWA)	DWR DRIWM Grant & Funding efforts
Promote increased use of recycled water	DWR (L) IRWMs, USBR, SWRCB, CDPH, (Potential Partnerships with Cal WARN, CUEA, and/or CRWA)	CWP, CWP-DCP, DWR DRIWM Grant & Funding efforts
Invest in improving on-farm efficiencies	CDFA (L), CDOC, DWR, USBR, SWRCB, NRCS, UC & UCCE	DWR DRIWM Grant & Funding efforts, other agency grant efforts.
Implement the 20x2020 Water Conservation Plan (Implementation, monitoring, evaluation, and adjustments phase—2011 to 2020)	DWR (L), IRWMs, USBR, SWRCB, CDPH, Appropriate agencies	CWP-DCP, DWR DRIWM Grant & Funding efforts
Provide technical support and funding for soil tilth efficiency improvement	CDOC(L), CDFA, DWR, USBR, SWRCB, NRCS	
Other		
Estimate budget needs and determine allocation procedures related to drought responses.	Governor's Office, DWR (L), Cal EMA, CDFA, CDF, CDFG	
Follow nationwide and worldwide drought efforts and apply lessons learned to California drought planning and responses.	DWR (L), CDFA, CDFG, CDPH, USBR, NOAA	CWP-DCP
Monitor and support development of new drought resistant crops.	CDFA (L), USDA, DWR, USBR, CDOC, UC & UCCE	
Plan, Design, and Build improvements to the water supply infrastructure that will reduce the risk and severity of water shortages.	DWR (L), SWRCB, IRWM, USBR, USACOE	

Table 2 – Potential Actions by Agencies in Responding to a Drought

Action	Agency(ies) with expertise or authority (Lead-L)	Related Documents or References
Level 1 - Abnormally Dry (Raising Awareness of Drought)		
Drought Indicator – The State's precipitation, snowpack, or runoff is lower than normal, or reservoir levels are below average. Conservation measures should be increased voluntarily, to help manage the state's current water supply		
Communication/Coordination and Planning		
Activate Drought Operations Center at DWR for central point of contact and information	DWR (L), Cal EMA(S), Appropriate Agencies	CWP-DCP
Convene Drought Monitoring Committee and Impact Assessment Work Groups (situation and assessment reports)	DWR (L), Appropriate Agencies	CWP-DCP
Designate agency spokesperson(s) to interact with the public and media	DWR(L), Appropriate Agencies	CWP-DCP
Issue a Drought Advisory and press release	DWR(L), Appropriate Agencies	CWP-DCP
Direct State agencies to conserve water at state facilities	DWR(L), Appropriate agencies	CWP-DCP
Expedite drought-related permit applications	DWR(L) Appropriate agencies	CWP-DCP
Communicate conditions, reinforce general conservation tips. Hold drought preparedness workshops.	DWR (L), Cal EMA, CDPH	20x2020, CWP
Coordinate with Federal, State, Local (County) and Tribal entities	DWR (L), Appropriate Agencies	CWP-DCP
Accelerate work with local governments and water providers on public awareness and outreach.	DWR (L), Appropriate Agencies	CWP-DCP
Review State laws to reduce impediments to providing water supplies to communities in emergency need – modify as necessary. (short-term)	CDPH (L), DWR	CWP-DCP
Monitoring		
Collect regional impact data and information	DWR (L), Appropriate Agencies	CWP-DCP
Publish community and State facility water use information through website, media and other public outreach.	DWR (L), Appropriate Agencies	CWP-DCP

Action	Agency(ies) with expertise or authority (Lead-L)	Related Documents or References
Facilitation of watershed and local planning for drought		
Seek funding to provide assistance to water systems in need of developing storage and infrastructure improvements (e.g., well deepening) only if communities have submitted a drought/conservation plan.	DWR (L), CDPH, US EPA	CWP-DCP
Other		
Hold more water in reservoirs in case next year is a dry one.	DWR (L)	
Level 2 - First Stage Drought (Voluntary Conservation, heightened awareness, increased preparation)		
Drought Indicator – The State's precipitation, snowpack, or runoff is lower than normal, or reservoir levels are below average. Conservation measures should be increased voluntarily, to help manage the state's current water supply		
All actions in Level 1 plus: **Communication/Coordination and Planning**		
Develop Emergency Action Plan including: • Developing information necessary for an Agricultural Emergency Disaster Declaration • Development of mandatory conservation measures • Development of mandatory curtailment measures • Identify priorities for surface water supplies (based on State Law) • Identify priorities for surface water supplies (based on State Law)	DWR (L), Cal EMA, Appropriate Agencies	CWP-DCP, CEP 14.22.10
Communicate drought severity through normal channels.	DWR (L), Appropriate Agencies	CWP-DCP, CEP 14.22.10
Conduct workshops or other methods of communication in drought stricken areas to provide information on assistance available.	DWR (L), Appropriate Agencies	CWP-DCP, CEP 14.22.10
Enhanced Media Outreach and provide assistance to communities for conservation and drought education.	DWR (L), Appropriate Agencies	CWP-DCP, CEP 14.22.10
Monitoring		
See actions in Stage 1 **Local Assistance**		
Prepare to directly assist isolated, rural systems who are at most risk and have the least resources for responding.	DWR(L), CDPH	
Work indirectly through local water agencies and local government in urban areas with robust water management infrastructure, resources and coordination.	DWR(L)	

Action	Agency(ies) with expertise or authority (Lead-L)	Related Documents or References
Facilitation of watershed and local planning for drought		
Expedite water transfers by providing assistance in the form of technical resources, emergency infrastructure, arbitrating supply disputes, etc.	DWR (L), SWRCB	
Conservation		
Increased water savings at federal, State and local facilities	DWR (L), All Agencies	CEP 14.22.10
Initiate heightened Water Conservation efforts (Save our Water Campaign)	DWR (L)	CEP 14.22.10
Encourage State facilities (including universities) to reduce water use by 10%.	DWR (L), All Agencies	CEP 14.22.10
Implement other reductions consistent with and similar to local community reductions.	DWR (L), CDPH, CDFA	CEP 14.22.10
Provide financial assistance to drought impacted sectors	CDOF(L) , All State Agencies w/funding	CEP14.4
Hold more water in reservoirs in case next year is a dry one. Start planning for any needed temporary engineering solutions.	DWR (L)	
Level 3 - Severe Drought (Mandatory conservation, emergency actions)		
Drought Indicator – Reservoirs are low; precipitation, snowpack and runoff are all well-below normal, and forecast to remain so. Mandatory conservation may need to be enacted in communities that do not have adequate water supplies.		
All actions in Level 1 & 2 plus: **Communication/Coordination and Planning**		
Convene Interagency Task Force following Emergency Drought Proclamation by Governor	DWR (L), Appropriate Agencies	CWP-DCP
Identify criteria thresholds for Emergency Proclamation	Cal EMA (L), DWR	California Emergency Plan (CEP)10.7.5
Initiate implementation of Emergency Action Plan and identify enforcement protocol.	DWR (L), Appropriate Agencies	
Coordinate responses to emergency conditions	Cal EMA (L), DWR	California Emergency Plan (CEP)10.7
Increased media outreach (and enhanced assistance to communities for conservation and drought education)	DWR (L), Cal EMA, Appropriate Agencies	CEP 10.5
Communicate conditions, promote general conservation tips, and provide information on drought mitigation and response options.	DWR (L), Cal EMA, Appropriate Agencies	CEP 14.22.10
Continue intelligence gathering and situation reporting	Cal EMA (L), DWR	CEP 10.4
Work with local health directors to assess public health threats and take appropriate actions	CDPH(L), Appropriate Agencies	
Provide regular situation reports to FEMA, ACOE, and appropriate agencies	DWR (L), Cal EMA	CWP-DCP

Action	Agency(ies) with expertise or authority (Lead-L)	Related Documents or References
Prepare a request for Presidential Disaster Declaration to FEMA	Cal EMA (L), DWR, Appropriate Agencies	
Monitoring		
Emergency notifications received by State Warning Center passed on to Drought Coordinators and as necessary other State and Federal Agencies.	Cal EMA (L), DWR	CEP 10.3
Local Assistance		
Coordinate with local and state government to facilitate declaration of Drought Emergency (Governor) in affected area(s).	Cal EMA (L), DWR	
Deploy emergency conveyance/interconnections as needed.	CDPH (L), DWR	CEP 14.12.7
Deploy local water supply augmentation measures as needed: • Atmospheric Water Generators: http://en.wikipedia.org/wiki/Atmospheric_water_generator • Portable Desalinization Systems • Drilling new wells	CDPH (L), DWR	CEP 14.12.7
Coordinate mutual aid assistance	Cal EMA (L), DWR, Local Agencies	CEP 10.6
Conservation		
Encourage State Facilities to reduce water use by 20%.	DWR(L) , DGS (S) All State Agencies	
Other		
Prepare conservation facilities for fish.	CDFG (L)	CEP 14.22.7
Provide watering devices on wildlife ranges	CDFG (L)	CEP 14.22.7
Permit streamlining for drought relief actions	DWR (L) , Appropriate Agencies	
Implement stress management program for water-dependent livelihoods	CDMH (L)	CEP 14.12.6
Hold more water in reservoirs in case next year is a dry one.		
Level 4- Extreme Drought (Maximum mandatory conservation)		
Drought Indicator – Reservoirs are low; precipitation, snowpack and runoff are all well-below normal, and forecast to remain so. Mandatory conservation may need to be enacted in communities that do not have adequate water supplies.		
All actions in Level 1 - 3 plus:		
Local Assistance		
Facilitate the provision of water hauling assistance/relief to communities.	DWR (L), Cal EMA, All Agencies	CEP 14.22.10
Impose restrictions as needed for affected areas – Governor's Emergency Powers.	DWR (L), Cal EMA, All Agencies	CEP 14.22.10

Action	Agency(ies) with expertise or authority (Lead-L)	Related Documents or References
Facilitate voluntary water purchases/transfers from irrigated agriculture or other permit holders for potable water deliveries, Ag use, and environmental protection.	DWR (L), Cal EMA, All Agencies	CEP 14.22.10
Facilitate greater use of recycled water.	DWR (L)	
Conservation		
Work with local water agencies in highest levels of conservation which could include elimination of non essential water use (No outside watering)	DWR (L), Cal EMA, CDPH	
Water rights of low priority cut off from water supply (As provided for in Water Code)	SWRCB (L), Cal EMA, CDPH	
Require State facilities to eliminate watering nonessential outdoor watering (exceptions for wildlife protection).	DWR (L), Cal EMA, CDPH	
Other		
Debris Management Programs	Cal EMA (L), DWR, Local Agencies	California Emergency Plan 11.3
Identifify airborne contaminates exacerbated by drought	CARB (L), CDPH	CEP 14.10.1
Administer emergency water transfers throughout the state	DWR (L), Appropriate Agencies	
Level 5 - Exceptional Drought (Water supplies cut off, maximum response)		
Drought Indicator – Extremely dry conditions persist across the state. Water safety, supply, and quality are all at risk, due to shortages. All sectors of water usage are facing hardship as a result of inadequate supply and dry conditions.		
All actions in Level 1 - 4 plus: **Communication/Coordination and Planning**		
Declare a water supply or water shortage emergency	Governor, Cal EMA (L), DWR	
Activate CA National Guard	Governor	
Invoke a ban on open burning	Local Governments	
Staff the State Emergency Operations Center	Cal EMA (L), Appropriate Agencies	
Facilitate Mutual Aid requests for Assistance to provide increased security by law enforcement due to severe water cutbacks.	Cal EMA (L), CHP, DOJ	California Emergency Plan 14.7
Conservation		

Action	Agency(ies) with expertise or authority (Lead-L)	Related Documents or References
Water use cut back to health and safety needs only	SWRCB(L), DWR	CEP 14.10.6, Water Code
Other		
Coordinate the movement of population out of areas without supply with local government.	BTHA (L), CHP, Cal EMA	California Emergency Plan 14.1
Adjudicate all water rights (groundwater and surface) allow uses for highest beneficial use only.	SWRCB(L), DWR	CEP 14.10.6, Water Code

Table 3 – Potential Actions by Agencies in Recovery from a Drought

Drought Indicators – Current Water Conditions throughout the State are at normal levels. No drastic water conservation measures are necessary, although water conservation should always be practiced. The state's reservoirs are full or nearly full and runoff across the state is at normal levels		
Action	**Agency(ies) with expertise or authority (Lead - L)**	**Related Documents or References**
Communication/Coordination and Planning		
Identify and communicate when drought restrictions set by the State should ease or cease.	DWR (L)	
Monitoring:		
Ongoing monitoring of recovery (reservoir replenishment and longer term climate data)	DWR (L)	
Assure replenishment of reservoirs and groundwater resources.		
Monitoring of groundwater levels including municipal wells.	CDPH (L), Local agencies	
Monitoring salt-water intrusion in coastal aquifers which may have been accelerated due to drought to assure intrusion is halted or reversed.	DWR (L), Local agencies	
Facilitation of watershed and local planning for drought:		
Manage pasture, rangelands and forest recovery	CDFA (L), State Lands, CAL-FIRE	
Local Assistance		
Reduction-of-herd recovery assistance for dairy and cattle operations.	CDFA (L)	
Return emergency water supply augmentation measures to stockpile. Perform maintenance necessary for proper storage of equipment such as desalination units.	DWR (L), Appropriate other Agencies	
Provide technical assistance to districts requesting help in phasing out drought rates and returning to standard water rates.	DWR (L)	
Pasture rehabilitation - State provides assistance in form of :	CDFA (L)	
Loans and Grants		
Technical Assistance		
Actions to diminish first flush concerns (For example: sediment transport off of denuded lands due to drought and/or wildfire)	SWRCB (L), RWQCB	
Provide deferred maintenance assistance for pumps, farming equipment and other water related infrastructure.	DWR (L), CDFA	
Conservation:		
Maintain drought conservation measures	DWR (L)	

