Policy and Regulatory Challenges for the Delta of the Future
Technical Appendix A

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Description

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Summary

In this appendix, we review several governance and regulatory challenges for the management of the Sacramento-San Joaquin Delta, taking into account the changes occurring in this region as a result of sea level rise, increasing risk to levees, inevitable changes in the sustainability of beneficial uses due to sea level rise and additional permanent island flooding, and the challenges posed by declining populations of native fish species. We find that although opportunities exist to improve the economic and environmental outcomes in the Delta, innovative solutions will face significant legal and regulatory hurdles.

The first issue is the inflexibility of the Clean Water Act. Sea level rise, climate change, the needs of the Delta ecosystem, and water quality and reliability concerns for water exporters all push in the direction of more variable Delta salinity, which a peripheral canal could facilitate. However, this change, expected to benefit native fish, could preclude some present agricultural uses within the Delta. The State Water Resources Control Board will need to work with federal officials to see how California can make the necessary regulatory changes to Delta water quality standards, while remaining in compliance with federal law.

The second issue is the unreliability of current legal protections for the environment and upstream users, which must be addressed before a peripheral canal could be built. Many of the safeguards these parties seek could be provided through a governance structure that ensures a flexible allocation of water for the ecosystem and limits long-term export volumes from upstream basins. This would allow the sizing of the canal to be decided on the basis of optimal water management opportunities for both human uses and the Delta ecosystem, rather than on fears that too much water might be diverted.

The third issue concerns the uncertainties surrounding the development of habitat conservation plans to comply with state and federal Endangered Species Acts. To seek greater regulatory certainty, exporters are currently pursuing a more comprehensive approach to habitat protection and species recovery in the Delta within a Natural Communities Conservation Program/Habitat Conservation Plan framework. However, the risks to species are high, and there are unanswered questions regarding the extent to which such a plan would protect the projects if species continue to decline, as long as exports can be linked to the problem. These risks will increase with climate change and the associated rise in water temperatures. Thus, current planning processes will need to consider the continued risk of water export cuts, even if a canal is built.

Fourth, important questions exist regarding the role of upstream diversions in addressing environmental problems in the Delta. Regulatory and market approaches are available to increase the contribution of upstream diverters to environmental flows; these users currently remove roughly twice as much water from the Delta as exporters. There is also a potential for export projects to face additional cuts from increased diversions in upstream watersheds, given their seniority under the area of origin laws.

The fifth issue concerns levee policy, given the high and increasing risks of levee failure. The state will need to engage in active planning to anticipate the transition in Delta landscapes with the increased risk of island flooding. Some islands may not be worth repairing because of their economic values, and a policy of preflooding some islands may be warranted to limit the risks of catastrophic failure or to accelerate development of aquatic habitat. If the state develops a policy to acquire Delta lands—either to ease transitions for Delta farmers or to facilitate preflooding—it must also consider the potential costs to neighboring levees that could be affected by island flooding. Forward-looking consultations with federal agencies are also required to develop new policies regarding the project levees that form part of federally authorized flood control projects.

The transition to a new Delta will require a fundamental reorganization of the Delta's governance and regulation framework. This task is best undertaken by the legislature and governor, in consultation with local governments, stakeholders, and the federal government. The state attorney general's office might begin this process with a white paper on available legal and institutional options.

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Introduction

"If a man neglect to strengthen his dike and do not strengthen it, and a break be made in his dike and the water carry away the farmland, the man in whose dike the break has been made shall restore the grain which he has damaged." *The Code of Hammurabi, King of Babylon, About 2250 BCE,* translated by Robert Francis Harper, 1904

Meeting the long-term goals of protecting the Delta ecosystem and making Delta waters available for human uses – the two co-equal objectives highlighted by the Delta Vision Blue Ribbon Task Force - will require new approaches to managing water and land resources to better balance human uses and ecosystem needs.[1] There can be difficult tradeoffs between these two objectives. As the recent decision by federal Judge Wanger on Delta pumping highlights, making flow regimes compatible with the needs of fish can result in water export reductions. [2] Protecting upland areas to allow the expansion of wetlands and to conserve habitat for birds and terrestrial wildlife can require limits on land development.[3] There are also potential tradeoffs among the goals of different human users of Delta resources. In particular, diverting water to a peripheral canal can improve water quality for exporters, but this solution may increase salinity for some in-Delta diverters.[4] A peripheral canal can also protect export supplies from a catastrophic failure of Delta levees, but it does little to protect in-Delta land owners from these consequences.

Over time, many of these tradeoffs will be accentuated by climate change and other drivers of change in the Delta. Sea level rise will make it increasingly difficult to manage Delta salinity. Together with continued subsidence and higher winter and spring flood flows, sea level rise will also increase the risks of levee failure. Higher water temperatures will worsen spawning conditions for endangered fish species, such as the delta smelt and various salmon runs.[5]

To increase the chances of favorable ecosystem and economic outcomes, California needs a policymaking environment that enables decisionmakers to anticipate the changes facing

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[1] See Isenberg, et al. (2008) for a discussion of the Blue Ribbon Task Force recommendations.

[2] In December 2007, Judge Wanger's ruling restricted flows to the export pumps at the southern edge of the Delta, to reduce the risk of entrainment of the delta smelt, a species listed under both the federal and state endangered species acts (Natural Resources Defense Council, et al. v. Kempthorne, Findings of Fact and Conclusions of Law Re Interim Remedies Re: Delta Smelt ESA Remand and Reconsultation, United States District Court, Eastern District of California, 1:05-cv-1207 OWW GSA (2007)). The Department of Water Resources (2007) estimates that these changes could reduce State Water Project exports on average by 22 to 30 percent.

[3] See Lund et al. (2007), chapter 4 for a discussion of the ecological importance of preserving some upland habitat in the Delta.

[4] For hydrodynamic modeling scenarios of salinity changes with a peripheral canal, sea level rise, and island flooding, see Appendix C to the main report.

[5] On delta smelt, see Bennett, 2005 and van Rheenan et al., 2004. See also Appendices D and E to the main report.

the Delta. This requires effective political leadership, a sound governance and finance system, and an appropriate set of regulatory tools.

