California’s Water Future

There is a strong consensus that the Sacramento-San Joaquin Delta (Delta) is in jeopardy as both an ecosystem and linchpin of the major water projects serving much of California. The Delta Vision Blue Ribbon Task Force, charged in 2006 with crafting a sustainability plan for the Delta, stated five years ago, “[t]he time for action is now. The Delta is in crisis, and each day brings us closer to a major disaster.”

The federal and state governments share responsibility to lead efforts to sustain this invaluable resource. In the last several decades, that has proved no simple task. A growing number of native species have declined to levels triggering legal protection, and efforts to help fish have compromised the delivery of water to farms and cities. Fights over how to divide Delta flows have spawned years of litigation. Meanwhile, the situation deteriorates. Fish populations have not rebounded, while the probability increases that an earthquake will lead to levee failure and catastrophic water supply disruption.

Six years ago, federal and state officials and other interested parties made a significant departure from a single-species approach to the Delta’s troubles. They embraced a comprehensive effort to create a durable regulatory framework that would lead to fundamental and systematic changes in the Delta. They set forth co-equal goals as simple as the estuary is complex: improve both ecosystem health and water supply reliability. They called the effort the Bay Delta Conservation Plan (BDCP).

What follows is a summary of major changes to the BDCP since February 2012. Recent critical decisions that push this historic effort forward reflect hard work, collaboration, and compromise and are detailed in the joint recommendations document of July 16, 2012.

But stabilizing the Delta will involve efforts beyond the BDCP. Making smart use of water statewide will boost the likelihood that we achieve the co-equal goals of water supply reliability and a healthy Delta ecosystem. Besides progress on BDCP, the federal and state governments are outlining here an integrated approach to California’s water future that includes increases in water use efficiency, water supply or storage, and improved operational efficiency – such as transfers and exchanges. These measures, while outside the BDCP, support progress toward the co-equal goals.
Since the February 2012 release of a preliminary BDCP proposal, months of intense collaboration have brought California closer than ever to agreement on how to stabilize Delta fisheries and water supply. The BDCP has been refined and shaped for long-term success. Now more than ever, the BDCP relies on science to meet statutory goals, strikes a fair balance among competing interests, and creates a strong structure to deal wisely with future risk and uncertainty.

Revisions continue to reflect the conviction that all Californians would benefit from healthy Delta fish and wildlife populations, and all Californians would benefit from greater reliability in the delivery of drinking and irrigation water.

Plans for a Sacramento River intake have been refined. The footprint of the facility necessary to divert water in the north Delta has shrunk, largely in response to the potential impact to Delta communities. The number of river intakes has dropped from five to three, and the capacity has been reduced from 15,000 cubic feet per second (cfs) to 9,000 cfs. The best fish-protection technology available will be used to screen the intakes. This new proposal is a 40 percent reduction from the previous proposal, and 60 percent smaller than the Peripheral Canal considered in the 1980s.

This new facility will provide more natural flow patterns in the south Delta, benefiting many species of native fish, while also safeguarding water deliveries from sea-level rise, earthquakes, and Delta levee collapse.

Before construction of a Sacramento River intake, restoration of Delta habitat critical to fish will have already begun. Federal and state BDCP participants recently committed to an unprecedented, accelerated habitat initiative that will eventually recreate thousands of acres of tidal wetlands.

Other critical decisions that move the BDCP forward include more robust requirements that incorporate transparency, research, monitoring, and tangible ecosystem restoration goals. These new plan elements will enable us to cope collaboratively with the uncertainty inevitable in such a comprehensive and long-lasting effort. The effects of each BDCP action — be it the operation of fish screens, creation of tidal habitat, or anything else — will be studied, monitored, weighed, and adjusted to achieve improvements in the health of native fish populations, while considering the co-equal goal of water supply reliability. The stable yet responsive regulatory framework proposed by the BDCP has been designed to accommodate new information and greater scientific understanding over time as we implement a comprehensive conservation strategy.

