

- Review of Near- and Mid-Term
Delta Actions and Water Supply Planning Implications

Summary

Recent action by the Department of Water Resources and U.S. Bureau of Reclamation to curtail pumping by the State Water Project and Central Valley Project from the Delta to protect dwindling numbers of Delta smelt underscores the incompatibility of how water is conveyed to California's economy and protection of in-Delta native fisheries. While the shutdown was temporary, the underlying need to better protect Delta smelt and other fisheries is likely to challenge Metropolitan and other Delta export users with more prolonged curtailments and potentially serious economic consequences throughout the State in the next several years.

Metropolitan's Board approved a Delta Action Plan in June 2007 that provides a framework for actions to reduce near-term and longer-term risks in the Delta. This Board Report provides more detailed information on the potential near-term and mid-term actions, and the water supply planning implications of the framework.

Detailed Report

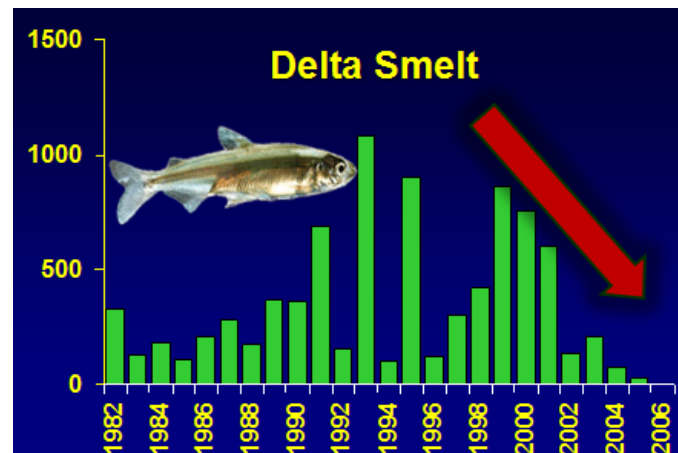
2007 Status Update

A. Fishery and Legal Conditions

During March through June 2007 the State Department of Fish and Game (DFG) conducted its spring-time fish population survey in the Delta. In this survey, a boat tows a fine-mesh conical net at specific locations throughout the Delta and Suisun Bay to collect and count Delta smelt to develop an index of the overall population. This spring's survey resulted in the lowest Delta smelt catch on record until late June when the survey resulted in juvenile abundance levels similar to low levels estimated for 2004 through 2006. As a result of these fish population surveys, the State Water Project (SWP) pumps, which deliver water to more than 25 million residents throughout the Bay Area, Central Coast, San Joaquin Valley and Southern California, and irrigate more than 750,000 acres of prime agricultural land, were voluntarily shut down by DWR on May 31, 2007 for 17 days (except for minimum public health and safety amounts) to help protect the Delta smelt that were clustered in the south Delta.

On June 17 the State Department of Water Resources (DWR) and the US Bureau of Reclamation (Bureau) began ramping up pumping after the water temperature in the Delta reached the laboratory lethal level for Delta smelt at 25°C (77°F). This water temperature criterion was set by DFG biologists. Although Delta smelt salvage has increased at the SWP Banks Pumping Plant (probably due to salvage of those fish trapped in Clifton Court during the month of May), it is expected to decrease in the coming weeks. In addition, any smelt remaining in the south Delta once water temperatures increase would likely suffer natural mortality.

On June 19 two environmental plaintiffs in the Delta smelt case sought a Temporary Restraining Order (TRO) in federal court contending that certain Delta Smelt Work Group (DSWG) recommendations needed to be implemented to avoid jeopardizing the existence of the Delta smelt. The DSWG recommendations included maintaining zero net negative flows in Old and Middle Rivers, and reducing the salvage of Delta smelt to zero at the SWP and Central Valley Project Delta pumping plants. Judge Wanger issued a decision (without prejudice) denying the TRO on June 22 concluding that there was insufficient scientific evidence that shutting down the Project pumps was necessary to avoid jeopardy and



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possible extinction of the species. Balanced against substantial evidence that a shutdown of SWP and CVP would cause major irreparable injury to urban and agricultural water users.

B. Water Supply Outlook

Water supply forecasts conducted by DWR for 2007 indicate that, despite the curtailed pumping operations in June; the SWP will still be able to deliver a 60 percent supply to its contractors. Metropolitan's share of this supply is about 1.15 million acre-feet. Including carryover storage from 2006 and interruptible supplies delivered earlier in the year, Metropolitan would receive about 1.45 million acre-feet of total deliveries under the 60 percent allocation.