Given the large number of stakeholders concerned with Delta outcomes, there is no substitute for higher-level political leadership to help chart a new course for Delta management and negotiate or otherwise achieve solutions to some of the difficult tradeoffs among human users of Delta resources. Mitigation offers a promising path for resolving some of these tradeoffs while fostering policies that best serve the overall interests of the state. However, given long-term limitations on state and federal funding, it is in both state and local interests for beneficiaries to pay for most Delta actions, rather than delaying urgent decisions with the distracting notion that state and federal governments will provide most funding. The State Water Project (SWP) and many local water projects provide sound precedents for the principle that water users should pay for the water infrastructure and operations from which they will benefit.[6]

Central issues for Delta governance include setting up better oversight of regional land resources, establishing a reliable funding stream for ecosystem management, and improving the process for balancing human water uses with ecosystem needs. The Delta Vision Blue Ribbon Task Force and the Bay Delta Conservation Program (BDCP) are each devoting considerable attention to these issues, which have also been the subject of legislative proposals (in the context of Senate Bill (SB) 27). Although the issues are complex, there are many successful resource management models to draw on elsewhere in California, including regional authorities such as the Coastal Commission and the Tahoe Regional Planning Authority, state land conservancies such as the Coastal Conservancy, and joint powers authorities (Aitchison, 2007). For the thorny question of ensuring stable funding for ecosystem management, California will need to move beyond the recent model of relying on periodic injections of state bond funding. A more appropriate—if more politically difficult—solution is to charge an ecosystem fee for all water diverted from the Delta.[7] As described in Chapter 6 of the main report and Appendices H and I, a peripheral canal, alone or in combination with continued through-Delta exports (dual conveyance) could generate substantial savings in water quality for agricultural and urban users of Delta exports. Tapping into this windfall savings would be a natural source of funds if a peripheral canal or dual facility were adopted.

One key governance issue brings California into new territory: how to provide adequate environmental and political safeguards in the event that a peripheral canal or dual conveyance system is built. There are also questions about whether the current regulatory framework is compatible with the changes coming in the Delta, either as a result of human actions (such as a peripheral canal) or of natural forces (notably, climate change). First, does the current federal and state system for managing Delta water quality allow for anticipatory, versus reactive, interventions? Second—as suggested by the quotation at the beginning of this appendix—what does the prospect of more Delta levee failures and island flooding mean for local and state responsibilities to neighboring landowners? Third, how can upstream diverters participate in a Delta solution? And fourth, how are Delta solutions that aim to balance ecosystem and

[6] See Lund et al. (2007), Chapter 9, for a discussion of financing and mitigation principles for Delta solutions.

[7] See Lund et al. (2007) for a discussion of this issue.

economic goals likely to fare in the face of an increasingly difficult natural environment for desirable species?

In this appendix, we focus on these four regulatory questions and the governance issue of providing safeguards for a new Delta. Our intent is not to provide the final word on these issues but rather to highlight areas that will need to be addressed squarely as part of any long-term Delta solution.

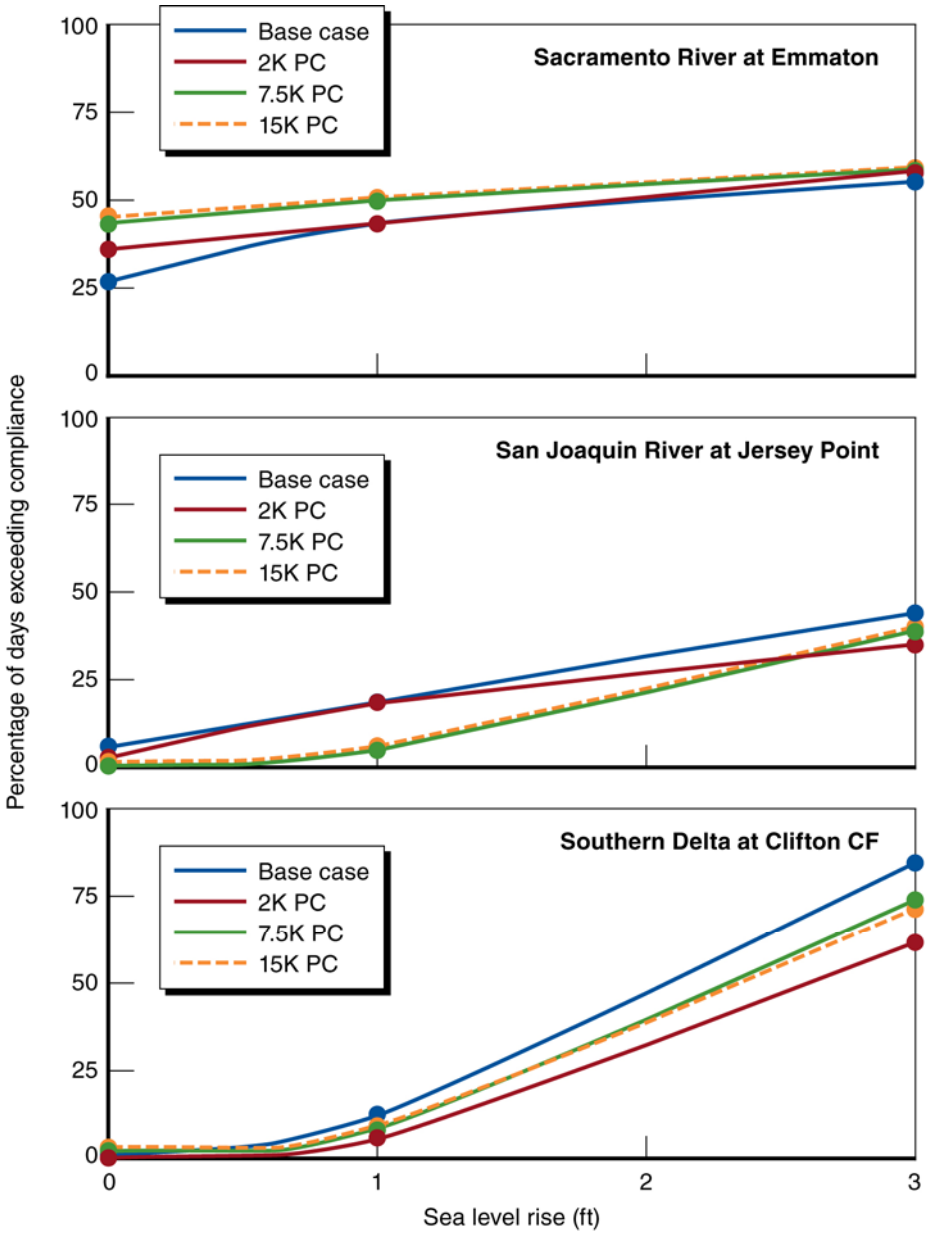
Regulating Water Quality in a Changing Delta

Since the Central Valley Project (CVP) came on line in the 1940s, Delta water quality has been managed to keep salinity low enough for in-Delta agricultural and urban users and project beneficiaries south of the pumps. After the SWP became operational in the early 1970s, the two projects assumed joint legal responsibility for meeting certain water quality standards for in-Delta users. Over time, water quality standards have been added to protect fish species. The State Water Resources Control Board (SWRCB, "the Board") has primary authority for adopting water quality standards under federal and state law (respectively, the Clean Water Act (adopted in 1972) and the Porter-Cologne Act (adopted in 1969)).