The water supplies of cities and farms dependent upon exports of Delta water will go hand in hand with progress toward measurable biological goals. Water project operation rules will be identified at the time a permit is issued based on the best available information. BDCP will also include a commitment to a structured, applied science effort to gain new insight about the ability of alternative water project operating rules, in combination with restored habitat and other conservation measures, to meet the biological goals. Outflow and exports may go up or down as we learn more from science.

The BDCP will not guarantee specific water supply to any water project user, but it will frame a likely range of supplies that public agencies can expect for their investment. It will also greatly reduce the risk of a catastrophic interruption of deliveries.

Although much work remains to be done, including the preparation of a complete draft plan and the completion of environmental review, recent critical decisions mark an important milestone in an historic process launched six years ago.

Details are tentative and subject to change based on environmental analysis and further public input, but recent decisions about the elements and policies of BDCP nevertheless represent a huge step forward in trying to solve problems of tremendous complexity.

In this process, no one group will get everything they want. Everyone will have to compromise for the greater good of all. The Delta demands a bold, balanced solution, and the BDCP is the most promising path to achieve it.
**BDCP Key Elements**

The BDCP is a 50-year, ecosystem-based plan designed to restore fish and wildlife species in the Delta in a way that also provides for the protection of reliable water supplies while minimizing impacts to Delta communities and farms. The BDCP is being developed in compliance with the federal Endangered Species Act (ESA), the California Endangered Species Act, and the California Natural Community Conservation Planning Act (NCCPA). It includes:

- Biological goals and objectives for 57 species, 11 of them fish
- Up to 113,000 acres of restored and protected aquatic and terrestrial habitat
- Measures to address other ecological stressors
- A new governance structure to collaboratively implement the BDCP
- New water conveyance facilities to improve flow patterns for Delta fisheries while improving water supply reliability
- A clear process for addressing issues and conflicts as they arise
- Financing mechanisms and funding responsibilities

**Habitat Restoration**

A century of human development has destroyed much of the intertidal habitats within the Delta where fish might rest, grow, feed, and avoid predators. The BDCP would reverse this trend with an accelerated habitat restoration program. The goals include creation of 30,000 acres of aquatic habitat over the next 15 years. In all, over its 50-year term, the BDCP calls for up to 113,000 acres of habitat restoration, including 65,000 acres of tidal marsh and 5,000 acres of riparian forest and scrub. Reconnecting floodplains, developing new marshes and returning riverbanks to a more natural state should boost food supplies and cover for fish throughout the Delta.

This effort to increase the quality, availability, spatial diversity, and complexity of Delta habitat will be closely monitored for desired – and possibly unexpected – outcomes. It will be implemented over time using established adaptive management principles.

**Biological Goals and Objectives**

To ensure accountability and balance, the fish and wildlife agencies that would permit elements of the BDCP are providing technical assistance in developing and fine-tuning more than 200 biological goals and objectives that will be used to guide the project in a way that leads to a healthier ecosystem.

The targets will include specific metrics for desired outcomes, such as larger fish populations, healthier individual fish, and bigger habitat areas. The permitting agencies will use these goals and objectives in evaluating the proposed project to ensure that BDCP is designed to meet the targets. If, after implementation, the project falls short of the goals and objectives, BDCP conservation measures will be adjusted through the project’s adaptive management program. In some cases, the objectives themselves might be adjusted if it is determined a change is warranted based on new information.

The BDCP now includes 214 biological goals and objectives for 57 fish and terrestrial species, their habitats, and the Delta ecosystem.

Based on June 2011 input from a panel of independent science advisors, biological goals and objectives for 11 covered fish species are being finalized for use in the analysis of the effects of the revised proposed project.