Table 4 – Conservation Actions and Water Use Reduction Targets (As of December 2009)

Agency	Location	Voluntary Conservation	Mandatory Conservation	Drought Response[(A)]
Bella Vista WD	Redding	✓		1, 3
Browns Valley ID	Browns Valley		✓	2, 4
Calaveras County WD	San Andreas	✓		1, 3, 4, 5
California American Water Company	Sacramento	✓ (10%)		1
Calleguas MWD	Thousand Oaks	✓		1
Carlsbad	Carlsbad	✓		1
Carmichael WD	Carmichael	✓		1, 4
Central Basin MWD	Commerce	✓		1, 6, 7, 8
Citrus Heights WD	Citrus Heights	✓ (5-10%)		1
City of Antioch	Antioch		✓ (15%)	2
City of Burbank	Burbank	✓		1, 3, 4, 5
City of Calistoga	Calistoga	✓		1
City of Carlsbad	Carlsbad		✓ (8%)	2, 4
City of Chino Hills	Chino Hills		✓	2
City of Cotati	Cotati	✓ (10%)		1
City of Delano	Delano		✓	2, 4
City of Escondido	Escondido	✓		1, 4
City of Folsom	City of Folsom	✓		1, 4
City of Fresno Water Division	Fresno		✓ (20%)	2, 4
City of Glendale	Glendale	✓		1, 3, 4
City of Glendora Water Division	Glendora	✓ (10%)		1, 4
City of Healdsburg	Healdsburg	✓ (20%)		1
City of Imperial Beach	Imperial Beach	✓ (10%)		1, 3, 5
City of Long Beach Water Dept	Long Beach		✓	2, 4
City of Pittsburgh	Pittsburgh		✓ (15%)	2, 3, 4, 6, 7, 8
City of Roseville	Roseville	✓ (20%)		1, 4
City of Sacramento Utilities Dept	Sacramento	✓		1, 4
City of San Diego Water Dept	San Diego	✓ (20 gal/day/person)		1, 2,3, 4, 5, 6, 7, 8
City of Santa Ana	Santa Ana	✓		1, 4
City of Santa Cruz Water Dept	Santa Cruz		✓	2, 4
City of Santa Rosa – Utilities Dept	Santa Rosa	✓ (15%)		1, 4
City of Simi Valley	Simi Valley		✓	2, 4
City of St. Helena	St. Helena	✓		1, 4
City of Stockton, Muni. Util. Distr.	Stockton	✓		1, 3, 4
City of Thousand Oaks	Thousand Oaks		✓	2, 4
City of Westminster	Westminster	✓ (10%)		1
City of Windsor	Windsor	✓ (15%)		1, 4
Coachella Valley WD	Coachella Valley	✓		1, 5, 6, 7, 8
Contra Costa WD	Concord	✓ (15%)		1, 3, 4, 6, 7, 8
Crescenta Valley WD	La Crescenta		✓	2, 4, 5
Cucamonga Valley WD	Rancho Cucamonga	✓		1, 5, 6, 7, 8
Del Paso Manor WD	Del Paso	✓		1
East Bay MUD	Oakland		✓	2, 3, 5, 6, 7, 8
Eastern MWD	Perris		✓	2, 3, 4, 5, 6, 7, 8
El Dorado ID	Placerville	✓ (15%)		1, 6, 7 ,8
Elsinore Valley MWD	Lake Elsinore	✓		1, 3, 5, 6, 7, 8
Fair Oaks WD	Fair Oaks	✓		1
Fallbrook PUD	Fallbrook		✓	2, 3, 4
Helix WD	La Mesa	✓		1, 3, 5, 6, 7, 8

Agency	Location	Voluntary Conservation	Mandatory Conservation	Drought Response(A)
Imperial ID	Imperial		✓	2
Inland Empire Utilities Agency	Chino Hills	✓		1, 4, 6, 7, 8
Kern County WA	Bakersfield		✓	2
Kings County WD	Hanford	✓		1
Las Virgenes MWD	Calabasas		✓	1, 4
Lincoln Avenue Water Co.	Altadena	✓		1
Los Angeles Co. Waterworks District	Alhambra	✓ (15-20%)		1, 4, 6, 7, 8
Los Angeles DWP	Los Angeles		✓	1, 3, 4, 5, 6, 7, 8
Marin MWD	Corte Madera	✓		1, 6, 7, 8
Metropolitan WD of Southern Cal	Los Angeles	✓		1
Monte Vista	Montclair		✓	2, 4
Moulton Niguel WD	Laguna Niguel		✓	2, 4
Municipal WD of Orange County	Fountain Valley		✓ (10%)	2
Nevada ID	Grass Valley	✓		1
North Marin WD	Novato		✓ (15%)	2, 4
Olivenhain WD	Encinitas	✓		1, 3, 4, 5, 6, 7, 8
Orange County WD	Fountain Valley	✓		1, 3, 6, 7, 8
Orangevale Water Company	Orangevale	✓ (5-10%)		1
Padre Dam MWD	Santee		✓	2, 3, 4, 5
Ramona MWD	Ramona	✓		1, 3, 4, 6, 7, 8
Rancho California WD	Temecula	✓ (10%)		1, 5, 6, 7, 8,
Redwood Valley CWD	Redwood Valley		✓ (50%)	2, 4
Regional Water Authority	Citrus Heights	✓		1
Rio Linda/Elverta Community WD	Rio Linda	✓		1
Sacramento County Water Agency	Sacramento	✓ (10%)		1
Sacramento Suburban WD	Sacramento	✓		1, 4
San Diego County Water Authority	San Diego		✓	2, 4, 6, 7, 8
San Francisco PUC	San Francisco	✓		1, 6, 7, 8
San Juan WD	Granite Bay		✓	2, 4
Santa Clara Valley WD	San Jose		✓	2, 6, 7, 8
Santa Margarita WD	Mission Viejo	✓		1
Sonoma County WA	Santa Rosa	✓		1, 6, 7, 8
Soquel Creek WD	Capitola	✓ (15%)		1, 4
Sweetwater Authority	Chula Vista	✓		1, 3, 4, 5, 6, 7, 8
Triunfo Sanitation District	Ventura	✓		1, 6, 7, 8
Vallecitos WD	San Marcos	✓ (10%)		1
Valley Center WD	Valley Center		✓	2
Ventura Co. Watershed Prot. District	Ventura		✓	2
Vista ID	Vista	✓ (10%)		1, 4
Walnut Valley WD	Walnut	✓		1, 6, 7, 8
West Basin MWD	Carson		✓	2, 3, 5, 6, 7, 8
West Valley WD	Rialto	✓		1
Western MWD	Riverside	✓		1, 4, 6, 7, 8
Westlands	Fresno		✓	2, 3, 4
Zone 7 Water Agency	Livermore	✓ (10%)		1, 6, 7, 8

Source: Compiled by DWR, Information from Association of California Water Agencies (December 2009), acwa.com

(A) Drought Response of Agencies:

1 = Urging voluntary conservation
2 = Mandatory conservation / rationing in effect
3 = Drought surcharges / rate increases
4 = Restrictions on outdoor residential water use
5 = Tiered rate structure adopted
6 = Public conservation outreach campaign
7 = Updating / adopting drought ordinance
8 = Local water emergency / water supply shortage declared

ATTACHMENT 1: Potential Roles and Responsibilities of Federal, State, and Local Agencies and Other Organizations that may be involved in Drought Management or Emergency Assistance

FEDERAL

Office of the President
- Declares drought emergencies if needed, allowing areas of the State to receive financial and other assistance from the Federal Emergency Management Agency (FEMA)

Federal Emergency Management Agency (FEMA)
- Provides emergency and other assistance to states, communities, and individuals suffering from the drought

National Oceanic and Atmospheric Administration / National Weather Service (NOAA)
- Tracks national and regional weather conditions
- Provides weather and climatological data

National Park Service
- Implements conservation measures at parks where campground water supplies are expected to be limited

U.S. Geological Service (USGS)
- Tracks streamflow and groundwater levels

U.S. Department of Agriculture (USDA)
- Provides emergency assistance in areas designated a disaster by the Secretary of Agriculture to help agricultural producers recover from production and physical losses
- Tracks agricultural financial assistance and acreage statistics

U.S. Bureau of Reclamation (USBR)
- Coordinates long-term water transfers activities with DWR
- Collaborates with other agencies on data collection
- Coordinates with other agencies on operations

U.S. Corps of Engineers
- Exercises emergency authorities for hauling water

U.S. Fish and Wildlife Service
- Adapts management practices to ensure that water is used to provide the greatest benefit to migratory birds and other wildlife

U.S. Small Business Administration

Administers the economic injury loan program for small businesses adversely affected by community agricultural losses

Bureau of Land Management

Develops a flexible grazing policy in response to drought

STATE

Governor

Provides overall direction for state government drought response
Declares drought emergencies and proclamations
Issues Executive Orders to State agencies for drought response
Requests federal assistance through FEMA

Department of Water Resources (DWR)

Coordinates State agency drought management and response activities
Maintains drought data and information on website
Issues drought advisory and initiate Drought Task Force
Promotes statewide water conservation
Provides technical assistance and conduct drought workshops
Implements water transfers program
Updates periodic California drought status reports and monthly drought Bulletins
Surveys drought impacts, in cooperation with other agencies and organizations.
Advises on water issues and concerns

California Emergency Management Agency (Cal EMA)

Cal EMA Secretary may ask Governor to request a presidential declaration for unemployment assistance, food commodities, crisis counseling assistance and training, legal services and other programs.
Coordinates State agency response activities during drought emergencies
Addresses emergency management needs related to the drought
Develops the Drought Concept of Operations Plan that documents operational activities and tasks carried out by agencies.

Department of Public Health

Protects and conserves, with other agencies, the State's drinking water supply resource
Assess and respond to impacts of water shortages on public health
Collects water samples after an emergency for laboratory analysis to verify that a water supply is safe
Evaluates the adequacy of emergency interconnections among the state’s public water systems

Provide technical assistance and continued financial assistance from existing resources to improve or add interconnections
Process requests for financial assistance (through Safe Drinking Water Act funding)
Monitors impacts to at-risk small public water systems
Reevaluation of required drinking water treatment as an on-going necessity to protect public health during drought
Maintains an up-to-date list of approved bottled water purveyors and water haulers
Provides health and nutrition programs for low-income women, infants, and children (WIC)

Department of General Services
Implements a water use reduction plan for state-owned and leased facilities

Department of Food and Agriculture
Monitors and assesses drought impacts on agriculture
Recommends measures to reduce the economic impacts of the drought on agriculture

Department of Boating and Waterway
Provides information on impacts to recreation
Recommends measures to reduce drought impacts on water-based recreation

Department of Social Services
Coordination and oversight of the Emergency Food Assistance Program for drought disaster victims

Department of Mental Health
Provides information on available short-term counseling for emotional or mental health problems caused by the economic impacts of the drought
Applies for and administers the FEMA Crisis Counseling Program grant for a presidentially declared disaster

Department of Community Services and Development
Provides funding for emergency food and other disaster services through its Community Services Block Grant (CSBG) Program

Labor and Workforce Development Agency
Recommends measures to address drought impacts on California's labor market
Collects information on labor impact

Employment Development Department
Provides a variety of employment services to employers and job seekers

Provides Unemployment Insurance (UI) to eligible workers who have lost jobs because of the drought
Reviews and monitors unemployment claims related to the drought

California Public Utilities Commission
Regulates the for-profit water utilities, and oversees their water conservation activities

California Conservation Corps
Coordinates monetary donations during times of disaster
Coordinates volunteer activities related to disaster response and recovery
Provides technical assistance regarding utilization of volunteers in disaster response and recovery

California Volunteers
Coordinates monetary donations during times of disaster
Coordinates volunteer activities related to disaster response and recovery
Provides technical assistance regarding utilization of volunteers in disaster response and recovery

Air Resources Board
Develops mitigation measures related to air quality impacts which may result from fallowed agricultural lands

CALFIRE
Addresses wildfire risks associated with droughts

State Water Resources Control Board
Expedites processing of water transfers during drought emergencies

CA National Guard
Assists with emergency distribution of water
Assists with deploying mobile desalinization

LOCAL

Water Agencies
Update the Urban Water Management Plans
Promote water conservation
Enforce drought response measures

County Agricultural Commissioner's Office
Provides agricultural drought impact estimates to support requests for drought designations by the USDA Secretary

Community Food Banks

Obtain and distribute food donations to those who have lost jobs or income due to the drought and water shortages

County Farm Advisors' Office - University of California Cooperative Extension Service

Provides technical advice and information to local farmers and ranchers on how to cope with the drought

County Farm Bureaus (Non-government groups)

Provides drought-related information to their members, and cooperate with State surveys of drought impacts

Resource Conservation Districts

Provides technical assistance, loans, and grants to help farmers and ranchers cope with some of the short-term and long-term consequences of droughts

Irrigation Districts

Agricultural water purveyors must efficiently distribute reduced surface water supplies, and help their members obtain supplemental water supplies. They provide technical water conservation information to their growers

County and Regional Economic Development Corporations (quasi-governmental organizations)

Cooperates in surveys of water shortage impacts and are involved in long-term planning efforts to help reduce drought impacts

OTHERS

American Red Cross

Provides emergency food, clothing, shelter, and medical assistance to needy individuals and families

Salvation Army

Provides a variety of services including help with food, household needs, clothing, and personal needs

California Utility Emergency Association (CUEA)

Provide notification and support in conservation issues to the private and municipcal providers of water

CalWORKS

Provides cash aid to eligible needy California families to help pay for housing, food, and other necessary expenses

Proteus, Inc.