The Bay-Delta Water Quality Control Plan (WQCP) is the foundational document for Clean Water Act and Porter-Cologne compliance, and it includes measures to protect the legally designated beneficial uses of Delta waters: agriculture, municipal, and industrial uses, and fish and wildlife. The most recent WQCP, finalized in 1995 and updated in 2006, maintains pre-existing standards for agricultural and urban diverters (State Water Resources Control Board, 2006). To protect fish, it also includes a variety of minimum flow requirements, as well as maximum salinity standards at the western edge of the Delta at some times of the year (the so-called "X2" standard). D-1641, adopted in 1999, is the associated water rights decision that designates the SWP and CVP projects as responsible for meeting these water quality standards (State Water Resources Control Board 2000).

Under this system, all parties are assumed to benefit from lower salinity in the Delta, and the amount of water exported can be reduced and reservoirs operated to maintain standards for fish and in-Delta diverters. For several reasons, this system is likely to run into increasing difficulties. First, the modeling results shown in Chapter 4 of the main report and Appendix C confirm concerns raised by some in-Delta interests: At current sea level, a peripheral canal for water exports will make it more difficult to continue to meet salinity standards for some in-Delta diversions (Figure A.1).[8]

[8] The Board's imposition of "Term" reflects its view that it is proper for new appropriators to share in the responsibility for meeting Delta water quality standards by curtailing diversions. When natural flow conditions are insufficient to meet water quality standards, Delta watershed diverters with "Term 91" conditions attached to their water rights (generally appropriative rights holders with rights established since 1965) are not entitled to divert water. This restriction does not apply to riparian rights holders. There is considerable uncertainty regarding the extent of riparian versus appropriative diversions within the Delta. In *Phelps v. State Water Resources Control Board* (157 Cal.App.4th 89 (2007)) the court of appeal affirmed that the Watershed Protection Statute (Wat.Code Secs. 11460, et seq.) does not grant Delta water users the right to the release of stored water by the CVP and the SWP without paying for it, and that the Delta Protection Act (Wat. Code Secs. 12200, et seq.) does not guarantee Delta water users a right to salinity control or an adequate water supply in all situations.



SOURCE: Appendix C, Figure C.21.

NOTES: The figure shows the share of days exceeding the compliance limit for daily average EC during the irrigation season (April 1 through August 15). The results do not signify specific violations of standards because regulations are for a 14-day average

Figure A.1. Average Share of Days Above Regulatory Limits for Irrigation, with Sea Level Rise

Second, the modeling illustrates that sea level rise or island failures alone will generate similar or worse salinity effects for many users of Delta waters. Failure of some western Delta islands—an increasingly likely event with sea level rise and other pressures on the levees—will constrain or eliminate through-Delta pumping and many in-Delta diversions. Even if the levees in the western Delta remain intact, one foot of sea level rise, which is quite possible by the middle of this century, could generate frequent violations of salinity standards for agricultural users pumping in the western and central Delta under any export management alternative (Figure A.1).[9] Reducing exports or upstream diversions may help maintain Delta salinity standards under some scenarios, but this strategy will become increasingly costly.

These changes in the Delta raise two types of conflict relative to current water quality standards. First, a conflict could arise because one set of users (exporters) could maintain or even improve water quality with a different system of water management (a peripheral canal), but another set of users would be left with deteriorating Delta water quality. Second, a conflict could arise over inconsistencies in the water quality standards for different uses. If, as discussed in Chapter 5 of the main report and Appendix D, it is better for desirable Delta fish species to allow greater variability in Delta salinity conditions across seasons and years, this would require standards that directly conflict with those designed to meet agricultural and urban needs.

The current regulatory system is not prepared to resolve such conflicts. In the extreme, the changes from sea level rise or island failures imply that it would no longer be practical to maintain standards for some currently designated uses of the Delta. Yet, although the Clean Water Act does not guarantee specific levels of water quality to designated uses of Delta waters, it does not allow states to remove designated uses if they are already being served.[10] This restriction is tied to the assumption that direct human actions are the only sources of harm to water sources; the Clean Water Act did not foresee water quality changes because of climate change, such as salinity intrusion. Likewise, the act assumes that standards for different designated uses do not inherently conflict, as would be the case in a variable Delta. The question facing California is whether flexible solutions to water quality conflicts can be devised, to allow proactive selection of a long-term Delta strategy that will serve the state's residents and the Delta ecosystem better than the deteriorating status quo.

A peripheral canal, combined with mitigation for loss of some Delta farmlands, could protect water quality for agricultural and urban exporters as well as in-Delta urban users. It also would be compatible with more variable salinity conditions for fish. Because a canal would not be able to provide all Delta farmers with a substitute source of fresh water, it might be most practical—whether or not it is legally necessary—to develop a complementary program

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[9] According to the fourth assessment of the Intergovernmental Panel on Climate Change (IPCC), the combined effects of thermal expansion and ice discharge could result in sea level rise in the range of 11 to 28 inches by 2100, depending on the greenhouse gas emissions scenario (Meehl et al, 2007). Another recent study suggests a larger range, with 8 to 16 inches of sea level rise by 2050 and 20 to 55 inches by 2100 (Rahmstorf, 2007). While these projections are uncertain, they signify that sea level rise greater than 4 feet cannot be ruled out under strong warming scenarios. Drawing on this research, the CALFED Independent Science Board recently recommended that a range of one to four feet of sea level rise over this century be used for planning purposes in the Delta (Mount, 2007).

