

DWR Staff Draft Objectives & Related Actions for Water Plan Update 2009

For Discussion at July 9, 2008 Advisory Committee Meeting

July 1, 2008

Developing the Update 2009 Strategic Plan Elements

One of the eight key activities for Water Plan Update 2009 is:

Review and revise as needed the vision, mission, and goals of the Water Plan, and update its initiatives, recommendations, and implementation plan. This includes (a) reporting progress on actions associated with Update 2005's 14 recommendations, (b) addressing "Parking Lot" topics from the Update 2005 Advisory Committee, (c) incorporating issues and initiatives from Steering Committee members, (d) updating the Water Plan stakeholder/customer survey, and (e) including strategic planning for flood management.

At its June 2007 meeting, the Water Plan Advisory Committee (AC) reviewed the strategic plan for Water Plan Update 2005 and offered changes. At its December 2007 meeting, the Advisory Committee discussed a DWR staff draft for some of the Strategic Plan Elements for Update 2009 (December 19, 2007) --- namely, the vision, mission, goals, and guiding principles. Through February 2008, a number of Advisory Committee and State-agency Steering Committee (SC) members submitted comments on the strategic plan elements that are posted on the Water Plan Comments Webpage. DWR used the comments to revise the Strategic Plan Elements, and the Track Change and Clean versions of the July 1, 2008 Strategic Plan Elements will be in the meeting materials for the July 9, 2008 AC meeting.

The draft objectives and related actions presented in this DWR Staff Draft are the next addition to the Update 2009 Strategic Plan Elements, and they will be the focus of the July 9 AC Meeting. At the AC Meeting, we will also begin framing the Update 2009 Recommendations. Taken together, these draft objectives and related actions will provide a framework for making Recommendations in Water Plan Update 2009 (after modifications and additions in response to AC and public comments).

Genesis of this DWR Staff Draft

The draft objectives and related actions presented in this DWR Staff Draft are taken in large part from DWR's Draft Climate Change Adaptation White Paper dated June 30, 2008, as well as from Companion State Plans (some of which are still working drafts).

- Objectives 1 – 9, derived from the Climate Change Adaptation White Paper, were initially developed as adaptation strategies to reduce climate change impacts.
- Objectives 10 – 14, derived from Companion State Plans, were developed to meet various resource management and communication goals.

DWR circulated an earlier draft of this document to SC members and the Work Team Leads, and it used their comments to improve the clarity and content of this July 1, 2008 draft. While incorporating comments, DWR staff tried to maintain the intent, if not the text, of objectives and related actions from Companion State Plans.

The Companion State Plans considered so far in preparing the draft objectives & actions are:

- Draft Climate Change Adaptation White Paper (DWR, June 30, 2008)
- Draft Water-Energy Climate Change Mitigation Strategies (WETCAT, March, 2008)
- Draft FloodSafe Strategic Plan (DWR, May 28, 2008)
- Preliminary Staff Draft Delta Vision Strategic Plan (Delta Vision, June 18, 2008)

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- Water Boards Strategic Plan 2008-2012 (Water Boards, 2008)
- Draft Bay-Delta Strategic Work Plan (Water Boards, June, 2008)
- Water Action Plan (CPUC, November, 2005)
- California Wildlife Action Plan (DFG, 2007)
- California Transportation Plan 2025 (April, 2006) and 2030 (Caltrans, October, 2007)
- Update 2009 Draft Tribal Communication Plan (TCC, June 17, 2008)
- Preparing for California's Next Drought – Changes Since 1987–1992 (DWR, 2000)
- Critical Water Shortage Contingency Plan, Governor's Advisory Drought Panel (2000)
- California Drought, An Update (DWR, April, 2008)

Objectives and Related Actions

Meeting the following objectives, and planning and investing in their related actions, will provide greater system diversity and resilience to future uncertainties and risk, and help California deal with climate conditions and other future uncertainties and risks. These objectives need to be fleshed-out to become SMART objectives as defined for the Water Plan.

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NOTE: The objectives and related actions in this DWR Staff Draft are not prioritized or presented in any particular order --- the numbering is included to facilitate their identification.

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Objective 1 - Fully Implement Integrated Regional Water Management

Integrated Regional Water Management (IRWM) provides a critical framework for actions to address the uncertainties presented by climate change, as well as other risks to California's water future. IRWM is a collaborative process that evaluates water resources management over an entire watershed or region, determines current and future water demands for many diverse uses, and then produces a comprehensive, adaptive plan for sustainable water uses in that region. Moreover, if appropriately developed and implemented, IRWM plans -- in combination with other regional planning efforts for transportation and land use -- can serve as the basis for broader community and regional plans for climate change adaptation beyond water resources.

California lies within multiple climate zones, therefore each region of the state will experience unique impacts from climate change. For some regions, improving watershed health will be an important concern. Other areas will be affected by saltwater intrusion. In particular, regions that depend heavily on water imports from other regions will need vigilant strategies to cope with greater uncertainty in their future supply. Because economic and environmental effects depend on location, adaptation strategies must be regionally suited.

Related Actions:

1. By XXXX, all regions of California must collaboratively develop and begin implementing an effective IRWM plan to provide reliable water supplies, water quality protection, public safety, environmental stewardship, and sustained economic prosperity for a growing population in a changing climate.
2. By 2010, all IRWM plans must include:
 - An assessment of the region's vulnerability to the increased risk and uncertainty associated with climate change and adaptation strategies to accommodate population growth and sustain economic prosperity.
 - An integrated flood management component (see Objective 3)
 - A drought contingency plan that assumes, until more accurate information is available, a 20% increase in the frequency and duration of future dry conditions.
 - Aggressive conservation and efficiency strategies (see Objective 2).
 - An assessment of regional groundwater and surface storage in the context of current and future water supplies and demands for urban and agricultural activities and the environment (see Objective 5).
 - Groundwater management and monitoring plans that protect and restore groundwater quality and eliminate overdraft.
 - Incorporation of wastewater treatment and recycling (see Objective 2)
 - Activities that link water management and land use, including Low Impact Development (LID), to help restore and ensure the sustainability of natural processes in watersheds to increase infiltration, slow runoff, improve water quality, and augment the natural storage of water, and provide other products, goods and services (see Objective 4).
 - An evaluation of the ability of entities within a region to share water supplies and infrastructure during catastrophic events and emergencies, such as droughts, and actions to build regional capacity to respond.
 - A monitoring plan for water use, supply and quality.
3. By XXXX, large water and wastewater utilities should conduct an assessment of their carbon footprint and consider implementation of strategies described in the draft AB 32 Scoping Plan to reduce GHG emissions. In order to take advantage of an existing

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framework and process for calculating their carbon footprint, these utilities should join the California Climate Action Registry.