**Species-Specific Biological Goals and Objectives**

A comprehensive set of biological goals and objectives also have been created for the following fish species:
- White Sturgeon
- Green Sturgeon
- Winter-run Chinook Salmon
- Spring-run Chinook Salmon
- Fall- and late fall-run Chinook Salmon
- Delta Smelt
- Longfin Smelt
- Sacramento Sptiltail
- Steelhead
- Pacific Lamprey
- River Lamprey

The smelt is an indicator species for the Delta, a gauge by which to measure the ecological health of the region. Once one of the most plentiful fish species in the Delta, smelt populations have greatly declined over the last decade. The BDCP seeks to restore sensitive fish populations by implementing aggressive habitat restoration projects, establishing new Delta water operating criteria, and constructing new north Delta water diversion facilities.

**Adaptive Management**

The biological goals and objectives of the BDCP will be advanced through an Adaptive Management Program that will provide mechanisms to make adjustments to BDCP conservation measures based on new scientific information and insight gained from monitoring and targeted research.
Establishing Operating Criteria for New Conveyance Facilities

There is considerable uncertainty over the degree to which a number of environmental stressors are contributing to the Delta’s decline. There is also uncertainty about how the ecosystem might respond to actions intended to counter those stressors.

The BDCP is meant to improve the estuary’s health, and with those improvements comes the anticipation of more flexible water operations and improved water supply reliability. But how can one determine how much water might be available if one cannot predict how the ecosystem will respond to BDCP actions intended to improve it? The answer: a scientifically-driven process to test the ecological response to various conservation measures.

Based on a consensus that more applied science can shed light on the importance of various stressors and the effectiveness of measures to counter them, this so-called “decision tree” process will be designed to provide information to help answer several key outstanding scientific questions. These questions relate to achieving biological goals and objectives that affect how much water may be delivered from the Delta.

The approach will give regulators the ability to issue a permit based on the best science available when a project is permitted, while also committing to reevaluate and modify the operating criteria as new insights are gained through applied science. Specific operational criteria subject to the decision tree process will be included in the draft BDCP. Regulatory agencies will retain the authority to determine what operations criteria are necessary, along with all the other conservation measures, to meet the biological goals and objectives. Depending on the results of the decision tree process, parameters may be adjusted, and the amount of water available for export or needed for outflows could go up or down.

Some of the questions that could be examined in this way involve the effectiveness of early wetland restoration projects to increase the populations of small fish and increasing flows to drive salinity further out of the Delta during the fall of wet years.

The decision tree process will focus studies to refine the initial operating criteria and would be in effect until a new conveyance facility is built and ready for operations, perhaps 10 or 15 years from now.

Flexibility does not end at that point, however. Once the conveyance facility is operational, the adaptive management program that has always been part of the plan will continue.

Decision Tree Approach

The decision tree will test the biological goals and objective outcomes for individual species to determine the most efficient actions to achieve the dual goals.

- Guided by biological goals and objectives for fish species
- First 15 years of plan, prior to facility operation
- Test scientific hypothesis about effectiveness of flows and habitat restoration on recovering species
- Supported by open, collaborative, community science process

The BDCP approach reflects a significant departure from the species-by-species approach taken in the Delta to date. Instead, the BDCP seeks to improve the health of the ecosystem as a whole, and its reach extends beyond the elements described here. The BDCP will involve myriad actions by multiple agencies, from the restoration of thousands of acres of habitat, to control of non-native aquatic weeds, to improvement of water quality. A major part of implementation will involve gauging effectiveness through monitoring, and adjusting actions based on results.
A final decision on three intake locations has not been made, and will be further analyzed in the Draft BDCP and Draft Environmental Impact Report/Environmental Impact Statement.

**New Conveyance Facilities**

The BDCP is intended to result in a permit to construct, test, and operate a new water diversion facility on the Sacramento River in the north Delta. The facility would feature:

- Three pumping plants, together capable of diverting up to 9,000 cfs.
- State-of-the-art fish screens that would protect passing fish.
- A forebay for temporarily storing the water pumped from the river.
- Two tunnels to carry the water 35 miles to the existing pumping plants in the south Delta. From there, water would be moved into existing aqueducts that supply much of the state.