To date, Metropolitan has remaining SWP Table A scheduled deliveries of approximately 550,000 acre-feet under a 60 percent allocation. Based on estimates of potential pumping restrictions that may be applied over the remainder of the year for protection of the fishery, staff estimates that the remaining SWP scheduled deliveries could be reduced and that approximately 275,000 acre-feet to 385,000 acre-feet may ultimately be delivered to Metropolitan.

Near-term (2008-2010) Outlook

A. Delta Operating Conditions

In the next few years, it is anticipated that the DFG will implement actions to reduce the salvage of Delta smelt. Dr. Peter Moyle (Biology Professor, UC Davis) and Dr. Tina Swanson (senior scientist, The Bay Institute) suggested a set of actions to be analyzed in a letter entitled "Recommendations for Actions to Protect Delta Smelt" dated March 13, 2007. The actions are prescriptive and pose restrictions to Delta export year round; hence staff is analyzing this set of actions as a worst case on water supplies.

The objective of these actions is to keep the smelt as much as possible out of the south Delta, and increase flushing flows from the Sacramento and San Joaquin rivers when fish surveys indicate smelt have moved back into the south Delta. The following is a summary of the proposed restrictions:

Months	Restrictions due to Delta Smelt Decline
Dec – Jan	0 cfs net flow in Old and Middle Rivers during pulse San Joaquin River outflows
Feb – Jun	0 cfs net flow in Old and Middle Rivers; extend VAMP export restrictions until 95 percent of smelt are downstream of the confluence of the Sacramento and San Joaquin rivers.
Jul – Sep	Greater than -5,000 cfs net flow in Old & Middle Rivers; no south Delta agricultural barrier until 95 percent of smelt are downstream of the confluence of the Sacramento and San Joaquin rivers.
Sep – Dec	Maintain X2 downstream of Collinsville (a measure of flow required to meet specific salinity levels for fish habitat); requires approx. 7,700 cfs outflow

VAMP stands for Vernalis Adaptive Management Plan, which was instituted with the San Joaquin River Agreement. It is a management approach to adjusting inflows from the San Joaquin River to address salinity and inflow requirements into the Delta, which would help with the survival of San Joaquin Chinook Salmon smolts as they pass through the Delta.

B. Water Supply Impacts

Under these Delta operating conditions, on average, Metropolitan would receive 750,000 acre-feet less than the 1.5 million acre-feet it currently receives from the SWP (a roughly 50 percent reduction). Metropolitan's supply during wet years would be reduced by approximately 900,000 acre-feet. Dry-year deliveries would see a reduction of approximately 600,000 acre-feet. The overall reduction in supplies would have a major impact on

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Metropolitan's supply outlook. The impact comes from two major areas. First, the decrease in SWP supplies over all year types would put increased, sustained demands on Metropolitan's dry-year storage programs, including all groundwater banking, conjunctive-use, and surface storage programs. Second, the decrease in SWP supplies available in normal and wet year types will severely reduce the opportunities to refill those storage programs. In other words, storage reserves would be likely to reach increasing rates of depletion, with little chance for refill or recharge. The table below shows the estimates of SWP Table A available to Metropolitan under DWR's 2005 SWP Reliability Report and under the Prescriptive Actions.

Period	Metropolitan's SWP Table A Supplies (TAF)		
	2005 SWP Reliability Report	Prescriptive Actions	Difference
Average	1,500	750	-750
Dry Year	1,250	650	-600
Wet Year	1,850	950	-900

C. Near-Term Delta Actions

Near-term actions are intended to implement immediate measures over the next 18 months to reduce fishery and earthquake-related risks while the Governor proceeds with his proposed comprehensive water plan, which includes the Delta Strategic Plan to develop a long-term solution to Delta related conflicts. At the same time, stakeholders may pursue implementation of certain physical measures under the Eco-Crescent Pathway Concept. These actions include:

1. Actions to Secure Permits for Interim Operations
 - Secure Endangered Species Act (ESA) and California Endangered Species Act (CESA) incidental take authorization based on a federal biological opinion to be issued in mid-2008. The Biological Opinion would probably provide ESA and CESA authorization for 3-5 years after mid-2008. Until a biological opinion is issued in mid-2008, the courts may supervise allowed incidental take by the SWP and Central Valley Project (CVP).
2. Operational and Physical Measures
 - Secure Environmental Water Account (EWA) assets to provide backstops through SWP water purchases and other means when necessary.
 - Revise real-time monitoring and operations in the Delta to protect native species, while improving water supply reliability.
 - Implement near-term physical measures – e.g. the Eco-Crescent Pathway Concept.
 - Take aggressive steps to address other causes of fishery decline including: invasive species, toxics, unscreened diversions, minimal San Joaquin River flows, and others.
 - Reduce risks due to levee collapse from an earthquake or flood by securing state approval and funding for a Delta Levees Emergency Preparedness and Response Plan consistent with April 2007 Board direction to work toward implementing a "Post-Event Strategy."

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3. Negotiations and Agreements

- Negotiate an amended Four-Pumps Fish Mitigation Agreement to be consistent with (and included as part of the mitigation) identified under the Delta smelt and Winter-run salmon Biological Opinions and Section 10/NCCP coverage.
- Select and finance early start ecosystem restoration projects to improve habitat conditions for ESA listed fisheries, financed through existing bond funds (Proposition 1E and 84).
- Select a preferred water supply/quality alternative for conveyance under the long-term Delta Vision Process by January 2008 that will include the following elements: ecosystem restoration, water supply reliability, water quality enhancement, flood control and levee stability, water storage, governance, and financing.
- Select a governance strategy to implement and operate new Delta facilities and ecosystem restoration elements in the Delta Vision and Bay-Delta Conservation Plan with the objective of providing public confidence in operations, management, and governance; to assist in ensuring environmental restoration, water quality and supply reliability goals are met; and to combine management functions, where appropriate, of new and existing water supply infrastructure.
- Select a financing strategy to fund construction and operation of new Delta facilities and ecosystem restoration elements identified in the Delta Vision and Bay-Delta Conservation Plan consistent with the April 2006 Board approved Delta policy principles.

D. Water Supply Impacts with Interim Real Time Operations

In an effort to minimize water supply impacts due to Delta smelt actions and minimizing take/salvage at the SWP and CVP pumps, Metropolitan and other state water contractors are evaluating interim real time monitoring and operations schemes. The objective of these operations is to minimize the take of smelt by the pumps while implementing physical measures under the Eco-Crescent Pathway Concept. Real time smelt protective criteria that result in the greatest supply impacts and greatest protection to smelt, are displayed in the table below. These criteria maintain continuous positive downstream flow on the San Joaquin River as means of resisting smelt movement toward the export pumps.

Months	Interim Real Time Operations
Dec - Jun	Qwest* greater or equal to 500 cfs
Mar - Jun	Old and Middle River flows greater or equal to 0 cfs
Nov - Jan	Delta Cross Channel gates always open
Dec - Jun	Take triggers in place as a backstop to avoid jeopardy
Dec - Jan	Old and Middle River flows greater or equal to -5,000 cfs during December - January when a monthly average Sacramento River flow is greater or equal to 20,000 cfs. Once the action is triggered, it stays in effect during that month.

* Qwest operating criteria is a measurement of the average tidal flow in the lower San Joaquin River. Positive Qwest indicates net flow towards the ocean and negative Qwest indicates reverse flow; in the lower San Joaquin River, which could carry smelt towards the Project pumps.

A preliminary range of real time operations have been evaluated in an attempt to minimize smelt take at the SWP and CVP pumps, resulting in a range of water supply impacts from 6 percent to 25 percent. These studies would help formulate a comprehensive plan of operational enhancements and infrastructure improvements, but require refinement and regulatory review to arrive at the eventual operating criteria. Operations may include preventive actions such as focused Delta Cross Channel operations and pump curtailments targeting predicted smelt salvage

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events. The essence of preventive actions such as real time monitoring and operations is that turbidity increases in the central Delta suggest the imminent onset of adult Delta smelt salvage in time to trigger operational changes of the Delta Cross Channel and Project pumps to prevent or reduce potential salvage. Interim real time operations appear effective at reducing supply impacts associated with smelt take, but are enhanced by the eco-crescent pathway improvements which provide added operational flexibility to protect smelt. Estimated water supply impacts associated with these operations are shown in the following table:

Period	Reduced SWP and CVP Exports: Prescriptive Actions vs. Interim Real Time Operations (TAF)	
	Moyle-Swanson Proposal	Interim Real Time Operations
Average	(-) 2,750	(-) 350 - 1300
Dry Year	(-) 2,550	(-) 500 - 1350
Wet Year	(-) 3,000	(-) 250 - 1300

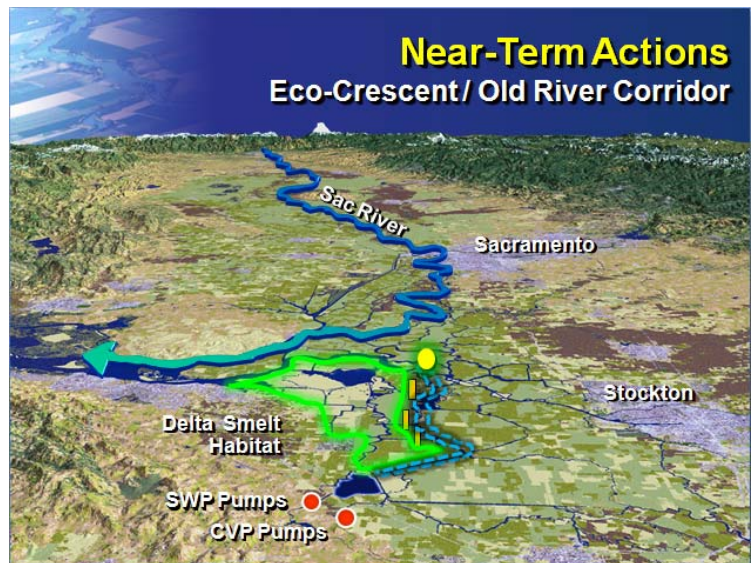
Preliminary modeling results indicate that interim real time operation could prevent smelt from reaching south Delta, in the vicinity of the Project pumps, as well as significantly lessen water supply reduction. However, this operating scheme requires very aggressive monitoring and operational adjustments on a real time basis. Inherently, this operating scheme also has some degrees of uncertainty because there may be other factors or hydraulic conditions causing smelt to reach south Delta. When smelt do reach south Delta, severe pumping reduction or shut down would be required to lessen smelt take. Physical measures such as the proposed Eco-Crescent Pathway Concept would mitigate for this risk.

Mid-Term Outlook

A. Expected Delta Operating Condition

The completed implementation of the Eco-Crescent Pathway Concept would mark the beginning of the mid term, a period that extends through the time when the long-term solution is being implemented.

The Eco-Crescent Pathway Concept creates in-channel habitat in the south Delta that would not be negatively influenced by the operation of the SWP and CVP pumps. Physical features consist primarily of temporary flow control tidal gate structures (e.g., stoplog gates, pivot gates or rock barriers with tidally operated one-way flap gates) in key Delta channels that separate Old and Middle Rivers. The intended effect of these tidal gates would be to keep smelt in the western Delta and create both a physical and hydraulic barrier to prevent the smelt from approaching the pumps. With the tidal gates, Project operations would be managed to create net positive Delta outflow in all smelt rearing areas, further protecting smelt from entering the south Delta where entrainment is more likely when the pumps are operating. These tidal gates would also provide significant water supply benefits in the event of seismic events in the Delta and resulting levee failure and would not preclude any long-term physical actions being contemplated as part of Delta Vision. Impacts to legal water users west of these tidal gates would be mitigated with pipeline connections to the eastern Delta, much as was done in the historic 1976-77 drought. The temporary structures would be designed to have minimal impact in the river when gates are not in



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operation. Typically, several vertical H-piles would be placed across the river so that temporary gates could be installed in several days in an emergency, thus minimizing impacts. Alternatively, a siphon could be installed allowing Victoria Canal and Middle River flows to pass beneath Old River, allowing Old River to flow unimpeded toward the ocean.

The Eco-Crescent Pathway Concept was analyzed through the use of water supply operational simulation computer models and particle tracking computer models. A revised set of operational parameters was utilized to ensure the minimization of Delta smelt salvage at the SWP. The operational parameters included:

Months	Eco-Crescent Operational Parameters (Qwest Criteria)
Dec – Feb	Greater than -1,000 cfs net Qwest flow (to reduce impacts on adult smelt)
Mar – Jun	When Qwest is positive (greater than 0 cfs), then allow less than 4,000 cfs net flow in the Old & Middle River towards the pumps. When Qwest is less than -1,000 cfs, no net flow (0 cfs) to Old and Middle rivers towards the pumps. When Qwest is between 1,000 cfs and 0 cfs, then allowable flow in Old and Middle River would be linearly interpolated between 0 to 4,000 cfs.
Jul -- Nov	No actions except for meeting existing outflows, X2 requirements, and export/inflow ratios.