4. DWR and other State agencies will provide financial incentives, technical assistance and other guidance to support regions in developing and improving their IRWM plans and their component plans. Their assistance will include standards, quantitative tools and other guidance for evaluating GHG emissions and developing adaptive responses to climate change.
5. DWR and other State agencies will focus technical and financial assistance on medium and small water utilities that may lack resources to prepare IRWM plans and to address climate change in their planning processes.

Objective 2 - Aggressively Increase Water Use Efficiency, Recycling and Reuse

The California Constitution explicitly prohibits the waste and unreasonable use of the State's water. Using water efficiently is a foundational action, one that serves to mitigate and adapt to climate change. Additionally, water conservation reduces not only water demand but, in many instances, energy demand as well, which in turn can lead to reductions in GHG emissions, and reduces the need for developing other supply options that may have adverse environmental impacts. Water use efficiency must be a key part of every water agency's water portfolio

Related actions:

1. As directed by Governor Schwarzenegger, DWR in collaboration with the California Energy Commission, the California Public Utilities Commission, the Water Boards, and the California Department of Public Health, will develop and implement strategies to achieve a statewide 20 percent reduction in per capita urban water use by 2020 that will help increase regional water supply self-sufficiency and reduce energy consumption by water systems. These five agencies, in coordination with the rest of the Water-Energy Subgroup of the Governor's Climate Action Team and the California Urban Water Conservation Council, will develop urban water use efficiency recommendations for incorporation into the California Water Plan Update 2009.
 - By 2010, all Urban Water Management Plans must include provisions to implement all economic, feasible, and legal urban best management practices (BMPs) established by the California Urban Water Conservation Council.
 - By XXXX, the California Urban Water Conservation Council should update existing BMPs and consider the development of new BMPs.
 - By XXXX, local and regional water use efficiency programs—residential, commercial, industrial, institutional, and agricultural—should emphasize those measures that reduce both water and energy consumption.
 - Incorporate Housing and Community Development's Green Building proposal for the State Building Code that will become effective on January 1, 2011, which includes a target for reducing indoor residential water use by 20%.
2. All local governments are required by statute to adopt the State Model Water Efficient Landscape Ordinance (MWELo) or equivalent. As the MWELo only addresses new development, local governments must pursue conservation programs to reduce water use on existing landscapes.

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3. Recycled water may represent a relatively energy efficient water management strategy in some regions of the state.
 - o In those regions, water and wastewater agencies should adopt policies by XXXX that promote the use of recycled water for all appropriate, cost-effective uses while protecting public health.
 - o In consultation with the Departments of Public Health and Water Resources, by XXXX the Water Boards will identify opportunities to maximize water recycling through its permitting authority.
4. As part of their IRWM, urban communities should invest in facilities to capture, treat and reuse XXXX acre-feet per year statewide of urban stormwater runoff, such as underground storage beneath parks, small surface basins in drainages, or the creation of catch basins or sumps downhill of development. Depending on the source and application, captured stormwater may be suitable for use without additional treatment, or it may be blended with recycled water to augment local supplies.
5. By XXXX, agricultural water agencies should fully implement Efficient Water Management Practices (EWMP) to reduce water demand, improve the quality of drainage water and return flows, and to report on implementation in their agricultural water management plans.
6. DWR and other State agencies will provide technical assistance and financial incentives to agricultural water agencies and growers to increase the percentage of California agricultural lands that are irrigated with highly efficient irrigation systems and management practices.
7. By XXXX, the Legislature should authorize and fund new incentive-based programs to promote the widespread and mainstream adoption of aggressive water conservation, recycling and reuse by urban and agricultural water systems and their users.
8. The Water Boards and the CPUC will exercise their authority to require water conservation measures in permitting and other proceedings. Additional State Legislation may be needed to further ensure attainment of these conservation efforts. Prior to any new measures, State government will evaluate the impacts on housing costs, including affordability to low and moderate income families and workers.

Objective 3 - Promote and Practice Integrated Flood Management

Integrated flood management is an approach to deal with flood risk that recognizes the:

- *interconnection of flood management actions within broader water resources management and land use planning*
- *value of coordinating across geographic and agency boundaries*
- *need to evaluate opportunities and potential impacts from a system perspective*
- *opportunity for multiple uses of floodplains*
- *importance of environmental stewardship and sustainability*

Many Californians already face an unacceptable risk of flooding. Catastrophic flooding within the Central Valley could mirror or exceed the economic, social and environmental damages caused by Hurricane Katrina in 2005. Over a half million people live behind levees in California now, with populations continuing to grow. Climate change may worsen the state's flood risk by producing higher peak flows and a shift toward more intense winter precipitation. Further, State government liability in the aftermath of the Paterno decision worsens the financial

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consequences of flooding. Flood systems throughout the state must be modified and, in some cases, enlarged, to accommodate the higher variability of flood flow magnitude and frequency, and managed to both protect public safety, stabilize the economy, and sustain ecosystems.