The new twin tunnels would be designed to operate by gravity, which eliminates the need for an intermediate pumping plant. Harnessing gravity to move the water south has many advantages: it reduces energy consumption and greenhouse gas emissions, requires the installation of fewer transmission lines, reduces the visual impacts of the project in the Delta, and cuts long-term operation and maintenance costs.

The proposed Sacramento River intakes would be screened with state-of-the-art technology that uses low-velocity approaches and engineered mesh – features that minimize both direct and indirect effects on fish. The plan provisions governing the diversions would specify fish screen performance standards, including a high survival rate of young fish. The river location of the fish screens and their modern design promise significant improvement over the existing screens at the south Delta water project pumps, which currently rely on 44-year old technology.

No final decisions on the proposed conveyance facility can be made prior to the completion of regulatory and environmental review and public input. The elements described here have been identified for the purpose of further analysis pursuant to the California Environmental Quality Act, the National Environmental Policy Act, the ESA, the NCCPA, and other applicable statutes.
Science will play a key role in all phases of BDCP, providing information about the benefits of habitat restoration and increased flows for sensitive fish species, among other issues.

The science program will be open, transparent, and collaborative. It will provide decision makers and the public the best science possible on the Delta, and should increase confidence in the results significantly.

The information generated by the BDCP science program will be put to practical use, guiding decisions through the BDCP’s extensive adaptive management program.

Areas of uncertainty or disagreement will be identified, such as the ecological role of freshwater flows during certain seasons. Through the BDCP process, it will be determined whether the area of uncertainty can be tested with timely, valid scientific research that is also logistically and economically feasible. Over time, such research should provide data that better informs future management and regulatory decisions.

Finance

The state and federal governments are committed to the “user pay” principle. The state and federal water contractors have agreed that the costs of the new water conveyance facility and associated mitigation of that facility would be paid through charges to the water users who benefit from its development and operation. Discussions are ongoing to work through the issues associated with financing any new infrastructure.

Financing for the habitat and other conservation measures in the BDCP would be provided in part by the contractors, but mostly would be paid by the state over a 40-year period. The federal government would likely make additional investments through existing programs. One source of funds could be the water bond that is currently scheduled for the November 2014 statewide ballot.

Other bonds, or state and federal funding sources, are expected to provide the funds needed to implement the conservation measures other than the conveyance facility. Historically, federal appropriations have paid for some Delta ecosystem improvements, and these programs are expected to continue. Not all finance-related issues have been resolved, but they are presently being addressed.
Other Efforts to Help Meet the Delta Co-Equal Goals

Many actions that will help solve California’s water problems – both in and beyond the Delta – are outside the scope and reach of the BDCP. Described below are actions on several broad fronts that are not part of the BDCP, but could work to support its dual goals. These actions are opportunities, not mandates. They are intended to be implemented in the manner they have been historically applied – through voluntary agreements with a sharing of costs that recognizes the benefits to both the public at large and the entities involved. Environmental review outside of the BDCP, with public input, will be necessary before binding commitments can be made to any of these elements.

The federal and state governments may implement the actions described below as part of their broader responsibilities for California water planning – separate but complementary to the BDCP.

Key integrated water management elements that help support achievement of the co-equal goals of the BDCP include:

- Increases in water use efficiency
- Increases in water supply
- Improved operational efficiency and transfers/exchanges

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Increases in Water Use Efficiency

State and federal governments will continue to invest in measures that have the potential to help increase water use efficiency or stretch existing supplies. Actions may range from public awareness campaigns to technological improvements. They include:

- Water conservation: The California Department of Water Resources and the U.S. Bureau of Reclamation (Reclamation) will provide technical and financial assistance to districts with the potential to save water through use of regulating reservoirs, canal lining, system automation, and modernization projects.
- Agricultural water use efficiency: State and federal agencies will partner with growers and irrigation districts to encourage use of drip and micro irrigation systems, irrigation scheduling, crop shifting, deficit irrigation, and other efficient water management practices. They will also provide assistance to enable implementation of the Water Conservation Act of 2009, which requires certain agricultural water suppliers to measure water delivered and charge customers based, at least in part, on volume delivered.
- Urban water use efficiency activities: State and federal agencies will help urban water suppliers to reduce per capita water use by 20 percent by the year 2020. Potential measures include public awareness campaigns and technological improvements that decrease water use by homeowners, businesses, manufacturers, and institutions.