It should be noted that studies of interim real time operations have included Qwest criteria equivalent to the eco-crescent operational parameters, as well as optional, more restrictive, Qwest criteria for smelt protection.

B. Mid-Term Delta Actions

The focus of the mid-term action plan minimizing water supply impacts and improving Delta ecosystem while a long-term solution is being implemented. These include: 1) continuing funding and implementation of early start “no regrets” ecosystem restoration projects; 2) securing long-term operating permits for the State Water Project under the Bay-Delta Conservation Plan; and 3) developing an implementation plan and environmental documentation for the preferred long-term Delta Vision. Specific elements in the mid-term plan include:

1. Develop Legislation for the Recommended Delta Vision Alternative. Authorization of new state facilities and funding of the public share of the recommended Delta Vision projects will likely require legislation. Metropolitan should pursue legislation that addresses all Delta issues in a comprehensive package.
2. Develop an Implementation Plan & Environmental Documentation for the Recommended Delta Vision Alternative. On January 2008, the Governor is scheduled to release his recommendation on a long-term Delta Vision. Following that release, the Department of Water Resources and CALFED, in coordination with Delta stakeholders, will begin preparation of environmental documentation and modeling analysis as needed. The scheduled completion date for this effort is mid-2009.
3. Secure Potential Changes to State Water Resources Control Board Standards based on recommendations from the Delta Vision Process. The recommendations from the Delta Vision process and the Bay-Delta Conservation Plan may trigger actions at the SWRCB to revise permits of the export projects. Permit changes would be due to likely changes in operations and reservoir release patterns.
4. Continue habitat and fishery improvements to reduce conflict with water supply operations.
5. Complete Bay-Delta Conservation Plan & acquire permit assurances for long-term operations. The Bay-Delta Conservation Plan (BDCP) is a comprehensive plan to address the ecosystem needs of the Delta and associated sensitive aquatic species and to provide a mechanism for the issuance of

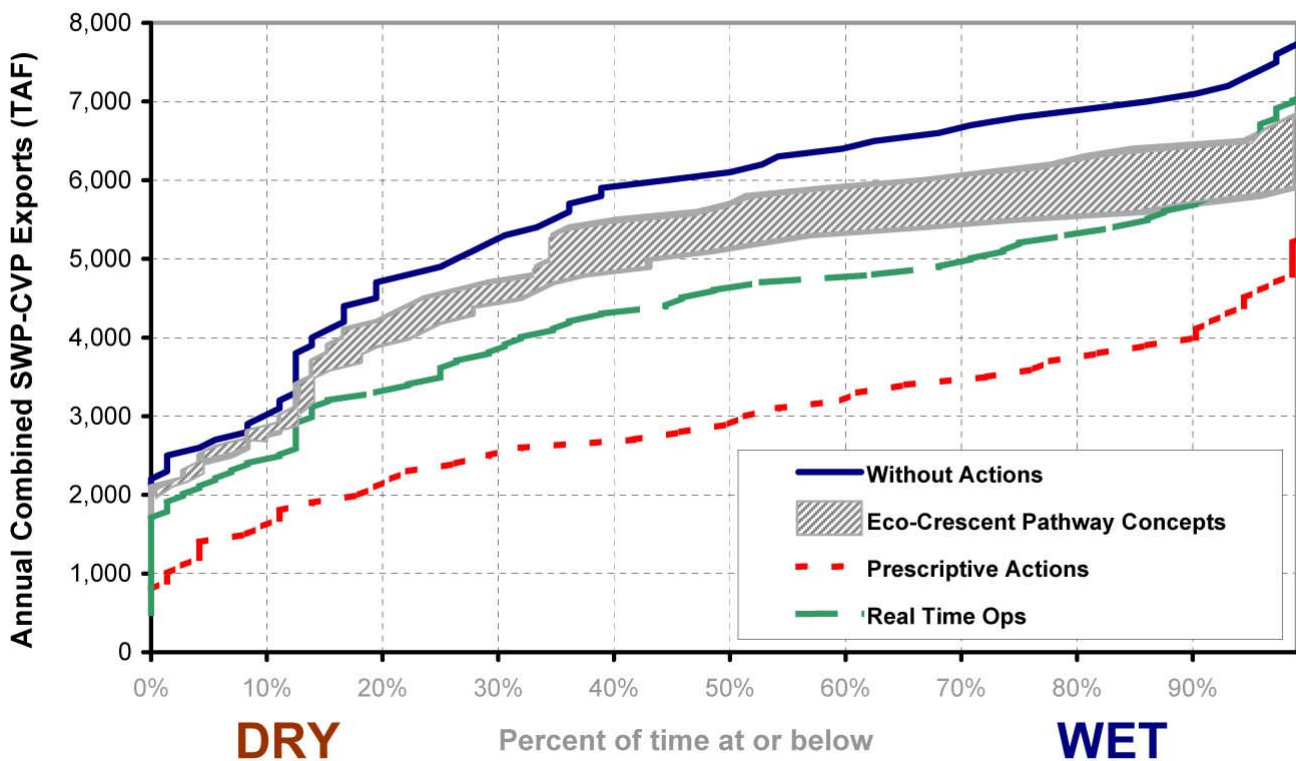
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incidental take permits pursuant to the Federal Endangered Species Act (FESA) and the State Endangered Species Act (CESA). Acquisition of the appropriate permits and drafting of the associated Environmental Impact Statement/Impact Report is scheduled for completion during the third quarter of 2009.