[10] See Section 40 CFR.131.10 (h).

to provide transitional assistance to affected Delta farms.[11] As long as everyone agreed, it might be possible to negotiate the necessary changes in Delta water quality standards. But with holdouts, the problem might be difficult to resolve without legal action.

The state must take the lead in resolving these conflicts, taking a forward-looking view of changing water quality conditions and needs. The SWRCB has the legal authority and the tools to take the lead on this effort, although it lacks the resources, political support, and mandate to do so. The Board recently resolved to develop a multiyear strategic work plan on Delta issues. This is an opportunity to consider future regulatory frameworks that can work best from the long-term standpoint of the ecosystem and the state's economy.[12] An activist SWRCB can push the regulatory discussion with federal, state, and local officials to find realistic ways to live with the changing conditions and uses of Delta waters. Delta salinity is the first of many such issues that California will face as the climate warms. For instance, in-stream temperature standards on many rivers and streams, including many within the Delta watershed, are also regulated under the Clean Water Act and Porter-Cologne, and it may become increasingly challenging to meet these standards, with longer warm seasons and warmer inflows into stratified reservoirs.

[11] Case law going back to the early 20th century has progressively established limits on the extent to which Delta water users are guaranteed water of a certain level of salinity. Salinity standards already vary by water-year type and by location in the Delta in recognition of the excessive costs of meeting higher, uniform standards. It may be possible to modify water quality regulations to allow increasing interannual and seasonal variability by pushing further in this direction—lessening salinity standards in some years (for greater interannual variability) and in later months in the irrigation season (for greater seasonal variability)—without making Delta farming unviable.

[12] Arguably, there is strong set of legal tools and precedents to make the case for giving fish and wildlife, especially endangered species, higher priority in setting water quality standards. These tools include the Public Trust Doctrine, Section 5937 of the Fish and Game Code (fish must be in "good condition" below dams), and the 1986 Racanelli Decision (discussed below).

Anticipating Levee Failures

As highlighted in Chapter 2 of the main report and Appendix B, the physical forces acting on the Delta suggest an increasing likelihood of levee failures in the coming decades, and for many islands the costs of repair may well exceed the value of economic activity and infrastructure assets that the levees protect. Similarly, the modeling results in Chapter 4 and Appendix C suggest that only the western islands might be important for maintaining Delta salinity standards. These findings suggest that it will not be in the interests of Delta landowners or the state to repair all levees after failures, and that it may also be in the state's interest to develop a strategy for purchasing and preflooding some islands to reduce salinity intrusion from extensive levee failures.

Clearly, additional economic analysis and hydrodynamic modeling work are needed to map out a long-term levee strategy of this type. Important legal issues also need to be considered regarding the potential hydraulic effects of island flooding on landowners on neighboring islands, such as greater wave action and increased underseepage, requiring reinforcement of the neighboring levees to avoid higher flood risk. We estimate that these mitigation costs can be substantial, ranging from several million to more than ten million dollars per island depending on the size of the flooded island and the length of levees affected on neighboring islands.[13]

There is no explicit statutory requirement to mitigate changes to neighboring levees if a levee breaks; in this case, neighboring landowners would need to resort to torts law and would need to prove that the levee owner was negligent or deliberately caused the levee failure. Even if fault were found, it might be difficult to receive payment from the local reclamation districts responsible for nonproject levees, because under the terms of Proposition 218 (a constitutional amendment passed in 1996), the districts would not have funds unless island landowners voted to assess themselves. Flooded landowners are unlikely to have the will or the capacity to provide such funds, particularly for islands that are not to be restored.

The situation is likely to be quite different if the state is directly involved, and the issues differ for nonproject and project levees. For nonproject levees, the state might purchase islands either as part of a long-term mitigation strategy for Delta landowners or with the intent to preflood the islands. In the first case, the state would likely be more exposed financially than private landowners, even if it did not deliberately cause the islands to flood. Preflooding the islands might make the state liable for the consequences to neighboring islands. In short, the state needs to develop a policy regarding neighboring island levees if it gets into the business of buying up Delta lands.

The state currently must repair project levees after a failure, unless the U.S. Army Corps of Engineers agrees that repairs are unnecessary —an action that would likely require congressional approval. Thus, any forward-looking policy regarding project levees—some of which protect highly at-risk islands—needs to anticipate these issues and involve federal consultations well in advance.

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[13] See the spreadsheet accompanying Appendix B, sheet SD_NR1. We have included these costs in our analysis of the costs of not repairing Delta islands after levee failures.

Including Upstream Diverters in a Delta Solution

Most reductions in net Delta outflow are due to upstream diversions and consumptive use of surface water and groundwater (Lund et al., 2007, Table 6.1). In an average year, water users upstream of the Delta on the Sacramento and San Joaquin Rivers and their tributaries divert roughly twice the amount of water from the Delta as do exporters (*Ibid.*). The Delta Vision Task Force argues for the need to involve both types of diversions, not just exports, in meeting ecosystem revitalization goals (Isenberg et al., 2008). Although the SWRCB has broad authority to involve upstream diverters in meeting environmental water quality needs in the Delta, efforts to do so have been very limited to date.[14]

In 1986, the Racanelli Decision (*United States v. State Water Resources Control Board*, 227 Cal Rptr. 161, at 195–1986) clarified that all water rights holders, irrespective of seniority, could be required to participate in meeting water quality standards. The decision made it clear that the Board has the authority to set water quality standards for beneficial uses including, specifically, protection of fish and wildlife. The Environmental Impact Report for the 1995 WQCP examined several alternatives for placing some responsibility for Delta water quality standards on upstream diverters (State Water Resources Control Board, 1999). The two alternatives that allocated responsibility by order of priority resulted in relatively little participation by upstream diverters, because most have rights senior to the export projects. A third alternative involved a much broader sharing of responsibilities, by relying on proportional cutbacks in upstream diversions on a watershed basis, irrespective of seniority. In the end, the CVP and SWP assumed responsibility for the water quality standards, but deals were made to seek contributions from senior agricultural users on the San Joaquin and Sacramento Rivers, in exchange for financial compensation.[15] In separate actions, the Board has required upstream diverters to modify flows to meet the needs of fish populations in the tributaries themselves.[16]

Looking ahead, there is a potential for significant increases in upstream diversions (Whitney, 2008). Potential avenues include perfection of the so-called "state filings"—water rights applications filed by the Department of Finance to reserve priority rights for other users when the CVP and the SWP were built. In addition, upstream water users in the "areas of origin" can receive higher priority for new water rights applications. Presently, over four million acre-feet of water rights applications are pending in the Delta watersheds; most (if not all) would rely on area of origin claims for seniority over the projects.[17] By way of comparison, Delta exports in recent years have averaged roughly six million acre-feet.