Provides career counseling, training, education, and English as a Second Language (ESL) programs in Kern, Kings, Fresno and Tulare counties

United Way

Mobilizes staff, volunteer leaders, and resources for disaster response

ATTACHMENT 2: Key Federal drought relief programs

Supplemental Revenue Assistance Payment Program (SURE): SURE provides assistance to farmers who have suffered crop losses due to natural disasters including drought.

Livestock Forage Disaster Program (LFP): LFP provides assistance to livestock producers during droughts.

Tree Assistance Program (TAP): USDA intends to implement TAP in California to assist farmers and orchardists who have lost vines or trees to drought in reestablishing their orchards and vines.

Emergency Assistance for Livestock, Honey Bees and Farm Raise Fish Program (ELAP): Livestock producers, beekeepers and fish producers who suffer a loss not covered under SURE, TAP, and LFP should be able to receive assistance from this program.

Noninsured Crop Disaster Assistance Program (NAP): NAP provides coverage to farmers who grow non-insurable crops and suffer natural disasters.

Emergency Conservation Program (ECP): The ECP provides emergency funding and technical assistance for farmers and ranchers to rehabilitate farmland damages by natural disasters and for carrying out emergency water conservation measures in period of severe drought.

Emergency Farm Loans (EFL): EFL funding is contingent upon Secretarial disaster designations. Emergency loans help producers recover from production and physical losses due to drought and other natural disasters.

Environmental Quality Incentive Program (EQIP): USDA launched a special EQIP drought initiative in 2009 that provided financial assistance to drought stricken producers. The assistance allowed producers to provide temporary coverage in fallowed fields subject to severe wind erosion, to rehabilitate springs for stock water, and to undertake critical water conservation measures. The USDA is ready to develop and launch a successor EQIP program if drought persist in 2010.

ATTACHMENT 3: Droughts Concepts and Impacts in California

This article is a companion piece to the California Drought Contingency Plan, written to prepare California for recurring droughts. The 2010 Drought Contingency Plan lays out a structure for California state government to prepare for drought and reduce drought impacts, along with an extensive list of actions to take at different drought stages. The 2010 Drought Contingency Plan is part of the 2009 California Water Plan Update, and will be revised as part of Water Plan revisions, to incorporate new information the state gains as it addresses drought. This is a companion article that discusses how to improve state resilience to drought, the institutional capacity to respond to drought; the difference between drought and ongoing shortage, and the potential for using drought indices and triggers to measure drought stages.

Understanding Drought

This article discusses three concepts related to drought, then it describes the impacts of drought throughout the state in different sectors. The first concept, resilience, is brought over from the California Climate Change Adaptation Plan, and applied in detail to drought. The second concept, capacity, describes California's ability to respond to drought at the state, regional and local level; this section also points to gaps in the institutional ability to respond to drought. The last concept is an illustration of the difference between drought and shortage, to illustrate the scope of the Drought Contingency Plan and to offer a solution to the confusion that always arises on this issue.

Resilience

Resilience is a major theme of California's climate change adaptation plan and disaster mitigation plans. Building resilience will buffer the state from the effects of drought (or any disaster); a resilient state will feel the effects of drought later, will suffer less from the impacts of drought, and will recover more quickly when drought has passed. Making the state more resilient can be done by increasing the characteristics that make up resilience, such as functional redundancy, holding reserve wealth, preparedness, and diversity of function.

<u>What is Resilience?</u>

There are economic, ecological and engineering definitions of resilience, which focus on slightly different things.

"Resilience" as applied to ecosystems, or to integrated systems of people and the natural environment, has three defining characteristics:

- The amount of change the system can undergo and still retain the same controls on function and structure;
- The degree to which the system is capable of self-organization;
- The ability to build and increase the capacity for learning and adaptation (Quinlan 2003).

An engineering definition of resilience calls out four dimensions of resilience:

- Robustness—avoidance of direct and indirect losses

- Redundancy—untapped or excess capacity (e.g., inventories, suppliers)
- Resourcefulness—stabilizing measures
- Rapidity—optimizing time to return to pre-event functional levels

Pinning down an exact definition of resilience is difficult, but the broad concept is useful. The opposite of a resilient state is a brittle one, in which function collapses early and severely during a disturbance and doesn't recover.

How to make California resilient to drought

California can become more resilient to drought by planning for it, by accelerating the Resource Management Strategies in the California Water Plan that increase resiliency, and by changing policies that make the state brittle.

Planning for drought

First, California can plan for drought. Drought managers in Australia consistently tell us to plan for more extreme events, and take action sooner, during the relatively wealthy pre-drought period. The climate record informs us that we have developed our current society during a relatively wet period; climate change predictions include a future with considerably less run-off and the possibility of historical extreme events.

The joint pressures of climate change and population growth mean that state drought plans must consider and plan for the possibility of droughts happening in quick succession with other catastrophes. Successive extreme events will interact to amplify the effects of each. For example, flood can strip a floodplain of cover and habitat; a drought or fire immediately after will delay restoration of the ecosystem. Further, droughts may occur against a backdrop of ongoing scarcity. For the state, the primary way interacting effects from drought and other climate perturbations will compound each other is that costs will be higher and arrive together. The same year that drought makes water a little more expensive to our cities, it also dries our mountains and grasslands out, making fires larger and more costly to fight. The same year reduced spring runoff means that we have less hydropower, growers throughout the state will be using additional energy to pump from groundwater.

At the state level, this document is an early road-map to developing a state response to drought. Most large urban water agencies write "Shortage Contingency Plans" as part of their Urban Water Management Plans. Three additional sectors of the Californian waterscape would benefit from writing plans to address shortage. Agricultural water districts do considerable drought response; they would be more resilient to droughts if they wrote shortage contingency plans that included district modernization, pricing and cut-back policies. Small urban water districts are acutely vulnerable to drought; they are not required to write Urban Water Management Plans, but they would be well served by having a shortage contingency plan. The third sector that would be more robust if they had Shortage Contingency Plans is large water users in the commercial and industrial sector. Businesses that use more than 10 million gallons per day should write a Shortage Contingency Plan for their process water. Large industrial users are often sheltered from the risks of an unreliable water supply by their water district; they should

assess for themselves the reliability of their sources and potential sources, and create plans for responding to a drought-related shortfall of the water they use.

Using Resilience as a Criteria for Implementing Resource Management Strategies
The 2009 Water Plan Update lists 27 projects, programs, or policies to help local agencies and governments manage their water and related resources. Implementing some or all of these Resource Management Strategies can bolster the qualities that make up resilience and promote drought resistance: a diversified water supply, overlapping ecosystem functions, reducing risk of shortfall from each source. Not every Resource Management Strategy bolsters resilience; some offer other benefits and reasons for implementation.

Diversifying water supply improves state and local resilience against drought, because different water sources have different risk profiles, and can be pulled into use when more vulnerable supplies fail. These Resource Management Strategies diversify water supplies:

- Recycled Municipal Water
- Desalination
- Water Transfers
- Cloud seeding (in Other Strategies)
- Groundwater Remediation/Aquifer Remediation

Stable overlapping ecosystem functions make the state more resilient to drought, because if drought interferes with one ecosystem capacity, others may take up some of the same function. For example, if a pasture has a varied plant community, plants that are more vulnerable may fail early in a drought, but others with more drought-tolerance will buffer the drought damage. These Resource Management Strategies promote ecosystem functions:

- Agricultural Lands Stewardship
- Recharge Area Protection
- Watershed Management
- Forest Management
- Ecosystem Restoration
- Flood Risk Management
- Urban Runoff Management
- Salt and Salinity Management
- Pollution Prevention

Some of the Resource Management Strategies, primarily the resource stewardship strategies, are biologically based; they'll become more complex and interlinked as they mature, yielding increasing benefits as they grow and stabilize. These strategies should be accelerated now, so they can provide more benefits sooner.

Making infrastructure more widely distributed and interconnected also increases resilience.

Reducing risk of shortfall by increasing the ability to store water supplies is another way to promote resilience, assuming that the state does not increase demand so that it is dependent on the full capacity of every supply. Similarly, although increasing water use efficiency in residential, agricultural and industrial use will be the fastest and cheapest method of extending current supplies, if the population continues to grow, eventually demand will harden. When water users have conserved as much as they can while maintaining what they consider valuable in their lifestyle, their water use is no longer flexible. Demand hardening decreases resilience if the water freed by efficiency and conservation gets put to uses the state considers mandatory. The Resource Management Strategies that buffer the state from hydrologic variability and reduce risk of shortfall are:

- Water Use Efficiency, urban and agricultural
- Conjunctive Management & Groundwater
- Surface Storage, CALFED and Regional
- Recycled Municipal Water
- Desalination
- Precipitation Enhancement

Changing Policies that Make California Brittle.
The primary direct action the state can take to prepare is to designate funds for a dry day reserve. In a study of what determines resiliency for agriculture, the researchers wrote: “[Farm] drought resilience is strengthened by the possession of liquid assets, access to credit, and the level of technical efficiency in agricultural production.” (Keil et al) This is no less true of the state, which could use that money during a drought as the liquid assets that locals could call on. The state could lend or grant for efficiency improvements, or simply to tide businesses that depend on water through until average-year hydrology returns. Just as California uses dams to move water from wet years forward into dry years, it should put away money in normal and average years to pay for the increased expenses of drought years (fire fighting, emergency response, efficiency improvements, temporary interties or other infrastructure).

Other measures would require policy decisions, but could include mandating that new developments show guaranteed water supplies for not only current average hydrology, but for a future with less run-off and more severe droughts, much as the Department of Public Health does for developments on fractured rock wells. This would preclude people becoming dependent on the average year supply.

Capacity
In this section, capacity to respond to drought means having the knowledge, tools, ability, money and authority to respond to drought. In general, California has a great deal of capacity, in delivery systems, expert staff, and legislative structures for emergency systems. Drought, like any stressor, exposes weaknesses in this capacity; those will be the topic of this section.

State:
The state has a good deal of institutional capacity and expertise to respond to drought. Many departments within the state have staff who have specialized in the factors that come into play when droughts occur (experts on fire, agriculture, economics, biodiversity, rangeland). The state is currently developing coordination efforts between its departments, primarily based in interdepartmental committees to oversee and harmonize large planning efforts, such as the Air Board's greenhouse gas reduction plan (for AB 32) and the Department of Water Resources' Water Plan (Steering Committee). The state also has experience responding to past droughts, much of which is recorded in drought reports. However, the state's institutional knowledge and experience will be diminishing in the next five years, as a large portion of the state workforce retires.

Other than the general California Emergency Plan, the state lacks a well-defined cross-departmental institutional structure for recognizing and responding to droughts. Drought response is coordinated ad hoc by a gubernatorial emergency proclamation, designating actions for state agencies and funds to address the immediate drought. The state doesn't have a standard process for recognizing a drought, nor a standing body designated to respond to droughts. Counties are the regional agencies that alleviate drought stresses on the ground, but state agencies only reimburse counties for their drought response if funds are designated in the governor's emergency proclamation.

The state's does not have funds designated for alleviating additional costs imposed by drought. Droughts increase the frequency and severity of fires, but the state does not maintain reserves for the incremental increase in firefighting costs from drought and climate change. Droughts impose localized hardships on growers and farming communities, which the state does not maintain funds to address. To date, the state has not exercised its financial capacity to proactively address drought.

Local:
Water districts span a huge range of capacity, from large water districts with hundreds of staff, extensive knowledge of their deliveries and well-developed Shortage Contingency Plans, to small rural systems intermittently run by one person, usually with considerable experience but no redundancy nor preparation for unusual events.

For large water districts, increasing capacity to respond to drought involves the efforts that many urban districts have been doing the first two years of the current drought. Many districts turned to their Shortage Contingency Plans (usually last updated in the last drought, in the early '90s) and revised them for current population and water supplies. Many cities passed water conservation ordinances, to be prepared for water rationing if it became necessary. Many realized that their water use data was insufficient to distinguish indoor and outdoor uses, and started to develop programs or calculations to determine those. Others realized they needed improved accounting and outreach tools. Bi-monthly billing creates a significant barrier to communicating with water users; by the time consumers receive their July/August bill, they've already done the bulk of their summer watering. Customers and the district have lost the ability to decrease

summer water use in response to higher prices, and customers are shocked and angry at a bill much higher than expected. Districts and cities hired water efficiency staff or re-trained building inspectors to do water audits. All of these capacity improvements will serve them in good stead in the next drought.

Agricultural water districts:
Like urban districts, agricultural water districts span a wide range of capacity, from large modernized agencies to small districts with a minimum of technology and staff. Some of the larger irrigation districts are required to write water management plans, but there is no requirement that agricultural districts write shortage contingency plans. Some, like El Dorado Irrigation District and Placer County Water Agency, have undertaken sophisticated modeling efforts on their own initiative but those are the exceptions. Most agricultural districts are reacting to drought as it unfolds, based on their experience, rather than an advance planning effort.