System re-operation is an important element of integrating California's water and flood management systems. Current water resources infrastructure is already strained to meet existing, competing objectives for water supply, flood management, environmental protection, water quality, hydropower and recreation. In a changing climate, the conflicts between competing interests will be even greater as supplies become less reliable. As prediction of climate change impacts will never be perfect, flexibility must be a fundamental tactic, especially with respect to water system operations. The improved performance of existing water infrastructure cannot be achieved by any single agency, and will require the explicit cooperation of many. Successful system re-operation will require that the benefits of such actions are evident to federal and local partners. System-wide operational coordination and cooperation must be streamlined in advance, and in order, to respond to hydrologic surprises that may very likely be delivered by climate change. Otherwise, jurisdictional positions and even operation processes will become insurmountable impediments to effective adaptation.

Related Actions:

1. By XXXX, State government will establish a System Re-operation Task Force comprised of state personnel, federal agency representatives, and appropriate stakeholders that will:
 - Quantify the potential costs and benefits and impacts of system re-operation for water supply reliability, flood management, hydropower, water quality, cold water management for fisheries, and other ecosystem needs.
 - Update operational guidelines (rule curves) for Central Valley resources.
 - Evaluate the need to amend flow objectives.
 - Continue studying forecast-based objectives.
 - Include watershed level analyses that detail localized costs and benefits.
 - Identify key institutional obstacles, including water rights, that limit system re-operation benefits.
 - Communicate demonstration project results to encourage broader participation in system re-operation analyses.
 - Identify dam safety issues.
2. To facilitate real-time operations, State, federal, and local agencies should collaboratively establish a statewide water system operations center. The center would serve as a clearinghouse for operational information of major systems throughout California, simulate system-wide capabilities under different scenarios, support seasonal, operational decision-making (including water transfers, groundwater recharge, and floodplain management), and assist communications during emergencies.
3. Flood management systems must better utilize natural floodplain processes on which they are founded. Integrating flood management with watershed management on open space, agricultural lands, wildlife areas, and other low density lands will attenuate flood peaks, reduce the mobilization of excessive sediments, temporarily store and recharge floodwaters, and reduce the loading of sediment entering downstream reservoirs and other flood management structures.
4. Provide 200-year (or greater) level of flood protection to all urban areas in the Sacramento - San Joaquin Valley by December 31, 2025.

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5. Provide 200-year (or greater) level of flood protection for all urbanizing areas in the Sacramento - San Joaquin Valley by December 31, 2025.
6. Restore flood protection to [TBD] people and [TBD] acres of agricultural land in rural areas in the Sacramento - San Joaquin Valley by December 31, 2025.
7. Improve ecosystem processes on [TBD] acres of floodplain by December 31, 2018.
8. Establish an interagency mitigation banking program by January 1, 2013 that provides lasting environmental benefits.
9. Design and implement a computer-assisted decision support system based on advanced forecasts for flood management reservoirs in Sacramento - San Joaquin Valley by December 31, 2014.
10. Develop a comprehensive Central Valley Flood Protection Plan (as described in SB5) with extensive stakeholder input by January 1, 2012. DWR will develop a multi-objective *Central Valley Flood Protection Plan* that includes actions to improve integrated flood management and account for the expected impacts of climate change. The plan will have strategies for greater flood protection and environmental resilience, including:
 - o Emergency preparedness, response, and recovery actions
 - o Expansion of the flood bypass system to reduce pressure on critical urban levees and provide for habitat and agricultural land preservation
 - o Structural and non-structural improvements needed in the flood protection system to provide at least 200-year level flood protection for urban areas
 - o Increased use of set-back levees to provide greater public safety, floodplain storage, habitat opportunities and system flexibility
 - o Evaluation of dam modifications to pass potentially larger probable maximum floods.
 - o Flood insurance requirements to address residual risk
 - o Integrate flood management with all aspects of water resources management and environmental stewardship
11. DWR will enhance statewide flood management planning by:
 - o Supporting regional flood management planning as part of Integrated Regional Water Management Program grant-making and technical assistance.
 - o Including flood management as a central part of the California Water Plan Update 2009 process
12. Identify opportunities and needs to improve integrated flood management statewide and develop a financing strategy by January 1, 2012.
13. Delineate expected floodplains for 100 and 200-year flood flows for all urban communities in the Sacramento - San Joaquin Valley by December 31, 2012.
14. Achieve 90% annual pass rate for urban levees in the Central Valley when inspected according to Federal and State levee standards (e.g., maintenance, encroachment, etc.) by 2025.
15. Develop and implement financial assistance program by July 31, 2009 that enables disadvantaged communities to adequately represent their interests in FloodSAFE workshops and decision making forum, and compete for funding opportunities.
16. By XXXX, all [certain size, certain vulnerability] communities should develop, adopt and practice formal flood emergency preparedness, response, and recover plans; including completion of a Delta Emergency Operations Plan by December 31, 2009.

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17. By XXXX, local governments and land use agencies should implement land use policies that decrease flood risk, including:
 - Updating their General Plans to address increased flood risks posed by climate change. Until more refined projections are developed, DWR recommends a 20% higher peak flow reference for planning purposes.
 - Locating new development outside of undeveloped floodplains unless the floodplain has a sustainable, 200-year level of flood protection.
 - Utilizing low-impact development techniques that store, infiltrate, and evaporate runoff.
 - Including flood-resistant design requirements in local building codes.

Objective 4 – Promote and Practice Ecosystem Stewardship and Sustainability

Reliable water supplies and resilient flood protection require ecosystem stewardship and sustainability to be a primary goal and foundational action for water resources management. Building adaptive capacity and system sustainability requires water and flood management projects to incorporate restoration and maintenance of biological diversity and natural ecosystem processes. Water supply and flood management systems are significantly more sustainable and economical when they preserve, enhance and restore ecosystem functions. Planning and designing for ecosystem functions will help maintain resilient systems that can recover from severe natural disruptions and, in fact, allow quicker recovery with lower economic costs. Moreover, by reducing existing, non-climate stressors on the environment, ecosystems will have more capacity to adapt to new stressors and uncertainties brought by climate change.

Adaptive Capacity is the ability of systems, organizations, and individuals to 1) adjust to actual or potential adverse changes and events, 2) take advantage of existing and emerging opportunities that support essential functions or relationships, and/or 3) cope with adverse consequences, mitigate damages, and recover from system failures. It is an indicator of how well a system could or would adjust and/or recover to external changes or large perturbations (eg: severe floods or droughts).