Increases in Water Supply

There are many ways improve management of existing water supplies and find or create additional sources:

- Conjunctive management and groundwater storage: Considerable interest and opportunity for additional groundwater storage exists south of the Delta. In general, the California Legislature has held that groundwater management is a local responsibility. The state will continue to provide technical and financial assistance to local agencies.
- Desalination: Several integrated regional water management plans consider desalination an integral component of a water resources portfolio. Opportunities for funding desalination projects will continue through state grants.
- Recycled municipal water: With an increase in state or federal funding, the opportunity exists to expand water recycling south of the Delta in both the State Water Project and Central Valley Project service areas. Although recycling is expensive, it is becoming more competitive and attracts strong support.
- Surface storage: Storage is an important part of any water solution for California. Opportunities exist to modify existing surface storage structures (such as dam spillways or gates) in ways that increase storage capacity. Changes in operations may also enhance water storage. In cooperation with local partners, state and federal agencies continue to study enlargement of Shasta Dam, creation of north-of-Delta offshore storage, expansion of Los Vaqueros Reservoir, and new or expanded storage in the upper San Joaquin River basin. DWR and Reclamation will continue to provide guidance, technical expertise, and planning assistance to local agencies, as requested.
Achieving Co-Equal Goals

Overall, improved water management throughout the state offers an opportunity to bolster both water supply reliability and ecosystem protection in the Delta, which is the center of California’s water supply network and a valuable natural resource unto itself. Although outside the BDCP, such efforts are important to support achieving the co-equal goals.

Improve Operational Efficiency and Transfers/Exchanges

Improving California’s ability to shift water from place to place can stretch supplies. Considerable opportunity exists for voluntary water transfers and exchanges throughout the Central Valley including state, federal, and local interests. The types of water management actions that would meet the goals of this element include:

• **Conveyance:** DWR and Reclamation will continue to assess federal and state water conveyance systems and support assessment of regional and local systems, as needed. Lack of east/west conveyance limits the ability to make the most effective use of water south of the Delta. There are many proposed projects to allow water to move between the east and west that have local support but lack funding. Such projects also can benefit from state and federal support in the permitting process.

• **System Reoperation:** Reclamation and DWR will continue to evaluate coordination of State Water Project and Central Valley Project operations and identify specific measures with quantifiable efficiencies.

• **Transfers/Exchanges:** Historically private transactions, voluntary water transfers and exchanges pose a considerable opportunity to improve water supply reliability. Examples include the 25-year Exchange Contractor Transfer Program and the North/South Transfer Program currently under federal and state environmental review. State and federal agencies can facilitate voluntary transfers, finding ways to limit procedural and administrative barriers while protecting water rights and the environment.
Ongoing Threats to the Delta

The status quo of the Delta – both the ecosystem and the water system depending on it – is not sustainable. Over the last 150 years, people have extensively modified the Delta estuary. Vast tidal wetlands have been carved into levee-ringed islands separated by waterways. Subsidence of the Delta’s unusual peat soils has put some land within the levees more than 15 feet below sea level. Loss of estuarine habitat and the operation of the water project pumps in the Delta have also affected many species of wildlife. Conflict over environmental protection and Delta water exports has lasted decades and worsened in recent years. The heart of California’s water system rests in the Delta, and its current configuration puts it – and the state’s broader economy – at serious risk.