Small rural water districts:
California also has small, rural water companies or districts with virtually no capacity to respond to drought or other emergency. Some are single-source districts on uncertain wells or rapidly dropping lakes. Some are old, handbuilt delivery systems, with literally no records, neither plans of the infrastructure nor deliveries to the water users. The very small districts are often operated by one man who relies on his extensive knowledge of the system to keep it running, but who hasn't transferred that knowledge to paper. Many small water companies are run by a volunteer board of directors, often retirees who live elsewhere but maintain a second rural residence. These companies may have a handyman or ditchtender to operate water deliveries, but no professional staff to do contingency planning. Few rural water districts maintain a reserve fund for planning and even fewer of them consider that there is sufficient taxable wealth within their service area to create large reserve funds. If a shortage contingency plan were required by the state, a director would have to take that on as an additional uncompensated task. Small rural water districts such as these have essentially no capacity for anything more than the usual daily operations.

A few hundred of the roughly 4000 smaller water companies in the state face running dry in the second or third year of a drought. Their first recourse is to drill an additional well, if they have access to an aquifer, or to connect to a neighboring district, but actions like these require money, aid agreements, easements or rights of way for emergency mains, contracts and billing. These can be difficult for a volunteer board to negotiate with no professional staff. Their second recourse is their county government, which, in the current budget crisis, is likely understaffed and underfunded for emergency response. The state or county Public Health Department may have to truck in water or coordinate an evacuation. A small rural water district will be hard-pressed to compensate the country for either. Help may come from the California Rural Water Association, which can send emergency aid with planning and response, including soliciting emergency grant money. The CRWA has a few people trained to help small rural water agencies, but not enough to meet the statewide need in the second or third

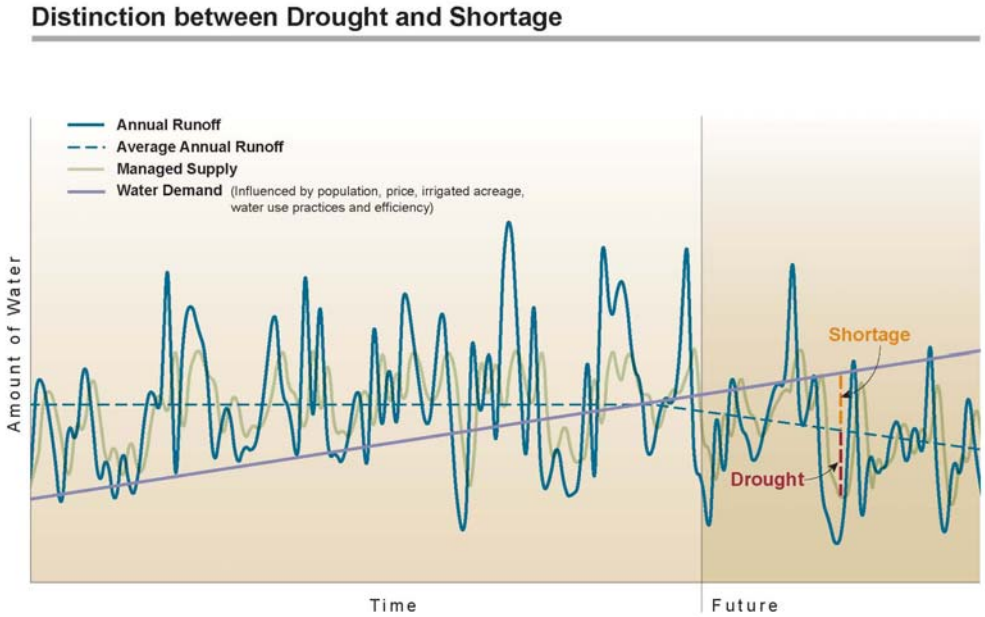
year of drought. When local assistance through the county has been exhausted, the state Department of Public Health can step in with additional assistance.

Individual:
Most residential water users have the capacity to reduce their water use when they turn their attention to it. Repeatedly asking urban water users to reduce their per capita water use and spreading that conserved water among new users from population growth will gradually ratchet down their ability to conserve, but for now, conservation remains the largest potential source of new urban water. Californian urban water users use from 100 to 400 gallons of water per day; Australian urban water users use about 40 gallons of water per day. Gov. Arnold Schwarzenegger has set policy with the goal of a 20% reduction in per capita water use by 2020; DWR and other state agencies are developing a plan to achieve this.

Most urban water users have the capacity to respond to drought by technology substitution and behavior change. Technology substitution, such as changing to low-water using appliances or smart irrigation timers, requires that they know of the available technologies, have the attention and time to make the substitution and that they have the money available to buy them. Behavior change, such as fixing leaks and changing washing patterns, primarily requires the individual's attention. Of the types of capacity, most urban water users need knowledge (of potential substitutes) and money to make the substitutes.

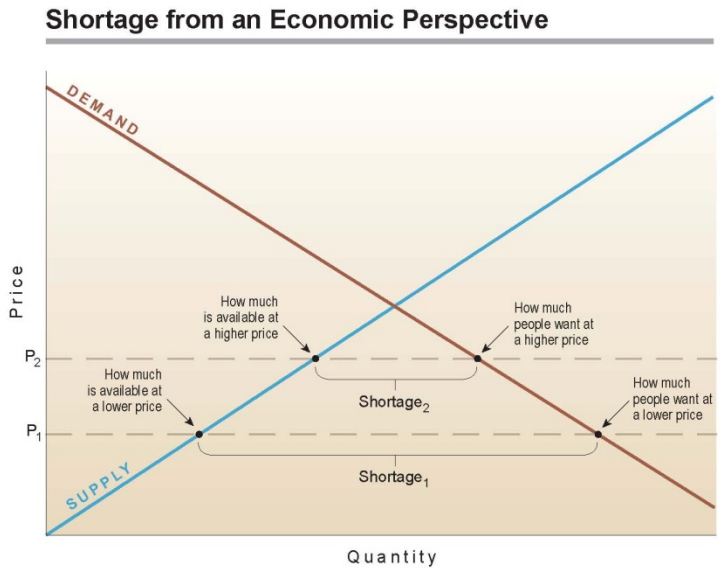
Drought, Scarcity and Shortage
Drought is a meteorological phenomenon, in which natural climate variability produces less precipitation than average within selected geographic boundaries.

Drought by itself means little. An uninhabited island receiving less precipitation than usual would not matter to most people. In practical terms, droughts matter when people have come to rely on receiving most of the water their local climate historically delivered. This is the comparison that makes a drought relevant (how much water people need, compared to supply), and is itself an unstable, normative concept.



This figure displays the difference between shortage and drought. The people of California want to use an amount of water that depends on the population, the extent of irrigated acreage, lifestyle and efficiency. If the amount of water that is available to them is less than that, they perceive a shortage. As climate change decreases the amount of run-off available to the state, and as population grows, this shortage could increase. Although some people refer to this as “permanent drought,” a new-long term average precipitation cannot be a drought, which is the state of getting less precipitation than average. The Drought Contingency Plan addresses the incremental impacts from increased dryness in drought years, not ongoing shortage, which is the domain of the California Water Plan.

Economics provides another definition of the term shortage; because this economic jargon is a synonym, it can confuse the lay reader. An economic shortage occurs when people can’t obtain something at the price set for it (figure 2). Demand at a low price may exceed supply; in that case, there is a shortage at that price. One solution economists suggest to decrease water shortage is to raise the price for water until demand at the higher price meets supply.



Raising the price (going from P1 to P2) does make the economic shortage smaller; Shortage1 is smaller than Shortage2. This is more of an abstraction than a solution for most water users. Decreasing the hypothetical difference between how much people want and can buy at a price doesn't solve the problem of drought for most water users. It does not increase the supply of water available to the state, nor change urban water user's experience of drought. Most water users think their demand for water is driven by physical necessities, like watering a lawn, irrigating all the acreage on a farm, or taking a shower. If higher prices force them to buy less water, they do not think "at this new price, I want less water, so even though I don't have as much water as I want to use, my economic shortage has decreased." Instead, they feel that they are paying more for less water, which is what they usually think of as a shortage.

Drought Impacts

This section lays out drought impacts in several sectors of the Californian whole. Looking at drought impacts suggests potential state responses.

<u>Public Health</u>

Drinking water

Small water systems have historically experienced the bulk of health and safety impacts, as well as the majority of water shortage emergencies— regardless of water year type. Although small systems serve a low percentage of California's total population, they constitute the majority of the state's public water systems. Small systems tend to be located outside the state's major metropolitan areas, often in lightly populated rural areas where opportunities for interconnections with another system or water transfers are nonexistent. Small systems also have limited financial resources and rate bases that constrain their ability to undertake major capital improvements. Most small system drought problems stem from dependence on an unreliable water source, commonly groundwater in fractured rock systems or in small coastal terrace groundwater basins. Historically, particularly at-risk geographic areas have been foothills of the Sierra Nevada and Coast Range and inland Southern California, and the North and Central Coast regions.

Risks to public health that Californians may face from drought include impacts on water supply and quality, food production (both agricultural and commercial fisheries), and risks of waterborne illness. As the amount of surface water supplies are reduced as a result of drought, the amount of groundwater pumping is expected to increase to make up for the water shortfall.

The increase in groundwater pumping has the potential to lower the water tables and cause land subsidence. Communities that utilize well water will be adversely effected both by drops in water tables or through changes in water quality. Groundwater supplies have higher levels of total dissolved solids compared to surface waters. This introduces a set of effects for consumers, such as repair and maintenance costs associated with mineral deposits in water heaters and other plumbing fixtures, and on public water system infrastructure designed for lower salinity surface water supplies. Drought may also lead to increased concentration of contaminants in drinking water supplies.

Respiratory diseases

Short-term effects of air pollution include irritation to the eyes, nose and throat, as well as increased incidence of upper respiratory inflammation. In addition, short-term air pollution tends to aggravate the medical conditions of individuals with asthma and emphysema. Similar to heat waves, public health impacts from particulate matter are highest among the elderly, followed by infants and young children.

Recent evidence shows that ozone and particulate matter exposures can initiate cardiovascular and lung disease resulting in increased overall mortality. An increase of ground-level (tropospheric) ozone can cause decreases in lung function and increase airway reactivity and inflammation. Particulate matter can aggravate existing respiratory and cardiovascular disease and damage the lungs, leading to premature death; it may also contribute to increased risk of cancer. According to the California Air Resources Board (CARB), current exposures to just two common air pollutants – ozone and particulate matter (PM) cause around 8,800 deaths, 9,500 hospitalizations, 200,000 cases of asthma and lower respiratory symptoms, and nearly 5 million school absences in California each year.

Drought also results in increased frequency and duration of wildfires; another significant risk to public health. Wildfire frequency and intensity is expected to grow as temperatures increase and vegetation dries due to longer dry seasons. In addition to the associated direct risk of fatalities, wildfires can lead to immediate and long-term adverse public health problems due to exposure to smoke. Smoke from wildfires is a mixture of carbon dioxide, water vapor, carbon monoxide, hydrocarbons and other organic chemicals, nitrogen oxides, trace metals, and fine particulate matter from burning trees, plants, and built structures. During wildfires, large populations can be exposed to a complex mixture of pollutant gases and particles, which can have both acute and chronic health impacts. Smoke can irritate the eyes, harm the respiratory system, and worsen chronic heart and lung diseases, including asthma. People with existing cardiopulmonary diseases are generally at the greatest risk from smoke inhalation, with age being a complicating risk factor for the exposed population.

Changes in temperature and precipitation are likely to cause changes both in the geographic distribution and the quantity of vectors (such as ticks and mosquitoes) that carry human disease. In California, three vector-borne diseases are of particular concern: human hantavirus cardiopulmonary syndrome, Lyme disease, and West Nile virus. These diseases vary in their response to climate-related factors such as temperature, humidity, and rainfall. The distribution of vectors may change as humid areas become drier and less suitable habitats, while other areas may become wetter, allowing for the vectors to exist where they previously did not. Abundance of small mammal reservoirs may similarly be affected.

Social and mental health
Health inequities: Declines in crop yields and fisheries may contribute to substantial increases in food prices, which would disproportionately impact low income communities who already spend a higher percentage of their income on food. Reduced agricultural employment will impact low income farm workers and their families.

Biodiversity and Habitat

California is one of the most biologically diverse regions of the world and its vast array of species and habitats make it one of the 25 biodiversity “hotspots” on earth. Hot spots are areas where at least 1,500 species of vascular plants (> 0.5% of the world’s total) are endemics and where at least 70% of the original habitat has been lost. Of all 50 states, California has the most unique plant and animal species, as well as the greatest number of endangered species. The state’s extensive biodiversity stems from its varied climate and assorted landscapes which have resulted in numerous habitats here species have evolved and adapted over time. The state’s ecological communities include coastal mountain ranges, coastal dunes, wetlands, rivers, lakes, streams, deserts, grasslands, chaparral, and inland forested mountains among others. The vast number of endemic species found in California, combined with the high level of threats to their persistence, makes California a ‘hotspot’ for biodiversity.

California is one of only five regions in the world with a Mediterranean climate. Habitats in these climatic regions are considered to be more threatened by climate change than tropical forests, since over 40% of these lands worldwide have been converted to other uses and less than 5% are protected worldwide. According to some estimates, more than 20% of the naturally occurring species of amphibians, reptiles, birds, and mammals in California are classified as either endangered, threatened, or "of special concern" to state and federal agencies. Therefore, the preservation of California's unique biological heritage is of ever-increasing importance given the forecasted impacts associated with drought and climate change.

The economy and the natural resources that sustain human life are dependent upon the state's biodiversity. These species and ecosystems provide numerous goods and services, including provisioning services (e.g., food and timber production, medicines, water and fuels), regulating services (e.g., water purification and carbon sequestration), supporting services (e.g., climate regulation and nutrient cycling) and cultural services (e.g., aesthetic values, and sense of place). Not only do these goods and services support California's economy but they support numerous recreational activities for residents.