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[14] The Board has authority to prevent waste or unreasonable use, to protect water quality, and to protect the public trust. The Board can use its continuing authority to place conditions on permits, licenses, and other water rights.

[15] On the San Joaquin system, some senior users lease water to help moderate flows under the Vernalis Adaptive Management Program. On the Sacramento system, water users have entered into an agreement to make up to 185,000 acre-feet of water available for in-Valley and export uses through conjunctive use projects. This program is still in the environmental review process.

[16] This includes actions by the East Bay Municipal Utilities District on the Mokelumne River and actions by the Yuba County Water Agency as part of the recent Yuba River settlement agreement.

[17] Other large applicants include the Delta Wetlands Project (over 1 million acre-feet of water for storage on Delta islands) and Westlands Water District (750,000 acre-feet), which has claimed area of origin rights

The potential for new upstream diversions, even if limited to a portion of the applications on file, raises questions about the long-term reliability of current planning efforts for Delta exports. One alternative to offset greater upstream diversions would be to move from a priority-based approach toward a watershed-based approach, with proportional cutbacks, for regulating water quality. Such an approach might be most consistent with the Public Trust Doctrine. Another would be to increase the use of market-based tools, building on existing arrangements to get senior upstream diverters to release flows in exchange for compensation. As noted in Chapter 6 of the main report and Appendix F, there is considerable potential for increasing outflows through a combination of higher minimum outflow regulations and market-based mechanisms.[18]

Any reduction in upstream surface water diversions in the Sacramento and San Joaquin basins might provide little additional flows into the Delta unless it was accompanied by actions to limit expansions of groundwater use. Many upstream users, when faced with reduced access to surface water, can merely shift water demands to groundwater. Given the hydraulic connection between surface water and groundwater in these basins, additional consumptive use of groundwater in the Sacramento and San Joaquin basins eventually leads to reductions in surface flows or groundwater mining. This physics of the problem is essentially unrepresented in California groundwater law (Sax, 2002).

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on the San Joaquin River system. Data on permit applications available from the Water Rights Information Management System (eWRIMS), at: http://www.waterboards.ca.gov/ewrims/. There are no overall estimates of the volume of state filings on the Delta watersheds. There is also a potential for some increase in riparian water rights diversions upstream of the Delta, although the total volume is likely to be small, given the restriction that riparian uses be limited to parcels adjacent to the stream or lake.

[18] Economic-engineering scenario modeling using the CALVIN model finds that the economic losses from increasing net Delta outflows are lower than regulations directly restricting exports, for the same volume of outflows. Water users in export areas, many of which have high value uses, are able to purchase some water from upstream diverters with lower value activities. For details, see Appendix F.

Protecting Endangered Species in the Face of Uncertainty

Declining native fish populations are an undeniable aspect of the current crisis in the Delta, with several species listed under the federal and state Endangered Species Acts. Judge Wanger's decision to curtail pumping was a remedial action under federal endangered species law and will significantly reduce exports from levels allowed under the WQCP. Current efforts to develop a Bay Delta Conservation Plan reflect water exporters' goals to move to a more flexible regulatory regime for species protection. The BDCP is being designed to serve jointly as a Natural Communities Conservation Program (NCCP) (under a state law that complements the state Endangered Species Act) and a Habitat Conservation Plan (HCP) under Section 9 of the federal Endangered Species Act. Within a NCCP/HCP framework, the exporters would move from being regulated on a species by species basis, with incidental "take" permits for harm done to species, to a regime in which the overall conservation plan for a group of species guides regulatory intervention. With a plan that is sufficiently protective of the stated conservation goals, which must include species recovery under the terms of the NCCP, the exporters hope to have assurances that they will not face the type of cutbacks that have occurred under the Wanger ruling.

An NCCP may provide the most promising process for dealing with aquatic species management issues in the Delta; it lays out clear guidelines for conservation goals, supported by scientific review, and it is the only statute that explicitly considers adaptive management as part of the conservation process.[19] Developing such a plan for the Delta will be challenging, given the number of players and the complexity of aquatic habitat and water operations issues. To date, other NCCPs have focused on terrestrial habitat protection, and the "project" at stake is where to allow land development—a relatively straightforward issue, with fewer moving pieces.[20]

Even with an approved plan, BDCP participants will likely continue to face some legal and regulatory uncertainty, judging by the NCCP experience in Southern California.[21] In the Delta, there is also a persistent risk that some species will not do well, even if the plan's conservation actions are well designed and carried out in earnest. The results of our expert survey show that the scientific community has serious doubts about the viability of the delta smelt under any water management alternative, even under the best cases (Figure A.2).[22] With climate change, the chances of viability decline significantly for this and other key Delta species. In addition to the many existing stressors, water temperature increases will make it harder for some species to find a suitable window of time to spawn and thrive.