Resilience: Improve capacity of resource/natural system to return to prior conditions after disturbance.

Related Actions:

1. By XXXX, water management systems should protect and re-establish XXXX acres of contiguous habitat and XXXX miles of migration/movement corridors for plant and animal species related to rivers and riparian or wetland ecosystems. IRWM plans should incorporate corridor connectivity and restoration of native aquatic and terrestrial habitats to support increased biodiversity and resilience for adapting to a changing climate. (See Objectives 1 and 3)
2. By XXXX, flood management systems should seek to re-establish XXXX miles of natural hydrologic connectivity between rivers and their historic floodplain. Establishing XXXX miles of setback levees and XXXX acres of bypasses will help retain and slowly release flood water, facilitate groundwater recharge, provide seasonal aquatic and wetland habitat, support riparian forests, and create shaded riverine and terrestrial habitats. This provides adaptation to increased flood levels, resiliency of flood and water supply systems to significant disturbance and drought adaptability. (See Objectives 1, 3, and 5).

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3. By XXXX, State government should evaluate and implement opportunities to return native anadromous fish to upper watersheds where they have been extirpated. The focus should be on populations that would benefit from expanded cold water habitats and should be used as a factor in reservoir systems re-operations. (See Objectives 1 and 3)
4. By XXXX, State government should identify lands at the boundaries of the San Francisco Bay and Sacramento-San Joaquin Delta that will provide the habitat range for tidal wetlands to adapt to and shift with sea level rise. Such lands can help maintain estuarine ecosystem functions and create natural land features that act as storm buffers, protecting people and property from flood damages related to sea level rise and storm surges. (See Objectives 1, 3, and 8)
5. By XXXX, State government should expand Delta island sediment accretion by XXXX feet (i.e. accumulation of land surface through new sediment deposition) to create equilibrium between land and estuary elevations along Delta fringes and islands. Sediment-soil accretion is a cost-effective, natural process that can help sustain the Delta ecosystem and protect Delta communities from inundation, and sequester carbon. (Supports Objectives 1, 3, and 8)
6. By XXXX, flood management systems should expand corridors of native riparian floodplain forests by XXXX acres and seasonal wetlands by XXXX acres, by increasing the flood capacity of river corridors through levee setbacks and reconstruction, and creating additional flood bypasses. Carbon sequestration within large, vegetated floodplain corridors will also assist State government meet GHG emissions reductions mandated by AB 32. (See Objective 3).
7. By XXXX, IRWM plans should include actions to protect, enhance, and restore XXXX acres of upper watershed forests and meadow systems that act as natural water and snow storage. This measure not only improves water supply reliability and protects water quality, but also safeguards significant high elevation habitats and migratory corridors. (See Objectives 1, 3, and 5)

Objective 5 - Improve and Expand Conjunctive Management of Surface and Groundwater Storage

Additional water storage can provide flexibility for better flood management, water quality, operational improvements and system reliability in response to daily and seasonal variations and uncertainties in water supply and use. California has historically depended upon its aquifers during droughts. However, groundwater resources will not be immune to climate change, and as droughts may be exacerbated by climate change, more efficient groundwater basin management will be necessary to avoid additional overdraft, and to take advantage of opportunities to store water underground and eliminate existing overdraft. Better management of surface storage reservoirs can provide benefits in a changing climate by capturing higher peak flows, providing cold water releases for fish, repulsing seawater intrusion to protect drinking water quality, and offsetting the loss of snowpack storage by facilitating increased storage of water above and below the ground.

Related actions:

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1. By XXXX, DWR will complete surface storage feasibility studies for the Sites Reservoir project and Los Vaqueros Reservoir expansion project and incorporate climate change considerations in these studies. DWR will also assist the U.S. Bureau of Reclamation in its investigations of the Shasta Dam enlargement project and Temperance Flat Reservoir project, and to local agencies to assess regional storage needs.
2. By XXXX, all local water and land use agencies or their regional partnerships should develop and begin implementing AB 3030 Groundwater Management Plans as a fundamental component of IRWM plans to:
 - o effectively use aquifers as water banks
 - o protect and improve water quality
 - o prevent seawater intrusion of coastal aquifers caused by sea level rise
 - o monitor groundwater withdrawals and water levels
 - o avert otherwise inevitable conflicts in water supply
 - o eliminate overdraft and provide for sustainable groundwater use
3. By XXXX, local land use agencies should adopt ordinances that protect the natural functioning of groundwater recharge areas.
4. By XXXX, State and local governments must increase funding incentives by \$XXXX to protect groundwater basins.
5. If and when needed, the State Water Resources Control Board can adjudicate groundwater to limit extractions that threaten water quality pursuant to the Water Code. Additional legislation, similar to that in other Western states, may be needed to comprehensively protect California's valuable groundwater resource.

Objective 6 - Improve and Expand Monitoring, Data Management and Analysis

California needs better data and analytical tools to produce useful and more integrated information on water quality, environmental objectives, economic and equity issues, surface water and groundwater interaction, and flood protection. The Statewide Water Analysis Network (SWAN) is preparing both a short-term and long-term plan to improve and peer-review data and analytical tools. SWAN's plan will also include the development of presentation and decision-support tools to make complex technical information more accessible to decision-makers and resource managers.

For example, the uncertainty that remains in the rate and magnitude of long-term climate change must be reduced. Improved data collection and a robust monitoring network will help identify trends, provide for better real-time system management, and evaluate and, if necessary, correct mitigation and adaptation strategies.

Determining the impacts of climate change on the varying regions of the state requires that data about the environment be collected and analyzed in a consistent and comprehensive way. Analysis of past records, current conditions, and trends can help provide a forecast for weather, climate, supply, and flooding variables. However, sensors that measure this information are inadequate, both off-shore and over land. Investment is needed in measurement networks, data analysis and archiving, and operational forecast tools. Additionally, funding must be sustained in these areas to preserve the continuous records that are vital to understanding the impacts of climate change.