Disturbance events or extreme weather events thought to increase due to climate change generally benefit invasive species given their tolerance to a wide range of environmental conditions. Invasive species often have greater flexibility and can survive under variable and extreme conditions, such as flood events or drought.

Biodiversity in natural ecosystems and working landscapes supports a wide range of ecosystem services that sustain human well-being and the economy of California. Ecosystem services are simply defined as the benefits people obtain from ecosystems. These include carbon sequestration, forage production, timber production, water storage and filtration, crop pollination, soil fertility, fish and game habitat, tourism, recreation and aesthetic values. Ecosystem services can be categorized as provisioning services (food, water, timber, and fiber), regulating services (the regulation of climate, floods, disease, wastes, and water quality), and cultural services such as recreation, aesthetic enjoyment, and spiritual fulfillment; and supporting services such as soil formation, photosynthesis, and nutrient cycling (Millennium Ecosystem Assessment 2005). Warming, changes in precipitation and increases in extreme events (drought, storms, heat waves, etc.) are expected to alter many ecosystem services, due to impacts on biodiversity and on the structure and functioning of ecosystems. Changes in the geographic distribution of individual species and major habitats will alter the distribution of ecosystem services across the state. For example, potential conversion of conifer forest to evergreen woodlands, forecast for regions of the Sierra Nevada and northern Coast Ranges, would reduce and redistribute timber production. Reduced snowpack, changes in water flows, expansion of reservoirs, and warmer water temperatures will impact freshwater ecosystems, with likely negative effects on many native species. Conflicts between human water uses and management of game and non-game fish populations are expected to increase under future climates.

Streams
Flowing water is important because it moves organic material and energy. This movement facilitates the exchange of nutrients between aquatic and terrestrial areas. In terrestrial areas, aquatically derived nutrients help support vegetation and wildlife. Emerging aquatic insects are prey for birds and bats foraging and breeding in riparian areas. Equally important, flowing water moves terrestrial organisms and detritus, which play an important role in aquatic food webs.

As a result of a decrease in snow pack and earlier snowmelt, stream flows are expected to be lower during the summer months and extending into the fall. In addition, reduced stream water depth and higher air temperatures will increase stream water temperatures, to levels that are potentially unhealthy for coldwater fish. Salmonids are temperature-sensitive and rely on precipitation and snow melt. The projected changes in inland water temperatures with changing seasonal flows is projected to place additional stress on these species, contributing to the need for increased resources for monitoring and restoration efforts. It is common for adult fish migrating to spawning grounds to encounter obstacles that require high flow conditions in order to pass. When drought results in reduced stream flows this could impede or halt their progress. A delay in the arrival to spawning grounds may decrease reproductive success and increase fish mortality. Repeated low stream flows during spawning migration periods may naturally select against large adult body sizes.

The projected changes in temperature and precipitation patterns will also affect the distribution and longevity of available surface water. Changes in the composition and structure of riparian communities may result from changes in precipitation and flow and could contribute to increased management conflicts as the needs of humans and wildlife compete for limited resources. Changes in temperature and precipitation associated with climate change may lead to less stored water and will have a direct effect on the survival of aquatic species and the preservation of wetland habitats.

Prolonged periods of drought can make ecosystems vulnerable to pests, non-native species invasions and frequent and intense wildfires. Moreover, reduced rainfall and snowmelt will lead to less water infiltrating the soil, stressing plants and animals. This reduced infiltration rate will also diminish groundwater recharge. Lowered levels of groundwater, combined in coastal areas with saltwater intrusion, will exacerbate dry conditions and further stress species and habitats. As an example, likely reductions in precipitation and higher variability in precipitation, both within and among years are likely to reduce survival of young seedlings, which are particularly susceptible to drought stress and has serious implications for the ability of ecosystems to recover from disturbance both natural and by active restoration (See also Forestry sector). Together, all these changes in water availability can cause landscape transformations as conditions select for species that require less water

Information on specific fishery impacts – such as fish kills or fish stranding -- directly attributable to present dry conditions is sparse and anecdotal. Impacts specifically drought-related have been reported for the Russian River system, where several fish

kills in spring 2008 and 2009 that included Endangered Species Act listed species (coho salmon and steelhead) occurred, attributed to wine grape growers' water use for grapevine frost protection. The National Marin Fisheries Service formed a frost protection task force in 2008, and in February 2009 requested emergency regulations from the State Water Control Board (SWRCB). SWRCB held an informational workshop in April 2009 on water use for frost protection; follow-up action will be determined.

Drought is more commonly an additional stressor for fish populations that may already be experiencing long-term declines for multiple reasons including loss of habitat, competition from introduced species, and water quality degradation. In 2008 and 2009, for example, the Pacific Fishery Management Council banned commercial salmon fishing off the coast of California, in reaction to depleted salmon stocks attributed primarily to unfavorable ocean temperature and food availability conditions. Similarly, the status of, and factors affecting, declines in fish populations migrating through or resident in the Delta are being extensively discussed in several forums; review of the this subject is beyond the limited scope of this document.

Central Valley state and federal wildlife refuges included in the Central Valley Project Improvement Act (CVPIA) have received full supplies (100% of so-called Level 2 refuge supplies, the water dedicated from CVP yield for refuges) from the CVP in 2007-2009. CVPIA further directed USBR to purchase additional supplemental water for wildlife refuges (so-called Level 4 refuge supplies). It is presently too soon to determine how much Level 4 refuge water USBR will be able to acquire in 2009; this information will be included in the end-of-year update of this report. If no Level 4 refuge water supplies were purchased, full Level 2 supplies would represent about 71% of the amount of water USBR believes is needed pursuant to CVPIA.

Recreation

Recreation Impacts of the present drought on recreation are not readily discernable at the statewide level, especially when considering the confounding impacts of current economic conditions and recent high gasoline prices. (Poor economic conditions may actually increase attendance at local facilities such as reservoirs, when people choose to curtail longer trips in favor of nearby recreational destinations.) Recreational sectors that may be impacted by drought include ski resorts, reservoir-based activities, and river-based activities (e.g. rafting). Some recreational facilities within these sectors are able to take adaptive measures such as snowmaking, relocating floating boat docks, extending boat ramps, or changing rafting locations to mitigate drought impacts.

Drought impacts on water-based recreation are highly localized, depending not only upon the adaptive capacity of recreational facilities, but also upon the magnitude of site-specific impacts. Taking reservoir-based recreation as an example, only some of the Sierran reservoirs popular with boaters have experienced significantly lower water elevations. At sites such as USBR's Folsom Lake -- where low water levels forced restrictions on boat operations and early curtailment of marina operations in 2007 and 2008 -- the reservoir's proximity to a major urban area still results in high levels of visitor

usage for other activities at the site. Many factors influence attendance at these facilities, but drought does not stand out as a causative factor.

Agriculture

The agricultural sector clearly demonstrates the site-specific nature of drought impacts. Agricultural drought impacts are normally felt earliest by those relying on unmanaged water supplies – entities carrying out dryland grazing and non-irrigated crop production (usually grain crops). Impacts to irrigated agriculture depend on the source and nature of the irrigation water supply – local groundwater, local surface water, or imported surface water – and any water rights or contractual provisions that may be associated with the source. The extent to which producers may mitigate water shortage impacts depends on multiple factors, but is heavily influenced by economic considerations. Factors involved in making decisions about mitigating irrigation water shortages include availability and costs of pumping groundwater, price of alternative surface water sources, capital investments associated with maintaining permanent plantings, and status of international crop markets.

Impacts of drought on dryland grazing are difficult to capture well, due to the absence of standardized metrics that provide comparable information across differing agency jurisdictions (e.g. county agricultural commissioners, U.S. Forest Service, U.S. Bureau of Land Management) and industry programs. The California State Office of the U.S. Bureau of Land Management estimates that animal unit months (an indirect measure of forage) on lands under its jurisdiction dropped about 8% from 2006 to 2008, although drought may be only one of several reasons for the decline. (Current economic conditions, for example, could result in permittees stocking less than the maximum number of allowed livestock.) Indirect information on drought impacts to rangeland may be inferred from county-level requests for U.S. Department of Agriculture disaster declarations used to authorize provision of financial assistance; however, many counties are presently still in the process of compiling 2009 impact information for consideration by USDA. A table of county-level disaster declarations and estimated damages will be included in the year-end update of this report, by which time information on designations made in response to spring and summer conditions will be available

Westlands Water District and other CVP contractors on the west side of the San Joaquin Valley were hit disproportionately hard by the 2007-2009 Drought. They are junior water rights holders, heavily-dependent on imported supplies. In 2009, Westlands WD fallowed more than 156,000 acres of their roughly 570,000 farmed acres, and their farmers were unable to harvest more than 41,000 planted acres. Westlands growers fallowed an average of about 69,000 acres each year during the 2000-06 period. During that period they never failed to harvest more than 2,000 acres in a year.

Preliminary and later forecasts of the jobs that would be lost in the San Joaquin Valley due to the water shortages ranged from about 2,000 jobs lost to about 21,000 jobs lost. A September 2010 study of the economic impacts of the 2009 San Joaquin Valley water supply cuts produced estimates of total employment lost due to the direct plus indirect

plus induced effects of the water cuts that ranged from 5,567 jobs to 7,434 jobs.(Reference 7). Estimates of total lost regional economic output in 2009 (both direct and indirect, and induced) ranged from about $586 million to $796 million. The authors of the September 2010 report conclude, "… a significant increase in the amount of water transfers was critically important to reducing the negative impacts of water scarcity."

The water shortages, combined with the housing market crash and recession, has added to the poverty in the communities on the west side of the San Joaquin Valley. The cattle industry likewise suffered from having to buy feed in this drought. Low milk prices from the recession combined with the cost of buying additional food to supplement low pasture yields is forcing dairy farmers out of business. Dairy farmers are selling or slaughtering their herds, with plans to slaughter approximately one hundred thousand head of cattle (to constrict the milk supply and raise prices). The flip side of the dairy industry's hardship is that fodder prices hit record highs in 2008 for corn, alfalfa and hay, in an example of drought creating wealth for California growers.

Forestry and Fire

The effects of a prolonged drought on forests will depend on the species present, their life stages, soil texture and depth, and the duration and severity of the drought.
A lack of consistently available moisture can impact forest health, although some regions and forest types will be impacted more than others. For example, declines in precipitation may have significant impact on those inland forests that are drier as compared to coastal forests which receive moisture through coastal fog. Climate change may, however, also result in decreased fog regimes.

In the short-term, forest trees will respond to increased drought by limiting growth and reducing water use. While adult trees, with their deeper root system and stored nutrients and carbohydrates, will be able to survive short-term droughts, new seedlings and saplings may be unable to establish. Under prolonged drought trees and shrubs may weaken and become more susceptible to pests, disease and wildfires, and some plant communities may be more vulnerable to invasive species. Reforestation success may be improved by management practices that use more drought tolerant species or genotypes, by changes in stocking, and other silvicultural practices.

Wildlands and Urban Interfaces - Wildfires
Forest and other wildlands in California are strongly affected by drought. Due to either acute short-term or prolonged long-term drought, the potential for catastrophic wildfires to occur increases dramatically. Vegetation moisture decreases; moisture content decreases in live fuels (grasses, brush...); increases fire risk, can intensify wildfire behavior, and prolong the fire season. In recent years, California has experienced an increase of catastrophic wildfires due to drought occurring throughout the state. The resulting impacts from these fires have had a devastating effect on the California economy and environment, while causing great stress to the communities involved due to loss of life and property damages.

Damages associated with wildfires and loss of timber resources can be one of the largest economic impacts of drought. California faces an increasing risk of damages from wildfires as urban development encroaches on the urban/wildland interface. A joint position adopted by the League of California Cities and the California State Association of Counties following Southern California's devastating wildfires in 2003 notes that: "Catastrophic wildfires are one of the most significant threats to communities, forests, and wildlands in California today" (LCC, CSAC 2004). The devastating Southern California wildfires of 2003 -- reported to be the then-costliest in U.S. history, and which followed a multiyear regional drought in Southern California – were mirrored in October 2007, when a combination of dry vegetation and Santa Ana winds created conditions favorable for another massive outbreak of fires in Southern California. Earlier that same year, dry conditions in Northern California had facilitated the spread of another damaging fire -- the Angora Fire near Lake Tahoe, estimated by CAL FIRE to entail more than $11 million in fire fighting costs. Costs of fighting the May 2009 Jesusita Fire in the Santa Barbara area were at least $20M.

Dry conditions, combined with warmer than average annual temperatures over much of the past decade, are leading to a almost year-round wildfire risk in Southern California.

Infrastructure and Energy

Water and energy are closely linked in California; drought makes energy scarcer, creates new energy demands, and heightens the need for conservation of both water and energy. Drought decreases runoff in mountain streams, and correspondingly decreases the potential for generating hydropower. Hydropower is an important component of California's electricity system, representing about 27% of the state's total installed generation capacity. Actual hydropower generation, however, varies greatly in response to hydrologic factors. Between 1990 and 2000, hydropower actually contributed from 9% to 25% of the in-state supply, as a result of annual variations in runoff. In 2001, a drought year, hydropower represented only 10% of the total in-state generation. Over an 18-year period between 1983 and 2001, hydropower represented just over 15% of electricity used within the state, including imports.

The ability to dispatch hydropower on short notice is perhaps an even greater benefit to the state's electrical system than its contribution to the state's overall installed capacity. Unlike many other generation sectors, hydropower units can start up and meet capacity load in a matter of minutes, as well as provide spinning reserve to meet transmission line voltage requirements. Although drought years reduce overall hydropower production, hydropower continues to play an important role in helping the state meet peak demand. Hydropower also contributes to the state's electricity system by providing low-cost energy. Many hydropower facilities in the state produce electricity at less than 2 cents per kilowatt-hour (kWh).