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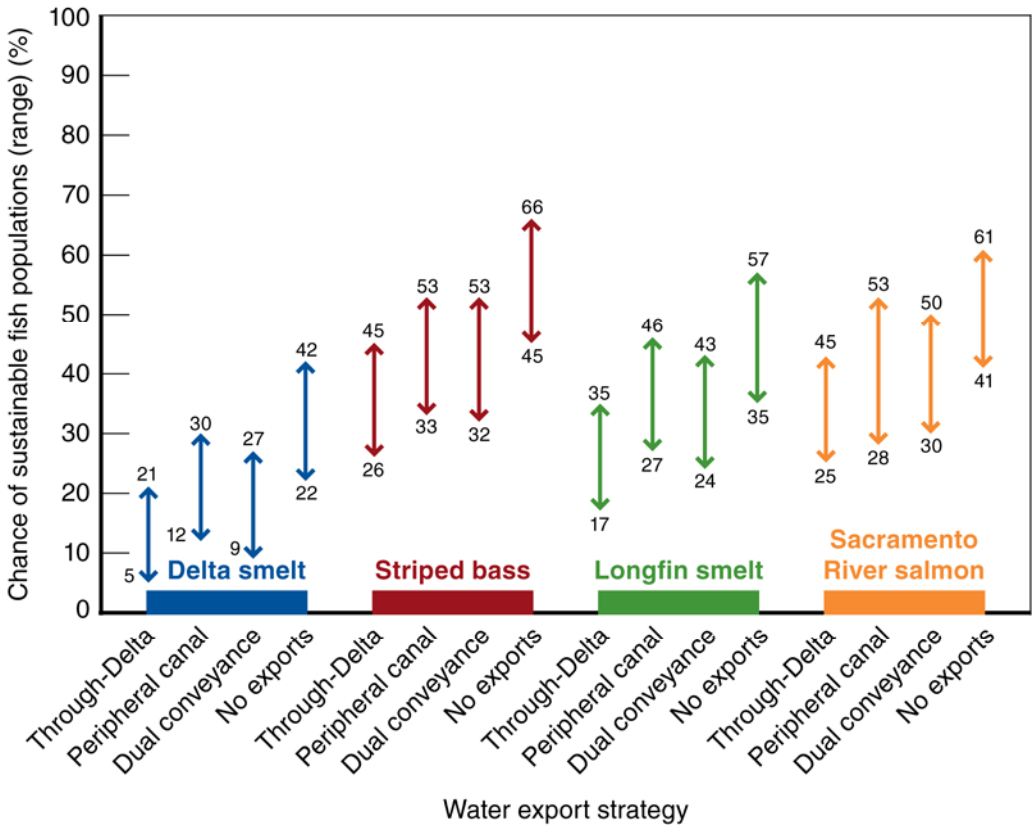
[19] In general, HCP requirements are less stringent, so this plan would likely be driven by the requirements of the NCCP.

[20] To our knowledge, the only other aquatic HCP is the recently developed multispecies HCP for the lower Colorado River.

[21] Despite receiving accolades from the country's planning community, San Diego County's NCCP has been held up by lawsuits over whether adequate resources were being devoted to its conservation goals.

[22] This survey, detailed in Appendix E to the main report, asked experts on Delta fish and the Delta ecosystem to state their subjective probabilities of viability of key fish species under alternative water export regimes, now and with climate change.



SOURCE: Appendix E.

NOTES: The figure reports the averages of 39 experts' high and low estimates of fish population viability several decades into the future.

Figure A.2. Expert Assessment of Likelihood of Sustainable Fish Populations in the Future with Different Water Export Strategies

The possibility of losing a species because of climate change was not foreseen by either the state or federal Endangered Species Acts. Like the Clean Water Act, these laws were passed in the 1970s, well before climate warming was in the spotlight, and they assume that harm to species in a project area is caused by direct human action. As a result, some important questions have not yet been tested: Can a well-planned NCCP/HCP protect against loss of a species from an external event such as climate change? Would incorporating climate change effects in the plan's adaptive management program—to foster the best conditions for the fish—be adequate to provide coverage?

Even if the Endangered Species Act did not apply if a species declined solely because of climate change, it may be difficult to argue that the CVP and SWP operations (or upstream diversions and operations) are not exacerbating or hastening the risk of extinction. Given the extent of physical manipulation of water in the Delta, proving that the projects play no role will be difficult. Thus, Endangered Species Act enforcement could still shut down or significantly reduce exports, as long as there was a reasonable chance that diversions were contributing to

the problem. Issues are likely to arise for other fish, in addition to the delta smelt, as evidenced by Judge Wanger's April 2008 ruling concerning winter and spring run Chinook salmon. The planning process needs to take this risk into account in evaluating the various alternatives and their costs.

Under current law, the only recourse to a direct conflict between species and economic losses would be a congressional exemption to the Endangered Species Act for the Delta, or a favorable ruling from the "God Squad"—an interagency cabinet-level group that can exempt projects from the act if the economic costs of compliance are too high. These are high-stakes events; to date, exemptions have been granted in only a handful of cases.[23] Here, as with the Clean Water Act, the Delta's issues are acute but not unique: numerous terrestrial and aquatic species are at risk of extinction from climate-related changes in habitat, accentuating the tradeoffs between species protection and economic development.[24]

[23] The God Squad procedure was established with an amendment to the ESA in 1978. The amendment was prompted by a dam project for the Tennessee Valley Authority, which would have harmed the endangered snail darter (Petersen, 2002). In this case, the project did not meet the economic significance justification required to allow an over-ride of the ESA provisions by the God Squad, but Congress granted an exemption. The God Squad exemption was granted for a logging case in the Pacific Northwest, where the species at risk was the northern spotted owl, at the end of the G.H.W. Bush administration. The Clinton administration subsequently determined that they did not need to harvest the timber.

[24] See Davis and Shaw (2001) and Malcolm et al, (2006).

Governance Safeguards for a Peripheral Canal

Among the export management alternatives considered in this report, two would involve constructing a peripheral canal. Because this decision would be a major departure from the present system of diversion, it would require new governance mechanisms. The peripheral canal is highly controversial. In June 1982, the last time a peripheral canal was seriously considered, it was rejected by a strong majority of Northern California voters (Figure A.3). The two main concerns are still being voiced by some today: the potential for a "water grab" by Southern California and the effects of a canal on the Delta ecosystem.25