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(NOTE: the Statewide Water Analysis Network (SWAN) will expand this objective and related actions beyond climate change.)

Related Actions:

1. For data to be useful in climate monitoring and climate change detection there must be better and more consistent monitoring of critical variables such as temperature, evapotranspiration, wind, and snow level. By XXXX, XXXX additional monitoring stations are needed at high elevations to observe and track changes occurring in the rain/snow transition zone, which is critical for projecting future water supply. Standards and repositories for these data are also needed to facilitate quality control, archiving, and user access.
2. Beyond climate, by XXXX there is a strong need to expand the monitoring network by XX percent of water flow, water quality and environmental conditions of rivers, natural landscapes, and groundwater basins. By XXXX, State agencies will collect and analyze instream flow data from XXXX additional streams.
3. By XXXX, State agencies will develop and publish standards and protocols for existing stations, to facilitate quality control, archiving, and user access.
4. Similarly, by XXXX an additional XXXX atmospheric monitoring stations are needed to improve observations of atmospheric conditions to help define underlying atmospheric processes that lead to California's seasonal and geographic distribution of precipitation. Climate modelers can then project future rain and snow patterns at the regional scale.
5. By 2009, DWR, the Water Boards, DPH, and the California Bay-Delta Authority will complete a feasibility study for a water use measurement database and reporting system. Information on water use is currently limited and often unreliable. Accurate measurement of water use can facilitate better water planning and management.
6. From XXXX to XXXX, DWR will participate with the National Oceanic and Atmospheric Association (NOAA) and Scripps Institute of Oceanography in implementing the Hydrometeorological TestBed program which enhances off-shore and land measurements of weather variables.
7. From XXXX to XXXX, DWR will participate in a pilot project to test the H2O 2.0 Initiative -- Adaptive Management for Water Storage and Flood Control Program. This program, proposed by Lieutenant Governor Garamendi, would establish a network of monitoring stations, use satellite imagery, and generate real-time data to inform water resource and flood management decisions.
8. In 2008, DWR completed the Integrated Water Resources Information System (IWRIS) as a working prototype of the Water Planning Information Exchange (Water PIE). IWRIS facilitates sharing data and networking existing databases and Web sites, among State, federal, regional, and local agencies and governments and citizen monitoring efforts. This information exchange system will improve analytical capabilities and develop timely surveys of statewide land use, water use, and estimates of future implementation of resource management strategies. By XXXX, DWR will expand the number of IWRIS partners (information providers) by XXXX and its users by XXXX.

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Objective 7 - Plan for and Adapt to Sea Level Rise

Of the many impacts of climate change, sea level rise presents the most challenging problem for which to plan because of the great uncertainty around ice sheet dynamics, as well as the potentially large impacts. Sea level rise also depends on local and regional factors such as land movement and atmospheric conditions. Much of the Sacramento-San Joaquin Delta, the hub of California's state and federal water projects, consists of islands that are below sea level and protected by levees. Rising sea levels will increase pressure on fragile levees and will pose a significant threat to water quality. Local and regional investments in water and flood management infrastructure, as well as wetland and aquatic restoration projects, are also vulnerable to rising seas.

Related Actions:

1. By XXXX, State government will establish an interim range of sea level rise estimates for short-term planning purposes for local, regional, and statewide projects and activities.
2. By XXXX, DWR, in coordination with other state agencies, will convene and support a scientific panel of the National Research Council (NRC) to provide expert guidance regarding official long-range sea level rise estimates and their application to specific California planning issues. These estimates should be revisited and revised regularly to reflect updated scientific data.
3. Based upon guidance from the NRC, DWR in collaboration with other State agencies, will develop long-range sea level rise scenarios and response strategies to be included in the California Water Plan Update 2013.

Objective 8 - Identify and Fund Focused Research on Climate Change and New Water Technology

Developing more focused research can help narrow the range of uncertainty in climate changes, with a concentration on the vulnerability of water and other natural resources. This research will assist in planning for new projects, management activities, and policies. State government will work with California research and academic institutions, like the California Academy of Science, California Council on Science and Technology, the University of California, and other universities and colleges, to identify and prioritize applied research projects leading to the commercialization of new water technologies and better scientific understanding of California's water-related systems.

Related Actions:

1. In association with research institutions such as the Regional Integrated Science and Assessment centers, Lawrence Livermore and Berkeley National Laboratories, and the University of California, by XXXX State agencies will identify focused research needs to provide guidance on activities to reduce California's vulnerability to climate change.
2. Since some uncertainty will always exist, the state's water supply and flood management agencies need to perform sensitivity analyses on their preliminary planning studies, and risk-based analyses for more advanced planning studies. As noted above, until better

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information becomes available, local agencies should anticipate 20% higher flood peaks and 20% more frequent and drier droughts.

3. State government will sponsor science-based, watershed adaptation research pilot projects to address water management and ecosystem needs. Funding for pilot projects should only be granted in those regions that have adopted and recognized IRWM plans and have broad stakeholder support.
4. As part of the on-going California Water Plan Update process, every five years DWR will provide estimates of changes to sea level, droughts and flooding that can be expected over the following 25 years.
5. State government will work with California research and academic institutions to identify, prioritize, and begin funding applied research projects by XXXX as part of a broad and diverse scientific agenda to fill gaps in knowledge about California's water resources.
6. State government will invest \$XXXX per year in pilot projects to help local agencies and governments and regional partnerships implement promising water technologies more cost effectively with knowledge and experience specific to each region.
7. The Energy Commission through its PIER Program will invest \$XXXX per year to conduct research and demonstration projects that explore ways to reduce the energy intensity of the water use cycle and to better manage the energy demand of the water system.

Objective 9 - Provide Sustainable Funding for Statewide and Integrated Regional Water and Flood Management

Adaptive responses to climate change will not come without a cost. Climate change magnifies the problems that exist with a water infrastructure that is already aging. While recent bond measures have provided a down payment for improving California's water and flood systems, climate change presents an ongoing risk that requires a long-term commitment of funding that is properly matched to anticipated expenditures, beneficiaries, and responsible parties.