As drought reduces the amount of hydropower to the state, the state will shift production to power plants, which require water for cooling. This increases demand for scarce water. Further, in drought years, growers and municipalities pump more groundwater, creating additional energy demands. Regions that supplement their water portfolios by treating and re-using wastewater or by desalination will also create new energy demand.

Ground subsidence causes other major effects on infrastructure. As people pull water out of aquifers to replace surface water that can't be delivered during drought, the ground settles enough to damage or crack buildings, aqueducts, well casings, bridges, and highway overpasses. In the current drought, subsidence-related cracking in the Delta-Mendota Canal has been reported. Other infrastructure in the same area, such as Highway 5, may be damaged from subsidence caused by groundwater pumping.

Although coastal areas don't experience subsidence, coastal aquifers may suffer increased saltwater intrusion if overlying users pump additional freshwater in drought years.

Drought Indices and Triggers

Indicators are variables which describe drought (examples - precipitation, stream flow, groundwater, reservoir levels, soil moisture, etc.). An index is a bundle of important indicators, combined into one value for ease of use. Triggers are defined as specific values of an index that initiate and terminate each drought status level, and suggested management responses. Below we discuss the types of drought indicators and outline a procedure which could be undertaken to develop indices and triggers for each region in California.

Types of Drought Indicators
Ultimately, drought of any type can be traced to the sole natural moisture input of the hydrologic cycle - precipitation. Likewise, a good measure of the overriding natural removal of water from a hydrologic system is the potential for evaporation, for which the surrogate of air temperature is most often used. Fortunately for drought monitoring, air temperature and precipitation are the two most commonly measured climatic variables. Often these two parameters are combined to produce relative measures of drought. Other indicators that are commonly used to monitor drought include: snowpack, reservoir elevations and current storage, soil moisture, stream flow, groundwater levels, fire and fuel load, and information obtained through observations from local conditions of soil moisture, vegetation and forage, stock ponds, and wildlife habitat.

California has extensive historical data for some of these indicators, especially indicators based on our managed water delivery system (reservoir conditions, streamflows at gaging stations). However, the state hasn't assembled the indicators into indices that provide a consistent and measure of the extent of drought. Further, a single drought index for the state could well disguise different degrees of drought throughout California. California is a large state; regions may experience very different levels of

drought in the same event. For these reasons the State should determine whether and how to assemble indicators into indices for the regions of California.

If California develops drought indices, the index can have threshold triggers to indicate the extent of the drought, from mild to extreme. Crossing the thresholds for the triggers indicates that it is time to initiate the additional drought responses listed in the Drought Action tables of the 2010 Drought Contingency plan.

ATTACHMENT 4: Cal EMA Drought Brochure

TAX ADVICE AND ASSISTANCE

Employment Tax Requests for Extension to Report and Pay:
Employers statewide directly impacted by the recent drought disaster may request an extension of up to 60 days to file their state payroll reports and to deposit state payroll taxes with EDD, without penalty or interest. For further information, call EDD's Taxpayer Assistance Center at 1-888-745-3886 or visit EDD's website at: www.edd.ca.gov

EMERGENCY NEEDS REFERRAL

The American Red Cross:
The American Red Cross (ARC) provides emergency food, clothing, shelter, and medical assistance to needy individuals and families. Contact the ARC at 1-866-GETINFO (438-4636).

The Salvation Army:
The Salvation Army provides a variety of services including help with food, household needs, clothing and personal needs. For more information call 1-800-SALARMY (725-2769) or visit the website at: www.tsatoday.org

Department of Community Services & Development:
The Department of Community Services & Development (CSD) provides funding to more than 100 local community organizations that offer assistance with clothing, motel vouchers, blankets, shelters, energy assistance and emergency food. For more information, contact 916-341-4200. For information on the Home Energy Assistance Program (HEAP), call 1-866-675-6623.

PROGRAMS FOR FARMERS, RANCHERS AND OTHER BUSINESSES

U.S. Department of Agriculture, Farm Service Agency:
The U.S. Department of Agriculture's (USDA) Farm Service Agency (FSA) provides emergency loans in areas designated a disaster by the Secretary of Agriculture to help producers recover from production and physical losses. Contact the FSA office listed in your local telephone directory, or visit FSA's website at: www.fsa.usda.gov

U.S. Small Business Administration, Economic Injury Disaster Loans:
Economic Injury Disaster Loans (EIDLs) are low-interest working capital loans to help small businesses; small agricultural cooperatives and certain private, non-profit organizations of all sizes meet their ordinary and necessary financial obligations that cannot be met as a direct result of a disaster, such as a drought. These loans are intended to assist through the disaster recovery period. The U.S. Small Business Administration (SBA) makes EIDLs available after a drought when the U.S. Secretary of Agriculture designates an agricultural disaster. Businesses primarily engaged in farming or ranching are not eligible for SBA disaster assistance; however, in drought disasters nurseries are eligible. Eligible businesses may qualify for working capital loans of up to $2 million to help meet financial obligations and operating expenses which could have been met had the adverse weather condition not occurred. For more information call SBA toll-free at 1-800-659-2955, or visit SBA's website at: www.sba.gov/services/disasterassistance
Hearing impaired individuals may call 1-800-877-8339.

(For individuals who are deaf, hard of hearing, or speech-disabled, please call the California Relay Service at 711 and ask to be put in touch with the California Emergency Management Agency at 916-845-8400.)

If you have been affected by the recent Drought, here is some information that may be helpful

This publication distributed by:
California Emergency Management Agency (Cal EMA)
www.calema.ca.gov

03/20/09

ASSISTANCE PROGRAMS

Food Assistance:
California Emergency Food Assistance Program (EFAP) provides federal commodities to 50 food banks with over 2300 distribution sites statewide. Food is then distributed to individuals that meet income eligibility requirements. For locating a distribution site serving your area call 1-800-283-9000, or visit the website at: www.cdss.ca.gov/cdssweb/PG55.htm

Supplemental Nutrition Assistance Program:
If you have been affected by the drought and are in need of food assistance due to a loss of income, you can apply for benefits through the Food Stamp Program from your local county welfare/social services office. For more information visit the website at: www.cdss.ca.gov/foodstamps/

CalWORKs:
CalWORKs provides cash aid to eligible needy California families to help pay for housing, food, and other necessary expenses. For information contact your local county welfare/social services department. To find your local office visit the website at: http://www.cwda.org/links/chsa.php or for more information on this program, visit the cash aid website at: http://www.dss.cahwnet.gov/cdssweb/PG54.htm

Women, Infants, and Children Supplemental Nutrition Program:
The Woman, Infants, and Children (WIC) program helps low-to-moderate-income pregnant women, new mothers and their babies and young children to eat well and stay healthy. WIC provides:

- Special checks to buy healthy foods such as milk, juice, eggs, cheese; and starting in October 2009--fruits, vegetables, baby foods and whole grains;
- Information about nutrition and health;
- Breastfeeding support and referrals to health care and community services.

For more information, visit the website at: http://www.cdph.ca.gov/programs/wicworks/Pages/default.aspx and click on "Find a Local WIC Agency" under Program Information.

Migrant Education Program:
The Migrant Education Program (MEP) provides supplementary education and support services to identified migrant children and youth, ages 3-21, to help them meet the state's academic content standards and to help them graduate from high school. For regional contact information, call 916-319-0851 or visit the website at: www.cde.ca.gov/sp/me/mt/

Local Utility Companies:
Many local utility companies have programs to assist eligible low-income households pay their energy bills or prevent service from being shut off during winter and during heat emergencies. Contact your local utility providers for available services.

Services for Seniors:
The California Department of Aging contracts with and provides leadership and direction to Area Agencies on Aging (AAA) that coordinate a wide array of services to seniors and adults with disabilities. You can locate an AAA in your area by calling 1-800-510-2020 or visit the website at: http://www.aging.ca.gov/local_aaa/AAA_listing.asp

The Senior Farmers' Market Nutrition Program (SFMNP) provides low-income seniors with coupon books used to purchase fresh fruits, vegetables, herbs and honey at Certified Farmers' Markets (CFM). The program begins in May and runs through November. The California Department of Food and Agriculture (CDFA) partners with California's AAA to distribute the coupon books. For more information contact 916-657-3231 or e-mail grants@cdfa.ca.gov

HEALTH CARE SERVICES

Access for Infants and Mothers Program:
The Access for Infants and Mothers (AIM) program provides low-cost health insurance coverage to uninsured middle-income pregnant women. For a copy of the AIM Handbook and application, please call 1-800-433-2611, or visit the website at: www.AIM.ca.gov

Healthy Families Program:
The Healthy Families Program (HFP) provides low-cost comprehensive health, dental and vision coverage to uninsured children and teens whose family income is too high to qualify for Medi-Cal. For a copy of the HFP Handbook & application, please call toll free 1-800-880-5305 or visit the website at: http://www.healthyfamilies.ca.gov

Medi-Cal Health Coverage:
Medi-Cal is a public health insurance program that provides comprehensive medical, dental and vision care coverage to low-income individuals, including families with children, seniors, persons with disabilities, pregnant women and low-income people with specific diseases, such as tuberculosis, breast cancer or HIV/AIDS. For more information, contact your county welfare/social services department.

Local, Maternal, Child, and Adolescent Health Program
The Maternal, Child, and Adolescent Health (MCAH) program helps low-income, uninsured, and underinsured families access health care services to address a broad range of public health problems. For more information on services visit the website at: www.cdph.ca.gov/programs/mcah
To access a list of local MCAH Department call 1-866-241-0395 or visit the website at: http://www.cdph.ca.gov/programs/mcah/Pages/MCAHDirectorsandLocalTollFreeNumbers.aspx

Crisis Counseling:
Short-term counseling may be available for emotional or mental health problems caused by the economic impacts of the drought. For more information, visit www.dmh.ca.gov

Health Information:
For information on health concerns related to the drought, please visit the California Department of Public Health website: http://www.bepreparedcalifornia.ca.gov

EMPLOYMENT SERVICES

Unemployment Insurance:
Workers who have lost their jobs because of the drought may be eligible for Unemployment Insurance (UI). The quickest and easiest way to apply is online. Visit Employment Development Department's (EDD) website at: www.edd.ca.gov Click on the "Unemployment" link, then on "Apply Online" (eApply4UI) at the top right of the page.

UI claims also can be filed by telephone at 1-800-300-5616. (For Spanish, call 1-800-326-8937. For TTY, call 1-800-815-9387.) UI benefits are provided to workers who are unemployed due to no fault of their own, or working less than full time, have a legal right to work in the U.S., and are ready, willing, and able to work.

Job Services:
Job seekers and employers will find a wide variety of employment services offered by EDD and local partners at One-Stop Career Centers and EDD Workforce Services Offices throughout the state. Using these job search and training services, job seekers with a legal right to work in the U.S. can connect with thousands of available jobs through the automated system CalJOBS. For more information, visit EDD's website at: www.edd.ca.gov

ATTACHMENT 5 - 2008 Executive Order and Emergency Drought Proclamation

Office of the Governor ARNOLD SCHWARZENEGGER THE PEOPLE'S GOVERNOR

EXECUTIVE ORDER S-06-08

06/04/2008

WHEREAS Statewide rainfall has been below normal in 2007 and 2008, with many Southern California communities receiving only 20 percent of normal rainfall in 2007, and Northern California this year experiencing the driest spring on record with most communities receiving less than 20 percent of normal rainfall from March through May; and

WHEREAS California is experiencing critically dry water conditions in the Sacramento and San Joaquin River basins and the statewide runoff forecast for 2008 is estimated to be 41 percent below average; and

WHEREAS water storage in many of the state's major reservoirs is far below normal including Lake Oroville, which supplies the State Water Project, at 50 percent of capacity, Lake Shasta at 61 percent of capacity and Folsom Lake at 63 percent of capacity; and

WHEREAS the Colorado River Basin has just experienced a record eight-year drought resulting in current reservoir storage throughout the river system reduced to just over 50 percent of total storage capacity; and

WHEREAS climate change will increasingly impact California's hydrology and is expected to reduce snowpack, alter the timing of runoff and increase the intensity and frequency of droughts in the western United States; and

WHEREAS diversions from the Sacramento-San Joaquin River Delta for the State Water Project (SWP) and federal Central Valley Project (CVP) are being greatly restricted due to various factors including federal court actions to protect fish species, resulting in estimated SWP deliveries of only 35 percent, and CVP deliveries of only 40 percent, of local agencies' requested amounts for 2008; and

WHEREAS dry conditions have created a situation of extreme fire danger in California, and these conditions resulted in devastating fires last year, resulting in proclamations of emergency for the counties of El Dorado, Los Angeles, Orange, Ventura, Santa Barbara, Riverside, San Bernardino, Santa Clara, Santa Cruz and San Diego, with wildfires there causing millions of dollars in damages; and

WHEREAS on May 9, 2008, I signed an Executive Order directing various agencies and departments within my administration to respond to these dry conditions and prepare for another potentially severe wildfire season; and

WHEREAS the current drought conditions are harming urban and rural economies, and the state's overall economic prosperity; and

WHEREAS some communities are restricting new development and mandating water conservation and rationing, and some farmers have idled permanent crops and are not planting seasonal crops this year, because of unreliable or uncertain water supplies; and

WHEREAS recent supply reductions have jeopardized agricultural production in the San Joaquin Valley; an

WHEREAS it is not possible to predict the duration of present drought conditions; and

WHEREAS while communities throughout the state have worked to significantly improve their drought preparedness, the readiness to cope with current and future drought conditions varies widely; and

WHEREAS immediate water conservation measures are needed this year to address current conditions and prepare for a dry 2009; and

WHEREAS the State of California is committed to enhancing drought response and drought preparedness and to protecting the state's economy and its environment

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, do hereby proclaim a condition of statewide drought, and in accordance with the authority vested in me by the Constitution and statutes of the State of California, do hereby issue the following orders to become effective immediately

IT IS HEREBY ORDERED that the Department of Water Resources (DWR) shall take immediate action to address the serious drought conditions and water delivery limitations that currently exist in California, and that are anticipated in the future, by taking the following actions:

1. Expedite existing grant programs for local water districts and agencies for new or ongoing water conservation and water use reduction programs and projects that are capable of timely implementation to ease drought conditions in 2008 or 2009.
2. Facilitate water transfers in 2008 to timely respond to potential emergency water shortages and water quality degradation, and prepare to operate a dry year water purchasing program in 2009.
3. In cooperation with local water agencies and other water-related organizations, conduct an aggressive water conservation and outreach campaign.
4. Immediately convene the Climate Variability Advisory Committee to prioritize and expedite drought-related climate research that will assist in responding to current drought conditions and help prepare for a potentially dry 2009.
5. Provide technical assistance for drought response to local water agencies and districts for improving landscape and agricultural irrigation efficiencies, leak detection and other measures as appropriate.
6. Review the water shortage contingency elements of Urban Water Management Plans and work cooperatively with water suppliers to implement improvements.
7. Coordinate and implement State Water Project operations and water exchanges to alleviate critical impacts to San Joaquin Valley agriculture.
8. Implement additional actions to facilitate drought response, preparedness and promote water conservation in 2008 and 2009, and which will contribute to achieving long term reductions in water use.