C. Water Supply Impacts

The chart below displays relative water supply impacts for interim real time operations and eco-crescent pathway concepts compared to baseline SWP and CVP supplies and the Prescriptive Actions. As noted above, these studies are preliminary and have helped to formulate a comprehensive plan of operational enhancements and infrastructure improvements to minimize impacts to water supplies. The Prescriptive Actions results in a supply reduction of about 50 percent. Interim real time operations, which may include focused Delta Cross Channel operations and pump curtailments targeting predicted smelt salvage events to help minimize smelt take, result in a range of impacts up to about 25 percent supply reduction. Eco-Crescent Pathway Concepts result in about a 10-20 percent supply reduction. The effectiveness of interim real time operations and Eco-Crescent Pathway concepts have been evaluated through particle tracking studies, which simulate smelt movement through the Delta under differing hydrodynamic schemes. Studies show that these operations are effective in protecting smelt, although added flexibility is provided by eco-crescent pathway improvements.

**Combined SWP-CVP Export Reliability
With and Without Facilities & Delta Smelt Actions**



The table below shows the estimates of SWP Table A supplies available to Metropolitan under the Eco-Crescent Pathway Concept. Preliminary modeling indicates that successful implementation of the Eco-Crescent Pathway Concept has the potential to significantly improve water operations in the Delta, and to lessen the impacts to water deliveries estimated under the Prescriptive Actions operating conditions. Compared to those deliveries, the Eco Crescent Pathway Concept could provide an improvement of 450,000 acre-feet on average. Wet-year deliveries could be improved by 550,000 acre-feet. Improvements in dry years would be in the range of 450,000 acre-feet.

Period	Metropolitan's SWP Table A Supplies (TAF)		
	2005 SWP Reliability Report	Prescriptive actions	Eco-Crescent Pathway Concepts
Average	1,500	750	1,000 - 1,200
Dry Year	1,250	650	800 - 1,000
Wet Year	1,850	950	1,300 - 1,500

Resource portfolio management would return to a more normal state of operation, with an increased probability of storing water supplies for future periods. Dry-year storage programs would no longer have to be operated on a sustained basis, and would have an opportunity to recover from any depletions that occurred during the near-term period. Improvements in this magnitude, over all water year types, would significantly improve the supply outlook for Metropolitan. However, it would not fully restore conditions to the current baseline state.

D. Effectiveness of Reducing Delta Smelt Take

Preliminary particle tracking studies, simulating the movement of smelt in the Delta, were performed to predict how effective the smelt protective options are in reducing smelt take. Results are presented in the table below. This analysis was done by releasing particles in a hydrodynamic model at a limited number of times (December 2001, April 2002, and December 2002) and locations in the Delta to determine what percent of particles reach the pumps. Results compare historical conditions versus interim real time operations and the Eco-crescent pathway options, and conclude that these smelt protective options are effective at reducing smelt take. Time specific Delta Cross Channel operations and pump curtailments, undertaken when salvage events are predicted to occur, were also found effective at eliminating take by keeping smelt further from the pumps in the west and central Delta. While preliminary and limited in nature, requiring refinement and review, these studies have helped form the basis of comprehensive plans to minimize pump curtailments and protect smelt.