State government needs to lead an effort to identify and prioritize funding strategies to finance regional and statewide water planning, programs, and infrastructure. State government needs to clearly articulate when, and for what actions, to use public investments from State and federal sources. California's water finance plan must also recognize the critical role of local public and private funding based on the principle of beneficiary pays and the need for user fees.

Related Actions:

1. By XXXX, the State Legislature should conduct a formal assessment of state and local financing mechanisms to provide a continuous, stable source of revenue to sustain the programs described in Water Plan Update 2009. Activities in need of certainty and continuity in funding include regional water planning and management, updating county and city general plans to address climate change impacts and adaptation, inspection and maintenance of flood management facilities, observational networks, and water-related climate change adaptation research.
2. By 2009, the Delta Vision Blue Ribbon Task Force will recommend strategic financing strategies and revenue generation methods in its Delta Vision Strategic Plan (see Objective 11).

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Objective 10 – Reduce the Energy Intensity of Water and Wastewater Management Systems

In June 2008, the Air Resources Board released the draft AB 32 Scoping Plan which includes six measures for reducing the energy intensity of water uses and water and wastewater management systems. These six measures are presented below as related actions. Three of the measures, water use efficiency, water recycling, and urban water reuse, are also covered in Objectives 1 and 2. These actions may also have the co-benefit of improving water quality and water supply reliability.

While water generates approximately one-third of the state's electricity, water use also requires significant amounts of energy. Approximately one-fifth of the electricity and a third of the non-power plant, natural gas consumed in the state are associated with water use. According to the California Energy Commission, end use of water is the most energy intensive portion of the water use cycle in California. In addition to the many efficiency efforts throughout the state, the Department of Water Resources is implementing a directive from the Governor to develop a plan to reduce per capita water use by 20 percent by 2020. Measures to increase water use efficiency and re-use will reduce electricity demand from the Water sector, reducing greenhouse gas emissions.

Related Actions:

1. Water use efficiency reduces not only water demand but, in many instances, reduces energy demand as well, which in turn can lead to reductions in GHG emissions. (see Objective 2 for related actions).
2. Recycled water may represent a relatively energy efficient water management strategy in some regions of the state (this action also appears in Objective 2).
 - In those regions, water agencies should adopt policies by XXXX that promote the use of recycled water for all appropriate, cost-effective uses while protecting public health.
 - In consultation with the Departments of Public Health and Water Resources, by XXXX the Water Boards will identify opportunities to maximize water recycling through its permitting authority
 - By XXXX, wastewater treatment plants should develop water recycling plans.
3. Local agencies and governments should implement cost effective, energy efficiency measures in water system infrastructure projects.
 - By XXXX, large water and wastewater utilities should conduct an assessment of their carbon footprint and consider implementation of strategies described in the draft AB 32 Scoping Plan to reduce GHG emissions. To take advantage of an existing framework and process for calculating their carbon footprint, these utilities should join the California Climate Action Registry.
 - By XXXX, the Water-Energy Subgroup of the Governor's Climate Action Team (WETCAT) will conduct a study to assess a reasonable energy reduction target for water and wastewater systems. Reduction in electricity consumption would in turn reduce the GHG emission associated with this amount of electricity generation.
 - By XXXX, the California Energy Commission, in collaboration with the WETCAT, will develop tools and protocols to evaluate, measure, and verify the energy impacts of water system and end use conservation and efficiency activities/programs.

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4. As part of their IRWM plans, urban communities should invest in facilities to capture, treat and reuse XXXX acre-feet per year statewide of urban stormwater runoff, such as underground storage beneath parks, small surface basins in drainages, or the creation of catch basins or sumps downhill of development. Depending on the source and application, captured stormwater may be suitable for use without additional treatment, or it may be blended with recycled water to augment local supplies (action also appears in Objective 2).
5. By XXXX, water and wastewater utilities should identify renewable generation projects that can be co-located with existing water system infrastructure, and where feasible begin their implementation. Examples of energy existing within water systems (water and wastewater projects) include water moving through conduits, sunlight, wind, and gases emitted from decomposing organic wastes. Producing energy from these resources at water and wastewater facilities will reduce greenhouse gas (GHG) emissions by offsetting the need for the facilities to consume electricity derived from natural gas and coal.
6. By XXXX, State government will establish a public goods charge for funding investments in water efficiency [and potentially other IRWM management strategies] that will lead to reductions in greenhouse gases. As noted by the Economic and Technology Advancement Advisory Committee, a public goods charge on water can be collected on water bills and then used to fund end-use water efficiency improvements, system-wide efficiency projects and water recycling. Depending on how the fee schedule is developed, a public goods charge could generate \$100 million to \$500 million annually to invest in further efficiency improvements.

Objective 11 – Practice Sustainable Management of the California Delta Ecosystem and Water Resources and Recognize the Delta as a Unique and Valued Area

***NOTE: At the time this draft Update 2009 objectives/actions document was prepared; the DV Task Force had not approved the content of the preliminary staff draft DV Strategic Plan. The 12 draft strategies from the staff draft are presented below for discussion purposes only by members of the Water Plan Steering Committee and Advisory Committee at the July 9, 2008 Advisory Committee meeting.**

The California Delta is the heart of our state, at once a water supply, an ecosystem, and a place that is indispensable to modern California. The Delta Vision Task Force published its vision for the future of this crucial and gravely threatened resource in December 2007. In that vision, the DV Task Force described a future in which the California Delta will continue to thrive over the coming generations, despite the major challenges – ranging from climate change to subsidence to population growth – that it will face. At the core of the Delta Vision is a set of 12 integrated and linked recommendations. Of these 12 recommendations, the first two are especially central:

- *The Delta ecosystem and a reliable water supply for California are the primary, coequal goals for sustainable management of the Delta.*
- *The California Delta is a unique and valued area, warranting recognition and special legal status from the State of California.*

The DV Task Force is currently working on the DV Strategic Plan to outline the broad strategic directions that state and federal government, local government, and the people of California should pursue to realize their vision. A preliminary staff draft strategic plan was posted for public review on June 18, 2008, and will be discussed at the DV Task Force meeting on June 26 and 27, 2008. The staff draft includes 12 strategies and numerous actions (not shown here)

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for implementing the 12 Delta Vision recommendations which form the basis for the staff draft DV Strategic Plan. The strategies are organized in four categories: Governance and Finance, Ecosystem, Water Supply Reliability, and the Delta as a Place and are presented below as related actions for the Update 2009 draft objectives. The Water Plan process will work closely with the Delta Vision initiative to obtain the work from the most current draft of the Delta Vision Strategic Plan and to provide feedback to Delta Vision from Water Plan participants.