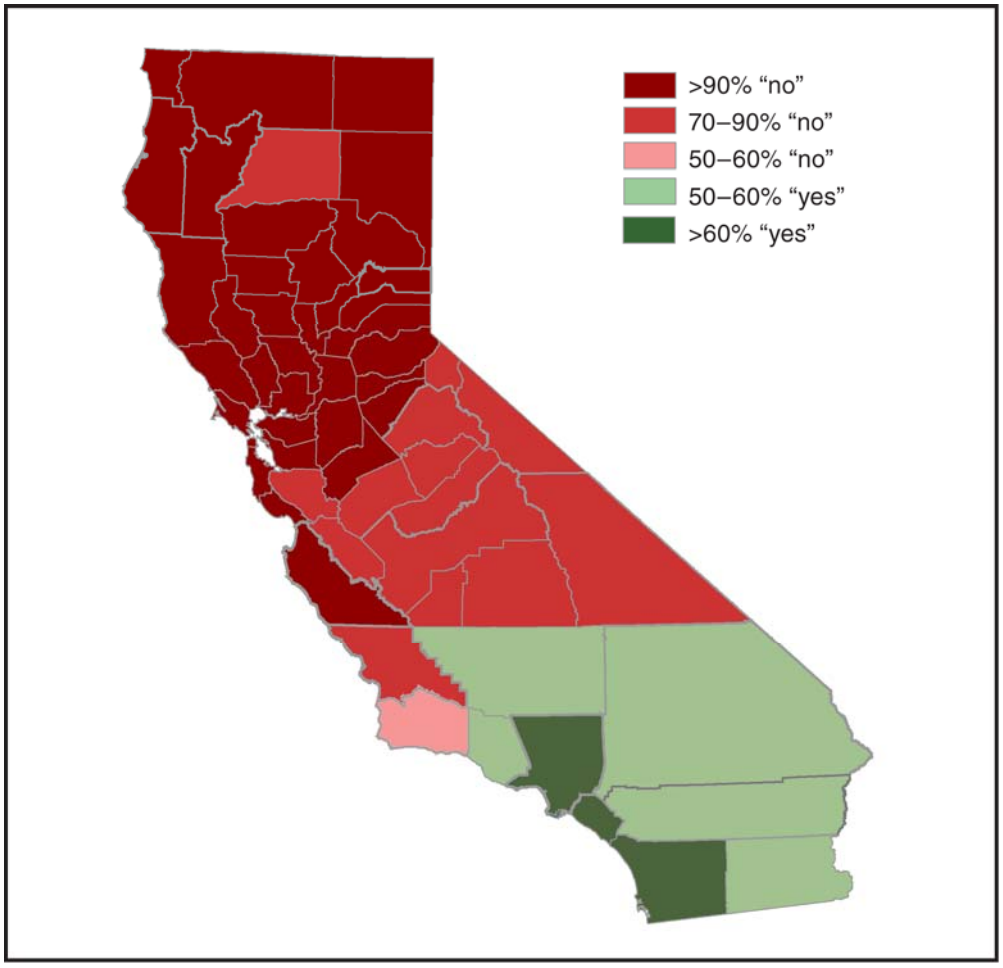


Figure A.3 - County voting patterns on Proposition 9 (Peripheral Canal), June 1982

[25] A third issue, relevant locally and as a motivation for funding the "no" vote campaign, was the costs to southern San Joaquin Valley farming interests of being connected to this new water source (Arax and Wartzman, 2003). Judging by the support of valley farmers for a canal this time around, this no longer seems to be an issue, although this support could wane if the canal proposal were too small or too expensive to accommodate farming interests.

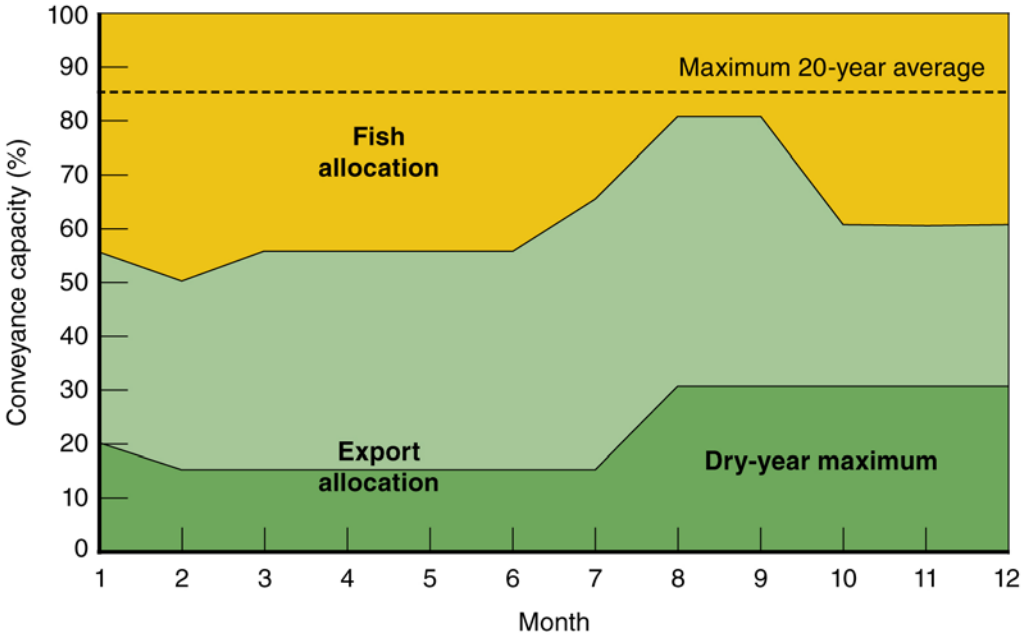
Although the San Francisco Bay Area now depends on Delta exports as much as urban Southern California, Sacramento Valley residents are sensitive to how much water can be exported from their watershed without causing local economic harm. And although there are potential environmental benefits from changing the intake points for water exports, environmentalists want to ensure that enough water is made available for habitat needs in the Delta if export water is diverted upstream.

One way to satisfy these apprehensions would be to provide physical safeguards, such as by building a very small canal or pipeline. However, this solution would limit the economic benefits from improving the conveyance of water exports, given the variability of rainfall and the scale economies of canal sizing. For several reasons, a very small canal also risks limiting environmental benefits: (i) it would not allow diversions to vary over the course of the tidal cycle, increasing risks of entraining downstream organisms; (ii) it would make it more difficult to allow salinity to vary within the Delta and Suisun Bay; and (iii) it would limit flexible adaptive operations that might reduce entrainment of fish at export intakes. An alternative is to build a canal large enough to benefit from water management opportunities and to provide solid safeguards through the governance system.

Providing safeguards to Sacramento Valley residents is largely a political issue, although considerations of "safe yield" to the region's groundwater basins could also play a role in setting export limits. The problem could be readily dealt with by setting long-term average limits to Delta exports—for instance, at the average of the last 10 or 20 years. This period would need to exceed the common decadal periods of wet and dry years. Such limits could be instituted by regulations, ownership of long-term capacity, or surcharge fees dedicated to environmental restoration or water development in Northern California.