Additional modeling runs will be conducted in the next several weeks to analyze alternative flow and gate operations to attempt to enhance supply reliability and reduce entrainment/salvage of Delta smelt.

Smelt Protective Option	Estimate of Smelt Reaching Export Pumps (percent)	
	San Joaquin River Release Location (west Delta)	Old River Release Location (central Delta)
Historic	0 - 20	77 - 99
Interim Real Time Operations	0 - 2	See note below
Eco-Crescent Pathway Options	0	0

Note: Of particles placed directly in the central Delta, up to 99 percent reach the export pumps. However, by taking preventive actions by opening the Delta Cross Channel up to 30,000 cfs and selectively reducing exports in December through January to maintain Qwest=> 500 cfs, around 2 percent of particles originating in the west

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Delta reach the export pumps. This suggests that creating this flow regime through early preventive actions can substantially keep smelt from entering the central and south Delta.

Water Resource Options to Meet Service Area Demand

Staff has conducted an analysis of existing and potential additional water supply options (including water use efficiency measures) to meet service area demands during a period of prolonged pumping cutbacks on the SWP. Some of these options have short and long term components to them, notably programmatic conservation and implementation of additional local supply projects. It is expected that both of these options will play a fundamental role in reshaping Metropolitan's approach to its long-term Integrated Resources Plan. The water resource options for the near and mid term include:

- Enhance local supply yield. In the shorter term, accelerating local supply yield includes identifying recycling/groundwater recovery close to completion; identifying and addressing Department of Health Services and permitting barriers; identifying conveyance improvements for facilitation of exchanges/yield (e.g. Central Feeder with San Bernardino Valley MWD); and encouraging member agency expansion of other local supplies. In the longer term, identification of all feasible local supply projects, barriers to implementation, and cost implications, will help to refine long-term planning targets for these resources.
- Conservation. In the shorter term, enhancements to water use efficiency programs includes accelerating programmatic device-based distribution; developing comprehensive multi-year messaging/public education programs; cooperative actions with large public and institutional users (e.g. CALTRANS, county and city parks and recreation departments, etc.); and consideration of changes to Tier 2 water rates reflecting the higher cost of new supplies. In the longer term, a regional effort to identify new methods of conservation outside of the current Best Management Practices, along with the cost implications of those types of measures, will help to guide the future outlook of conservation in the context of the Integrated Resources Plan.
- Enhance groundwater withdrawals. Most of the groundwater storage programs, both in the Central Valley and in the Metropolitan service area, have multiple years of storage. These programs can be drawn upon to increase available water supplies and reduce pressure on Metropolitan's surface storage.
- Procure new water supplies. Analysis is being conducted on opportunities for procuring new supplies, including purchasing South-of-Delta and Colorado River Aqueduct based supplies; augmenting existing groundwater and water transfer programs (e.g. Arvin/Edison, Semitropic, etc.); exercising the Desert Water Agency-Coachella Valley WD callback; and ensuring North-of-Delta options are available when pumping capacity is available.
- Replenishment Program. Significant reductions in groundwater replenishment deliveries would be considered.
- Interim Agriculture Water Program. Curtailment of deliveries under the Interim Agriculture Water Program could occur as early as January 2008.
- Allocation Plan. Development and implementation of a shortage allocation plan will provide a Board-adopted method to ensure that water supplies can be managed to meet uncertain conditions.

Next Steps

The intent of this letter is to identify and describe near- and mid-term conditions and actions that can be taken to address water supply risk while a long-term resolution for the Delta is being developed. Analysis results included in this report are preliminary and provide information on the opportunities of operational and physical changes to the Delta that would lessen smelt take and water supply impacts. Additional refinements to operational and physical features will be analyzed in the next several months to better formulate near and mid-term actions.

Statewide water policy for the long-term is expected to be resolved in the Governor's Delta Vision Process, and in the development of the Bay-Delta Conservation Plan. These two processes are slated to have recommendations

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for the long-term Delta solutions beginning in January 2008. The recommended actions would include elements for water quality/supply infrastructure, Delta habitat protection and restoration, flood control and levees, and others. Staff will return in August with a Board report focusing on the decisions and proposed schedule for actions for addressing a long-term Delta solution.