The DV Strategic Plan will include performance indicators and time-based targets --- completion dates and targets will be added as they become available in the DV Task Force Strategic Plan.

Related Actions:

Governance & Finance

1. Create a multi-part governance structure, with a California Delta Ecosystem and Water Council, a strengthened Delta Protection Commission, a California Water Utility [includes the State Water Project], a Delta Conservancy, and a Delta Science and Engineering Board. The Council develops and adopts the California Delta Ecosystem and Water Plan (CDEW Plan) and has ongoing responsibility for its implementation. The CDEW Plan incorporates all plans developed under species protection laws.
2. Ensure consistency of action among existing state, federal and local entities by creating the CDEW Plan, clarifying the roles of existing agencies in the Delta, and making full use of existing laws and constitutional principles governing water.
3. Finance the activities called for in the CDEW Plan by creating effective and transparent revenue-generation mechanisms that reflect the true value of resources, and are linked to value-creation for beneficiaries and future generations of Californians.

Ecosystem

4. Restore physical habitats in multiple large, connected complexes of tidal marshes, floodplains, shallow open water, seasonal wetlands, grasslands and riparian edges that support native and desirable non-native species, and that increase the land-water interfaces characteristic of the historic Delta and other effective estuaries.
5. Restore appropriate water flows and other ecosystem processes throughout all Delta habitat types.
6. Reduce or remove stressors to the Delta ecosystem, including invasive species, contaminants, and entrainment.

Water Supply Reliability

7. Maximize regional water self-sufficiency throughout California by a wide range of supply augmentation and demand management techniques.
8. Integrate and strengthen management of all aspects of the water cycle, including surface flows, groundwater, flood management, infiltration, and water quality.
9. Create a wet-period diversion, conveyance and storage system to the greatest feasible extent to minimize ecosystem stress and prepare for climate change.

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Delta as Place

10. Increase recognition of the Delta as a place, and enhance tourism and recreation, by creating a National Heritage Area and a multi-unit State Recreation Area, and by facilitating new investments in “gateway” locations near major cities and highways.
11. Enhance the Delta as a place by creating multi-purpose river corridors on each major river system entering the Delta, and by creating Special Area Management Plans for selected areas.
12. Improve the Delta’s flood protection and levee system by improving upstream flood management, designing and financing levee types to protect specific land uses and services, and conducting comprehensive emergency management planning and preparation.

Objective 12 – Protect and Restore Surface Water and Groundwater Quality

The Water Boards released their draft Strategic Plan 2008-2012 on May 30, 2008 which includes environmental, planning and organizational priorities. The environmental and planning priority objectives and actions from the Water Boards’ Strategic Plan are presented below as related actions 1, 2 & 3. Related actions 4 & 5 are from Water Plan Update 2005. The objectives from the Water Boards’ Strategic Plan for promoting sustainable water supplies are covered in Objective 2 – Aggressively Increase Water Use Efficiency.

The Water Boards’ Strategic Plan considers climate change and other future drivers for trends. It also notes that most of the actions in their strategic plan will be implemented in a watershed framework because healthy watersheds, or drainage basins, that provide clean and adequate surface water and groundwater, and support healthy riparian and wetland habitat, are essential to support the State’s resources and economic future. A watershed approach is hydrologically focused, recognizes the degree to which groundwater and surface water bodies are connected physically, recognizes the linkages between water quantity and water quality, and requires a comprehensive, long-term approach to water resources management that takes system interactions into account. State efforts alone cannot support a comprehensive watershed protection approach. Success depends on the integration of State, federal, and local programs, most importantly local land use decisions made by local officials, stakeholder involvement, and the actions of millions of individuals, which, when taken together, can make enormous impacts.

Related Actions:

1. Develop and begin implementation of innovative strategies by 2010 to have all 2006-listed water bodies on track to fully support beneficial uses by 2030 to protect and restore surface water quality.
 - Implement a statewide strategy to efficiently prepare, adopt, and implement TMDLs, which result in water bodies meeting water quality standards, to adopt and begin implementation of TMDLs for all 2006-listed water bodies by 2019.
 - Manage urban and agricultural runoff to reduce pollutant loadings, reduce wet weather beach postings by 75 percent by 2020, and, where applicable, explore opportunities for using management techniques to promote sustainable water supplies.