Providing safeguards for the ecosystem requires scientific input. In addition to guaranteed minimum inflows into the Delta for ecosystem needs, the ideal system would provide the ecosystem with variable flows across seasons and years, depending on conditions of the fish and other factors. To allow for this flexibility, a formal Delta Environment Authority might control a sizable amount of conveyance capacity, which could be allocated to Delta inflows, or to lower San Joaquin River flows or leased to exporters, depending on ecosystem needs. For some period of time, the minimum inflow requirement could include adequate flows to maintain salinity standards for in-Delta diverters, until this latter goal became unattainable because of sea level rise or island flooding. Exporters, too, would have a lower bound of water availability from the canal, which would vary seasonally and by water-year type. Hydrodynamic modeling and analysis by biologists could help establish the size and pattern of these allocations.

Figure A.4 provides a simple illustration of such a system. A side benefit of this flexible arrangement is that leasing of the fish allocation on some occasions could create a stream of income for ecosystem investments.



NOTES: Additional Delta outflow requirements also would exist (not shown here). Annual and monthly percentages shown here are for illustration only. In dry years, export users could convey only the volume represented in the dark green area. In wet years, export allocations would extend to the top of the light green area. The fish allocation (yellow area) would be available for various Delta environmental uses or for lease to export users, when the water was not needed for fish. Over a 20-year period, exports would not be allowed to exceed a maximum 20-year average (or other appropriate threshold), to protect interests in the Sacramento Valley watershed

Figure A.4 - Allocation of Peripheral Canal Capacity in a System with Safeguards

Some parties could still worry that the system could be undone through the political process—for instance, by a change in the laws governing the canal or the public institutions that manage it. To provide legal safeguards, two alternative approaches have recently been proposed. The first, suggested in SB 27, is to provide a constitutional protection of export limits.[26] An alternative proposal is to consider a type of public/private partnership for managing the canal, with a private party (for instance, an environmental water trust) to manage the flexible allocation for the ecosystem.[27] With a private partner, the governance rules for canal operation would be subject to private contracts law. If the agreement specified appropriate compensation for abrogation of the contract terms, this could make the system less vulnerable to modification by administrative or legislative fiat. Effective legal safeguards for environmental flows have occurred elsewhere in California, such as with Mono Lake, increased Trinity River flows, and the protection of Wild and Scenic Rivers.

[26] Constitutional protections of north coast rivers and Delta water quality were part of the agreement for the peripheral canal proposal in the early 1980s. Dissatisfaction with these environmental protections on the part of some southern Central Valley agricultural interests was a factor in the canal's defeat (Hundley, 2001).

[27] See Natural Heritage Institute (2008) for a discussion of this issue.

Governance and Decisionmaking for a New Delta

The CALFED experience of the 1990s and early 2000s shows that extensive stakeholder processes cannot be relied on to make major strategic decisions for the Delta. Too many divergent interests were involved and essentially any interest could block any major decision, effectively limiting actions to modest modifications of the status quo (Lund et al. 2007). Today, prospects for stakeholder decisionmaking are further dimmed by diminishing state and federal funding to provide external incentives for agreement. The urgency and magnitude of the Delta's problems require more capable frameworks for making strategic decisions. The transition to a new Delta will require a fundamental reorganization of the Delta's governance and regulation framework. This task is best undertaken by the legislature and governor, in consultation with local governments, stakeholders, and the federal government. The state attorney general's office might begin this process with a white paper on available legal and institutional options.

California has made major strategic decisions regarding water in the past, such as flood control early in the 20th century and the development of major projects in the middle of the last century (Kelley, 1989; Lund et al., 2007, Chapter 2). In both cases, decisions were preceded by long periods of controversy. But persistent crises and realization of the importance of strategic change ultimately prevailed in effecting change. These decisions reconfigured existing local governments and state and federal agencies to implement fundamentally new directions in water management. Without comparable decisions today, Delta management will remain in the realm of tinkering with the deteriorating status quo until court decisions or physical catastrophe intervene.

Affirming a strategic decision alone is insufficient. Real institutional, financial, and technical capability and authority must also be created to implement the decision. Indeed, as with early 20th century flood control and the development of California's major water projects, the new institutions were designed specifically to implement new the management strategy and infrastructure. Effective governance form should follow desired physical function. Establishing such capability, in a state with many other problems and few available funds, will require financial and leadership involvement from the beneficiaries of implementation.

Conclusion

In sum, although opportunities exist to improve the economic and environmental outcomes in the Delta, innovative solutions could face significant legal and regulatory hurdles. The first issue is the inflexibility of the Clean Water Act. Sea level rise, climate change, the needs of the Delta ecosystem, and water quality and reliability concerns for water exporters are all pushing in the Delta to have more variable salinity, which could preclude some present agricultural uses. The SWRCB will need to work with federal officials to see how California can make reasonable and necessary regulatory changes to Delta water quality standards, while remaining in compliance with federal law.

To build a peripheral canal, which could provide numerous water quality and reliability benefits, it will be necessary to overcome concerns about the unreliability of current legal protections for the environment and upstream users. Many of the safeguards these parties seek could be provided through a governance structure that ensures a flexible allocation of water for the ecosystem and limits long-term export volumes from upstream basins. This would allow the sizing of the canal to be decided based on optimal water management opportunities for both human uses and the Delta ecosystem, rather than on fears that too much water might be diverted.

Current planning processes will need to consider the continued risk of water export cuts, even if a canal is built. To seek greater regulatory certainty, exporters are currently pursuing a more comprehensive approach to habitat protection and species recovery in the Delta within an NCCP/HCP framework. However, the risks to species are high, and there are unanswered questions regarding the extent to which such a plan would protect the projects if species continue to decline, as long as exports can be linked to the problem. These risks will increase with climate change and the associated rise in water temperatures. In addition, the projects face cuts from increased diversions in upstream watersheds, which would be senior in priority under the area of origin laws. Regulatory and market approaches will be needed to lessen this risk.

The state also will need to engage in active planning to anticipate the changes in Delta landscapes with the increased risk of island flooding. Some islands may not be worth repairing because of their economic values, and a policy of preflooding some islands may be warranted to improve fish habitat and limit the risks of catastrophic failure. If the state develops a policy to acquire Delta lands—either to ease transitions for Delta farmers or to facilitate preflooding—it must also consider the potential costs to neighboring island levees that could be affected by island flooding. Forward-looking consultations with federal agencies also are required to develop new policies regarding the project levees that form part of federally authorized flood control projects.

The transition to a new Delta will require a fundamental reorganization of the Delta's governance and regulation framework. This task is best undertaken by the legislature and governor, in consultation with local governments, stakeholders, and the federal government. The state attorney general's office might begin this process with a white paper on available legal and institutional options.

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