Risk of Catastrophic Failure

The levees that line hundreds of miles of waterways in the Delta protect local communities, regional infrastructure (such as gas lines), and California’s economy. These levees are vulnerable to winter storms, seepage, slumping, and the natural processes that eat away at the Delta’s highly-organic peat soils. Yet a major earthquake poses the single greatest danger. A major earthquake potentially could cause levee failures and flooding on as many as 20 islands at once and jeopardize water supplies for two-thirds of the state. In the event of a major earthquake, water rushing through levee breaks would fill the bowl-like Delta islands. Saltwater from the bay would be drawn deep into the Delta, forcing federal and state water project operators to stop pumping from the south Delta to avoid saltwater contamination of water delivery systems. Depending on the amount of water stored in the state’s major reservoirs when an earthquake hits, this interruption in fresh water distribution could last months or years, at a potential economic costs of tens of billions of dollars.

BDCP Solutions—The BDCP preferred proposal would isolate water deliveries from increasingly stressed Delta levees, while using state-of-the-art fish screens and water project operating rules that accommodate fish spawning and migratory patterns. The proposed project would also help California cope with changing weather patterns by enabling the capture of large amounts of winter flood flow at times of minimal ecological risk. A more reliable facility for moving water through the Delta would also facilitate voluntary north-to-south transfers among water agencies, boosting the state’s ability to respond to drought.

Climate Change

Change is natural and inevitable in the Delta. The warming of the global climate system is already affecting the Delta in several ways. Over the last 100 years, sea level has risen approximately 6 feet at the Golden Gate Bridge, and as levels continue to rise – an additional increase of three feet or more by 2100 is predicted – pressure will increase against Delta levees, potentially causing instability and seepage. Higher sea levels also increase tidal mixing and salinity levels in the Delta. Without BDCP, repelling saltwater from the federal and state water project pumps would require the release of increasing amounts of freshwater from upstream reservoirs. As warmer average temperatures push snow levels higher in the Sierra Nevada mountain range, more winter precipitation will fall as rain. More intense storm runoff and peak flood events will further stress levees. Multiple levee failures from a single flood are possible, depending upon water levels, tides, wind, and other factors.

BDCP Solutions—The BDCP proposed conveyance project would draw water directly from the Sacramento River in the north Delta, allowing fresh water to reach the federal and state water project pumps even if levees collapse throughout the interior Delta.
Regulatory Curtailment of Water Supplies

The toll major water projects take on California’s fish and wildlife has become more obvious in the half-century or so since the biggest dams, reservoirs, and Delta pumping plants were built. In recent decades, litigation and legislation have attempted to ameliorate these environmental effects, so that some of the water captured by federal and state reservoirs that once went to cities and farms now flows for environmental purposes.

However, to date, this approach to fish protection measures has focused largely on individual species. This narrow approach has failed to restore fish populations, and has left water users without a reliable supply year to year. Combined with drought, regulatory restrictions to protect fish can force farmers to idle farmland and increase unemployment in the Central Valley.

Environmental restrictions on the major pumping plants in the south Delta can also hobble California’s ability to respond to natural differences in the amount of precipitation the state receives from one year to the next. Even when water is available in one part of the state, pumping restrictions may prevent it from being moved through the Delta to where it is needed most.

BDCP Solutions—The BDCP seeks to restore a greater measure of flexibility to the water system. It puts more tools to work that could help restore water supply reliability, and, as its ecosystem goals are realized, it will reduce or eliminate regulatory impacts on water supplies.

How the BDCP Addresses Delta Threats

In the most basic sense, the BDCP provides a regulatory structure designed to provide mutual improvement for both the ecosystem and water supply reliability. Project proponents agree to a range of actions to benefit the estuary’s ecological health, including clearly defined rules on water diversions, in return for the long-term permits needed to build and operate a facility that changes where and how water is diverted from the Delta.

A major part of implementation will involve an unprecedented effort to monitor, gauge effectiveness, and adjust accordingly. BDCP offers the greatest hope in many years that California may manage risks to its central water supply, recover a natural treasure, and deal wisely with future challenges.
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