IT IS FURTHER ORDERED that DWR and the Department of Public Health (DPH) prioritize processing of loan and grant contracts for water suppliers and public water systems demonstrating drought-related hardships.

IT IS FURTHER ORDERED that DWR and DPH coordinate with the State Office of Emergency Services and local offices of emergency services to identify public water systems at risk of experiencing health and safety impacts due to drought conditions and water delivery limitations, and to mitigate such impacts.

IT IS FURTHER ORDERED that DWR and DPH work with local water districts to evaluate system interconnections among the state's large water purveyors, review the status or availability of mutual aid agreements among those large water purveyors, and work with the parties to those mutual aid agreements to correct any deficiencies that restrict the movement of water in an emergency situation

IT IS FURTHER ORDERED that DWR coordinate with the California Public Utilities Commission to identify investor-owned water utility systems at risk of experiencing health and safety impacts due to drought conditions and water delivery limitations, and to mitigate such impacts.

IT IS FURTHER ORDERED that DWR work with the Department of Food and Agriculture (CDFA), the United States Department of Agriculture and the United States Bureau of Reclamation to identify potential federal funding for local water agencies and farmers to facilitate the rapid installation of best available irrigation management and conservation systems.

IT IS FURTHER ORDERED that the CDFA work with county Agricultural Commissioners and others as necessary to identify and gather data on crop losses and other adverse economic impacts caused by the drought and, when necessary, transmit that information to the appropriate federal and state agencies.

IT IS FURTHER STRONGLY ENCOURAGED that local water agencies and districts work cooperatively on the regional and state level to take aggressive, immediate action to reduce water consumption locally and regionally for the remainder of 2008 and prepare for potential worsening water conditions in 2009.

This Order is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at

law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person.

I FURTHER DIRECT that as soon as hereafter possible, this Executive Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given to this Executive Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 4th day of June 2008.

ARNOLD SCHWARZENEGGER
Governor of California

ATTEST

DEBRA BOWEN
Secretary of State

Office of the Governor ARNOLD SCHWARZENEGGER THE PEOPLE'S GOVERNOR

PROCLAMATION

06/12/2008

State of Emergency - Central Valley Region

PROCLAMATION
by the
Governor of the State of California

WHEREAS on June 4, 2008, I issued an Executive Order proclaiming a statewide drought; and

WHEREAS in my June 4 Executive Order, I called on all Californians to conserve water, and I directed state agencies and departments to take immediate action to address the serious drought conditions and water delivery reductions that exist in California; and

WHEREAS in issuing my June 4 Executive Order, I said that I would proclaim a state of emergency in any county where emergency conditions exist due to the drought, in an effort to protect the people and property of California, including the businesses, workers and communities that depend on water deliveries for their livelihood and survival; and

WHEREAS since issuing my June 4 Executive Order, I have determined that emergency conditions exist in Central Valley counties caused by the continuing drought conditions in California and the reductions in water deliveries; and

WHEREAS statewide rainfall has been below normal in 2007 and 2008, with many Southern California communities receiving only 20 percent of normal rainfall in 2007, and Northern California this year experiencing the driest spring on record with most communities receiving less than 20 percent of normal rainfall from March through May; and

WHEREAS California is experiencing critically dry water conditions in the Sacramento and San Joaquin River basins and the statewide runoff forecast for 2008 is estimated to be 41 percent below average; and

WHEREAS water storage in many of the reservoirs serving the Central Valley are far below normal including San Luis reservoir which is at 53 percent of capacity, Lake Shasta at 61 percent of capacity and Lake Oroville at just 50 percent of capacity; and

WHEREAS diversions from the Sacramento-San Joaquin River Delta for the State Water Project (SWP) and federal Central Valley Project (CVP) are being greatly restricted due to various factors including federal court actions to protect fish species, resulting in estimated SWP deliveries of only 35 percent, and CVP deliveries of only 40 percent, of local agencies' requested amounts for 2008; and

WHEREAS the United States Bureau of Reclamation (USBR) recently announced an unexpected reduction in its water supply allocations to Central Valley Project (CVP) contractors within the San Luis Delta Mendota Water Agency Service Area from 45 percent to 40 percent; and

WHEREAS this unanticipated reduction will result in crop loss, increased unemployment and other direct and indirect economic impacts to Central Valley counties; and

WHEREAS water rationing has been ordered by the City of Long Beach, the City of Roseville, and the East

Bay Municipal Utility District, which serves 1.3 million people in Alameda and Contra Costa counties; and

WHEREAS on June 10, 2008, the Metropolitan Water District of Southern California, which supplies water for 26 cities and water agencies serving 18 million people in six southern California counties, declared a water supply alert in an effort to sustain their water reserves; and

WHEREAS some communities are also restricting new residential and commercial development because of unreliable or uncertain water supplies, and this is causing harm to the economy; and

WHEREAS dry conditions have created a situation of extreme fire danger in California, and these conditions resulted in devastating fires last year, with wildfires causing millions of dollars in damages; and

WHEREAS San Joaquin Valley agriculture constitutes a $20 billion industry, and serves as an essential part of California's economy; and

WHEREAS the lack of water will cause devastating harm to the communities that rely on this important industry, as growers lack sufficient water to finish the growing season, are forced to abandon planted crops, and are forced to dismiss workers; and

WHEREAS the lack of water is causing agricultural workers in the Central Valley to lose their jobs, resulting in a loss of livelihood, an inability to provide for their families, and increased negative social and economic impacts on the communities that depend on them; and

WHEREAS San Joaquin Valley agricultural production and processing industries account for almost 40 percent of regional employment, and every dollar produced on the farm generates more than three dollars in the local and regional economies, and the loss of these dollars is devastating communities; and

WHEREAS almost 20 percent of San Joaquin Valley residents already live in poverty, and it consistently ranks as the top region in the nation in foreclosures; and

WHEREAS as workers lose their jobs because of the lack of water, they often move their families away from the communities, resulting in further harm to local economies, lower enrollments in local schools and reduced funding for schools; and

WHEREAS the city of Fresno received only 54 percent of normal rainfall in 2007 and 76 percent of normal in 2008, and had its fourth driest spring on record; and

WHEREAS on June 11, 2008, the Fresno County Board of Supervisors passed a resolution declaring a local state of emergency due to the severe drought conditions, stating among other things that the lack of water has resulted in water rationing by Fresno County water districts; that these reductions are causing abandonment of current planted seasonal crops and permanent crops; that the cumulative crop reductions will result in job losses in Fresno County communities; that the loss of revenue has negatively impacted Fresno County businesses and Fresno County government tax revenue; and that there will be a substantial negative economic impact to the community; and

WHEREAS the Fresno County Board of Supervisors also requested that I declare a state of emergency due to the drought conditions; and

WHEREAS the Central Valley cities of Bakersfield, Modesto, Stockton, and Sacramento experienced their driest spring on record in 2008, and additional Central Valley counties are experiencing similar emergency conditions caused by drought and lack of water deliveries; and

WHEREAS to date, almost $65 million in losses have been reported by 19 counties due to reduced rangeland grasses that are used to graze livestock, and those reductions have been caused by drought; and

WHEREAS statewide and local conditions collectively have led to the rationing of water by affected water districts to their member farmers and these further reductions are resulting in abandonment of current planted seasonal crops and permanent crops; and

WHEREAS the crop losses will cause increased food prices, which will negatively impact families and economies throughout California and beyond our borders; and

WHEREAS the lack of water deliveries has forced local communities to draw water from their emergency water reserves, putting communities at risk of further catastrophe if emergency reserves are depleted or cut off; and

WHEREAS the circumstances of the severe drought conditions, by reason of their magnitude, are beyond the control of the services, personnel, equipment and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property exist within the counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern, caused by the current and continuing severe drought conditions.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the California Constitution and the California Emergency Services Act, and in particular, section 8625 of the California Government Code, **HEREBY PROCLAIM A STATE OF EMERGENCY** to exist within the counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern.

IT IS HEREBY ORDERED that all agencies of the state government utilize and employ state personnel, equipment and facilities for the performance of any and all activities consistent with the direction of my Office of Emergency Services (OES) and the State Emergency Plan, and that OES provide local government assistance under the authority of the California Disaster Assistance Act, and that the emergency exemptions in sections 21080(b)(3) and 21172 of the Public Resources Code shall apply to all activities and projects ordered and directed under this proclamation, to the fullest extent allowed by law.

I FURTHER DIRECT THAT:

1. OES shall provide assistance under the authority of the California Disaster Assistance Act, by assisting public water agencies with drilling of groundwater wells or the improvement of existing wells and water delivery systems for human consumption, sanitation, and emergency protective measures, such as fire fighting.
2. The Department of Water Resources (DWR) shall transfer groundwater of appropriate quality through the use of the California Aqueduct to benefit farmers in the San Joaquin Valley
3. DWR and the State Water Resources Control Board (SWRCB) shall expedite the processing of water transfer requests.
4. DWR, in cooperation with USBR, shall make operational changes to State Water Project facilities, including the San Luis Reservoir and Southern California reservoirs, that will permit additional water deliveries to the San Joaquin Valley.
5. DWR shall prepare and file necessary water right urgency change petitions to facilitate surface water transfers and the use of joint point of diversion by the SWP and Central Valley Project.
6. SWRCB shall expedite the processing and consideration of water rights urgency change petitions filed by DWR and other water agencies to facilitate water transfers to the San Joaquin Valley.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 12th day of June, 2008.

ARNOLD SCHWARZENEGGER
Governor of California

ATTEST:

_____
DEBRA BOWEN
Secretary of State

ATTACHMENT 6 - 2009 Executive Order and Emergency Drought Proclamation

Office of the Governor ARNOLD SCHWARZENEGGER THE PEOPLE'S GOVERNOR

EXECUTIVE ORDER S-11-09

06/19/2009

WHEREAS on June 4, 2008, I issued an Executive Order proclaiming a statewide drought, and I ordered my administration to take immediate action to address the water shortage; and

WHEREAS on June 12, 2008, I proclaimed a state of emergency for nine Central Valley counties because the drought had caused conditions of extreme peril to the safety of persons and property; and

WHEREAS on February 27, 2009, I proclaimed a state of emergency for the entire state as the severe drought conditions continued and the impacts were well beyond the Central Valley; and

WHEREAS the February 27, 2009 state of emergency proclamation provided specific orders and directions to my Department of Water Resources, State Water Resources Control Board, Department of General Services, Department of Public Health, California Department of Food and Agriculture, and Labor and Workforce Development Agency to reduce and mitigate the human, environmental, and economic impact of the drought; and

WHEREAS I have supported state and local water managers' efforts to increase the availability of water, directed efforts to better integrate regional water management practices to balance water demand with water supply, directed expedited water transfers, ordered increased job training, and substantially increased statewide water conservation; and

WHEREAS I have requested and we have received United States Department of Agriculture disaster designations for 21 counties for drought; and

WHEREAS the drought conditions have exacerbated unemployment and the local emergency food banks are struggling to meet the demands of hungry families.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the state Constitution and statutes, activate the California Disaster Assistance Act to provide temporary supplemental assistance to the local governments and non-profit organizations that provide food and other aid to those who are impacted by the drought statewide.

IT IS HEREBY ORDERED that my California Emergency Management Agency, Department of Social Services, Labor and Workforce Development Agency, and California Department of Food and Agricultural develop a comprehensive strategy by July 15, 2009, to provide adequate nutrition for those individuals who are temporarily unable to afford food as a result of the drought conditions.

IT IS FURTHER ORDERED THAT the provisions of California Unemployment Insurance Code section 1253 imposing a one-week waiting period for unemployment insurance applicants are suspended as to all applicants who are unemployed as a specific result of the drought conditions, who apply for unemployment insurance benefits during the time period beginning June 19, 2009, and ending on the close of business on November 1, 2009, and who are otherwise eligible for unemployment insurance benefits in California.

I FURTHER DIRECT that as soon as hereafter possible, this Order be filed in the Office of the Secretary of State and that widespread publicity and notice be given this Order.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 19th Day of June 2009.