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- Maximize the efficient use of Water Board and other agency staff to initiate actions to ensure that adequate stream flows are available for the protection of fish and wildlife habitat while meeting the need for diversions of water for other uses. The Department of Fish and Game will provide recommendations on fish and wildlife needs.
 - Take appropriate enforcement actions and innovative approaches as needed to protect and restore all surface waters.
2. Develop and begin implementation of innovative strategies by 2012 to improve and protect groundwater quality in high use basins by 2030 to protect and restore groundwater quality.
- Implement an integrated groundwater protection approach by 2012 to improve and protect groundwater in high-use basins that (a) evaluates and regulates activities that impact or have the potential to impact beneficial uses; (b) recognizes the effects of groundwater and surface water interactions on groundwater quality and quantity; and (c) encourages and facilitates local management of groundwater resources.
 - Identify strategies to ensure that communities that rely on groundwater contaminated by anthropogenic sources will have a reliable drinking water supply, which may include surface water replacement, in the future.
 - Ensure the viability of groundwater basins as high quality drinking water supplies, where appropriate, through waste discharge requirements (WDRs) and the clean-up of contamination.
3. California water planning comprehensively addresses water quality protection and restoration, the relationship between water supply and water quality and describes the connections between water quality, water quantity, and climate change.
- Prepare, as a part of the California Water Plan, a comprehensive Water Quality Plan to guide the State's water management activities, including protection and restoration of water quality through the integration of statewide policies and plans, regional water quality control plans (Basin Plans), and the potential effects of climate change on water quality and supply.
 - Basin Plans are consistently organized by 2012, and updated by 2015, to provide a clear structure that readily conveys the beneficial uses, potential impacts of climate change, water quality objectives, goals for watersheds, plans for achieving those goals, and monitoring to inform and adjust the plans and that fully integrates other statewide plans and policies such as the California Ocean Plan.
 - Achieve near-term priority Basin Plan amendment needs by collaborating in third-party initiated processes that incorporate Water Board requirements and stakeholder interests. An example is the Santa Ana Regional Water Board's Basin Plan amendment process initiated with funding assistance from stakeholders.
4. State government must lead an effort with local agencies and governments to remediate the causes and effects of contaminants on surface water and groundwater quality. The evaluation should be completed by XXXX to inventory, evaluate, and examine the effect of contaminants on public health, long-term sustainability of water resources and treatment costs, and should identify cost-effective ways and propose management strategies to improve water quality.
5. To safeguard water quality for all beneficial uses, State government will adopt preventive programs that integrate source water protection, pollution prevention, matching water quality to use, salt management, and water treatment and distribution.

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Objective 13 – Increase Tribal Participation and Access to Funding

Water Plan Update 2005 recommended that DWR and other State agencies must invite, encourage, and assist tribal government representatives to participate in statewide, regional, and local water planning processes and to access State funding for water projects. As part of Update 2009, a Tribal Communication Committee (TCC) has prepared a comprehensive Tribal Communication Plan for the California Water Plan. The Tribal Communication Plan includes definitions, goals, objectives, guiding principles, audience and venues, and a detailed implementation plan. One of the 12 objectives calls for convening a Tribal Water Summit during Update 2009 and publishing the summit proceedings in the final Water Plan Update 2009. The 10 plan objectives are listed below.

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. Additionally, because some water bodies and Tribal boundaries cross State borders, the Tribal Communication Plan includes Indigenous Communities in Oregon, Nevada, and Arizona that are impacted by water in California.

Related Actions:

1. Everyone involved in the California Water Plan (CWP) shares information with California Native American Tribes about how Tribal water issues intersect with water law, planning and management in California. Intersections include, among other things, water rights, human life and health, fisheries management, water diversions, water storage and conveyance, flood management, water use efficiency, desalination, and climate change.
2. Everyone involved in the CWP shares information with California Native American Tribes about how the water planning, management, and projects of State, Local and Federal Governments, as well as water purveyors, impact and affect California Native American Tribes.
3. Everyone involved in the CWP shares information with California Native American Tribes about State funding that is available for water projects, how California Native American Tribes can apply for this, what obstacles they may face in accessing these funds, and how they can influence future funding programs.
4. California Native American Tribes use the CWP as a stepping stone to ensure their representation and genuine participation in water planning processes throughout California, including those linking water to public health, housing, economic development, and environmental justice.
5. California Native American Tribes build a foundation of knowledge and relationships for developing their own long-term water management plans, as well as participating genuinely in regional and local water planning, including Integrated Regional Water Management Plans.
6. California Native American Tribes shape the content of the CWP through a variety of mechanisms, particularly the review of Regional Reports, Resource Management Strategies, and other materials, and Tribal and public meetings.
7. California Native American Tribes build working relationships and partnerships with relevant State, Local and Federal Governments, and water purveyors that are based on mutual respect, fairness, honesty, responsibility, and mutual trust.

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8. California Native American Tribes educate State, Local and Federal Government, and water purveyor executives and planners about the historical and ongoing relationships between California Native American Tribes and water, especially cultural and religious practices.
9. California Native American Tribes propose and clarify how DWR works with California Native American Tribes in State water planning efforts.
10. California Native American Tribes build a foundation of knowledge and relationships for hosting a Tribal Water Summit in 2009 that includes the highest level of decision-makers from State, Local and Federal Governments, and water purveyors.

Objective 14 – Prepare Response Plans for Floods, Droughts, and Other Catastrophic Events

This objective and its related actions are not as far along as the others. For this draft, DWR staff used objectives and recommendations from the draft FloodSafe Strategic Plan for flood preparedness, and DWR drought reports. More information is needed for other catastrophic events.

Related Actions:

1. By XXXX, all [certain size, certain vulnerability] communities should have formal flood emergency preparedness, response, and recover plans, including completion of a Delta Emergency Operations Plan by December 31, 2009. (this action also appears in Objective 3)
2. By XXXX, IRWM Plans and Urban Water Management Plans should include a drought contingency plan that assumes, until more accurate information is available, a 20% increase in the frequency and duration of future dry conditions. (this action appears in Objective 1)
3. By XXXX, DWR will develop a long-term drought preparedness plan, and updated it as needed, that includes:
 - o A multi-year, joint operations strategies for the State Water Project and Central Valley Project.
 - o An assessment of local drought contingency planning and preparedness to identify coverage, comprehensiveness, limitations, and gaps.
 - o Plan and sequence of actions and local assistance for dry conditions covering early and later drought stages.
 - o Plan for a Critical Water Shortage Reduction Marketing Program (drought bank).
 - o Plan for assisting small water systems owners and homeowners in rural counties.
 - o Identify needed improvements to real-time surface and groundwater monitoring programs.
 - o Identify needed research in long-range weather forecasting.
4. PLACEHOLDER: Additional action(s) are needed here for preparedness planning to respond to other catastrophic events that would disrupt water resources and infrastructure like earthquakes, wildfires, chemical spills, facility malfunctions, and intentional disruption.