ARNOLD SCHWARZENEGGER
Governor of California

ATTEST:
DEBRA BOWEN
Secretary of State

Office of the Governor ARNOLD SCHWARZENEGGER THE PEOPLE'S GOVERNOR

PROCLAMATION

02/27/2009

State of Emergency - Water Shortage

PROCLAMATION
by the
Governor of the State of California

WHEREAS the State of California is now in its third consecutive year of drought; and

WHEREAS in each year of the current drought, annual rainfall and the water content in the Sierra snowpack have been significantly below the amounts needed to fill California's reservoir system; and

WHEREAS the rainfall and snowpack deficits in each year of the current drought have put California further and further behind in meeting its essential water needs; and

WHEREAS statewide, 2008 was the driest spring and summer on record, with rainfall 76 percent below average; and

WHEREAS the Sacramento and San Joaquin River systems, which provide much of the state's reservoir inflow, were classified as Critically Dry for the 2008 water year; and

WHEREAS in the second year of this continuous drought, on June 4, 2008, I issued an Executive Order proclaiming a statewide drought, and I ordered my administration to begin taking action to address the water shortage; and

WHEREAS because emergency conditions existed in the Central Valley in the second year of the drought, I issued an Emergency Proclamation on June 12, 2008, finding that conditions of extreme peril to the safety of persons and property existed in the counties of Sacramento, San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern caused by severe drought conditions, and I ordered my administration to take emergency action to assist the Central Valley; and

WHEREAS the drought conditions and water delivery limitations identified in my prior Executive Order and Emergency Proclamation still exist, and have become worse in this third year of drought, creating emergency conditions not just in the Central Valley, but throughout the State of California, as the adverse environmental, economic, and social impacts of the drought cause widespread harm to people, businesses, property, communities, wildlife and recreation; and

WHEREAS despite the recent rain and snow, the three year cumulative water deficit is so large there is only a 15 percent chance that California will replenish its water supply this year; and

WHEREAS in the time since the state's last major drought in 1991, California added 9 million new residents, experienced a significant increase in the planting of permanent, high-value crops not subject to fallowing, and was subjected to new biological opinions that reduced the flexibility of water operations throughout the year; and

WHEREAS because there is no way to know when the drought will end, further urgent action is needed to address the water shortage and protect the people and property in California; and

WHEREAS rainfall levels statewide for the 2008-2009 water year are 24 percent below average as of the February

1, 2009 measurement; and

WHEREAS the second snow pack survey of the 2009 winter season indicated that snow pack water content is 39 percent below normal; and

WHEREAS as of February 23, 2009, storage in the state's reservoir system is at a historic low, with Lake Oroville 70 percent below capacity, Shasta Lake 66 percent below capacity, Folsom Lake 72 percent below capacity, and San Luis Reservoir 64 percent below capacity; and

WHEREAS low water levels in the state's reservoir system have significantly reduced the ability to generate hydropower, including a 62 percent reduction in hydropower generation at Lake Oroville from October 1, 2008 to January 31, 2009; and

WHEREAS a biological opinion issued by the United States Fish and Wildlife Service on December 15, 2008, imposed a 30 percent restriction on water deliveries from the State Water Project and the Central Valley Project to protect Delta Smelt; and

WHEREAS State Water Project water allocations have now been reduced to 15 percent of requested deliveries, matching 1991 as the lowest water allocation year in State Water Project history, and Central Valley Project water allocations for agricultural users have now been reduced to zero; and

WHEREAS the lack of water has forced California farmers to abandon or leave unplanted more than 100,000 acres of agricultural land; and

WHEREAS California farmers provide nearly half of the fresh fruits, nuts and vegetables consumed by Americans, and the crop losses caused by the drought will increase food prices, which will further adversely impact families and economies throughout California and beyond our borders; and

WHEREAS agricultural revenue losses exceed $300 million to date and could exceed $2 billion in the coming season, with a total economic loss of nearly $3 billion in 2009; and

WHEREAS it is expected that State Water Project and Central Valley Project water delivery reductions will cause more than 80,000 lost jobs; and

WHEREAS the income and job losses will adversely impact entire communities and diverse sectors of the economy supported by those jobs and income, including the housing market and commercial business; and

WHEREAS these conditions are causing a loss of livelihood for many thousands of people, an inability to provide for families, and increased harm to the communities that depend on them; and

WHEREAS this loss of income and jobs will increase the number of defaults, foreclosures and bankruptcies, and will cause a loss of businesses and property at a time when Californians are already struggling with a nationwide and worldwide economic downturn; and

WHEREAS the Central Valley town of Mendota, as one example, already reports an unemployment rate of more than 40 percent and lines of a thousand or more for food distribution; and

WHEREAS when jobs, property and businesses are lost, some families will move away from their communities, causing further harm to local economies, lower enrollments in local schools and reduced funding for schools; and

WHEREAS at least 18 local water agencies throughout the state have already implemented mandatory water conservation measures, and 57 agencies have implemented other water conservation programs or restrictions on water deliveries, with many agencies considering additional rationing and water supply reductions in 2009; and

WHEREAS the lack of water has forced local communities to draw water from their emergency water reserves, putting communities at risk of further catastrophe if emergency reserves are depleted or cut off; and

WHEREAS the state recently endured one of its worst wildfire seasons in history and the continuing drought conditions increase the risk of devastating fires and reduced water supplies for fire suppression; and

WHEREAS on February 26, 2009, the United States Department of Agriculture and the United States Department of Interior created a Federal Drought Action Team to assist California to minimize the social, economic, and

environmental impacts of the current drought; and

WHEREAS the circumstances of the severe drought conditions, by reason of their magnitude, are beyond the control of the services, personnel, equipment and facilities of any single county, city and county, or city and require the combined forces of a mutual aid region or regions to combat; and

WHEREAS under the provisions of section 8558(b) of the California Government Code, I find that conditions of extreme peril to the safety of persons and property exist in California caused by the current and continuing severe drought conditions and water delivery restrictions.

NOW, THEREFORE, I, ARNOLD SCHWARZENEGGER, Governor of the State of California, in accordance with the authority vested in me by the California Constitution and the California Emergency Services Act, and in particular California Government Code sections 8625 and 8571, **HEREBY PROCLAIM A STATE OF EMERGENCY** to exist in California.

IT IS HEREBY ORDERED that all agencies of the state government utilize and employ state personnel, equipment and facilities for the performance of any and all activities consistent with the direction of the California Emergency Management Agency (CalEMA) and the State Emergency Plan.

I FURTHER DIRECT THAT:

1. The California Department of Water Resources (DWR) shall, in partnership with other appropriate agencies, launch a statewide water conservation campaign calling for all Californians to immediately decrease their water use.

2. DWR shall implement the relevant mitigation measures identified in the Environmental Water Account Environmental Impact Report, Environmental Impact Statement, Supplement, and Addendums for the water transfers made through the 2009 Drought Water Bank. In addition, the California Air Resources Board shall, in cooperation with DWR and other agencies, expedite permitting and development of mitigation measures related to air quality impacts which may result from groundwater substitution transfers.

3. DWR and the State Water Resources Control Board (SWRCB) shall expedite the processing of water transfers and related efforts by water users and suppliers that cannot participate in the 2009 Drought Water Bank, provided the water users and suppliers can demonstrate that the transfer will not injure other legal users of water or cause unreasonable effects on fish and wildlife.

4. The SWRCB shall expedite the processing and consideration of the request by DWR for approval of the consolidation of the places of use and points of diversion for the State Water Project and federal Central Valley Project to allow flexibility among the projects and to facilitate water transfers and exchanges.

5. DWR shall implement short-term efforts to protect water quality or water supply, such as the installation of temporary barriers in the Delta or temporary water supply connections.

6. The SWRCB shall expedite the processing and consideration of requests by DWR to address water quality standards in the Delta to help preserve cold water pools in upstream reservoirs for salmon preservation and water supply.

7. To the extent allowed by applicable law, state agencies within my administration shall prioritize and streamline permitting and regulatory compliance actions for desalination, water conservation and recycling projects that provide drought relief.

8. The Department of General Services shall, in cooperation with other state agencies, immediately implement a water use reduction plan for all state agencies and facilities. The plan shall include immediate water conservation actions and retrofit programs for state facilities. A moratorium shall be placed on all new landscaping projects at state facilities and on state highways and roads except for those that use water efficient irrigation, drought tolerant plants or non-irrigated erosion control.

9. As a condition to receiving state drought financial assistance or water transfers provided in response to this emergency, urban water suppliers in the state shall be required to implement a water shortage contingency analysis, as required by California Water Code section 10632. DWR shall offer workshops and technical assistance to any agency that has not yet prepared or implemented the water shortage contingency analysis required by California law.

10. DWR shall offer technical assistance to agricultural water suppliers and agricultural water users, including information on managing water supplies to minimize economic impacts, implementing efficient water management practices, and using technology such as the California Irrigation Management Information System (CIMIS) to get the greatest benefit from available water supplies.

11. The Department of Public Health shall evaluate the adequacy of emergency interconnections among the state's public water systems, and provide technical assistance and continued financial assistance from existing resources to improve or add interconnections.

12. DWR shall continue to monitor the state's groundwater conditions, and shall collect groundwater-level data and other relevant information from water agencies, counties, and cities. It is requested that water agencies, counties and cities cooperate with DWR by providing the information needed to comply with this Proclamation.

13. DWR and the Department of Food and Agriculture shall recommend, within 30 days from the date of this Proclamation, measures to reduce the economic impacts of the drought, including but not limited to, water transfers, through-Delta emergency transfers, water conservation measures, efficient irrigation practices, and improvements to CIMIS.

14. The Department of Boating and Waterways shall recommend, within 30 days from the date of this Proclamation, and in cooperation with the Department of Parks and Recreation, measures to reduce the impacts of the drought conditions to water-based recreation, including but not limited to, the relocation or extension of boat ramps and assistance to marina owners.

15. The Labor and Workforce Development Agency shall recommend, within 30 days from the date of this Proclamation, measures to address the impact of the drought conditions on California's labor market, including but not limited to, identifying impacted areas, providing one-stop service, assisting employers and workers facing layoffs, and providing job training and financial assistance.

16. DWR and the Department of Food and Agriculture shall be the lead agencies in working with the Federal Drought Action Team to coordinate federal and state drought response activities.

17. The emergency exemptions in Public Resources Code sections 21080(b)(3), 21080(b)(4) and 21172, and in California Code of Regulations, title 14, section 15269(c), shall apply to all actions or efforts consistent with this Proclamation that are taken to mitigate or respond to this emergency. In addition, Water Code section 13247 is suspended to allow expedited responses to this emergency that are consistent with this Proclamation. The Secretary for the California Environmental Protection Agency and the Secretary for the California Natural Resources Agency shall determine which efforts fall within these exemptions and suspension, ensuring that these exemptions and suspension serve the purposes of this Proclamation while protecting the public and the environment. The Secretaries shall maintain on their web sites a list of the actions taken in reliance on these exemptions and suspension.

18. By March 30, 2009, DWR shall provide me with an updated report on the state's drought conditions and water availability. If the emergency conditions have not been sufficiently mitigated, I will consider issuing additional orders, which may include orders pertaining to the following:

(a) institution of mandatory water rationing and mandatory reductions in water use;

(b) reoperation of major reservoirs in the state to minimize impacts of the drought;

(c) additional regulatory relief or permit streamlining as allowed under the Emergency Services Act; and

(d) other actions necessary to prevent, remedy or mitigate the effects of the extreme drought conditions.

I FURTHER REQUEST THAT:

19. All urban water users immediately increase their water conservation activities in an effort to reduce their individual water use by 20 percent.

20. All agricultural water suppliers and agricultural water users continue to implement, and seek additional opportunities to immediately implement, appropriate efficient water management practices in order to minimize economic impacts to agriculture and make the best use of available water supplies.

21. Federal and local agencies also implement water use reduction plans for facilities within their control, including

immediate water conservation efforts.

I FURTHER DIRECT that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 27th day of February, 2009.

ARNOLD SCHWARZENEGGER
Governor of California

ATTEST:
DEBRA BOWEN
Secretary of State

ATTACHMENT 7 - Acronyms and Initializations

ACOE – Army Corps of Engineers
BTHA - Business, Transportation and Housing Agency
CARB – California Air Resources Board
Cal Boating – Department of Boating and Waterways
Cal EMA – California Emergency Management Agency
Cal Fire – California Department of Forestry and Fire Protection
Cal WARN - California Water/Wastewater Agency Response Network
CDFA – California Department of Food and Agriculture
CDFG – California Department of Fish and Game
CDOC– California Department of Conservation
CDOF – California Department of Finance
CDPH – California Department of Public Health
CDPR - California Department of Pesticide Regulation
CDSP – California Department of State Parks
CEC – California Energy Commission
CHP – California Highway Patrol
CDMH – California Department of Mental Health
CNG – California National Guard
CNRA – California Natural Resources Agency
CRWA - California Rural Water Association
CSLC – California State Lands Commission
CUEA - California Utility Emergency Association
DOJ – Department of Justice
DWR – Department of Water Resources
IRWMs – Integrated Regional Water Management Plans
NOAA – National Oceanic and Atmospheric Administration
RWQCB – Regional Water Quality Control Boards
SWRCB – State Water Resources Control Board
UCCE – University of California Cooperative Extension
USBR – United States Bureau of Reclamation
USDA – United States Department of Agriculture
USEPA- United State Environmental Protection Agency
USFS – United States Forest Service
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey

CALIFORNIA DEPARTMENT OF WATER RESOURCES
1416 Ninth Street, Sacramento, CA 95814

http://www.water.ca.gov/drought/