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Policy Implications of Permanently Flooded Islands in the Sacramento–San Joaquin Delta

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ABSTRACT

The Sacramento–San Joaquin Delta (Delta) is in a state of inevitable transition. Physical and financial pressures are likely to transform parts of the Delta into open water within the next 100 years. Because flooded islands have different habitat, water quality, and hydrodynamic implications, depending on location, depth, orientation, and other physical factors, the state may decide to intentionally flood one or more Delta islands in an effort to better manage the Delta's ecosystem and valuable water supplies. This paper outlines three sets of near-term actions the state would have to take to begin transitioning toward intentional island flooding, and discusses legal and political challenges to those actions. Several key findings include the following: (1) amendments to California's water code and revisions to the Delta Land Use and Resource Management Plan may help the state ensure the legal authority to differentiate levee policies within the Delta; (2) permits for a first, experimental flooded island will likely require the State Water Resources Control Board to revise the Delta Water Quality Control Plan to allow for more short-term flexibility and deal with conflicting ecosystem and water supply uses; and (3) the state may want to prepare mitigation plans for private land-

owners on neighboring islands whose levees could face new threats of erosion and/or seepage from a nearby flooded island in order to avoid inverse condemnation lawsuits. If the state decides to shift its levee policies in the Delta, serious consideration will need to be given to these and additional common, regulatory, statutory, and constitutional laws.

KEY WORDS

Sacramento–San Joaquin Delta, levee policy, flooded islands, governance, water rights

INTRODUCTION

California's Sacramento–San Joaquin Delta (Delta) is in a state of political and physical transition, posing legal and institutional challenges for state legislators and administrators, as well as engineering and economic challenges for the region and the state. Physical and financial pressures on the levee system are increasing, rendering some islands economically unsustainable. A recent Public Policy Institute of California (PPIC) and University of California, Davis (UCD) report predicts that these pressures will likely transform parts of the Delta into open water within this century (Suddeth and others 2008). The consequences of this inevitable transition will depend on how it is managed. Planned flooding of Delta islands

is likely to be much less costly than a catastrophic failure of levees from an earthquake or flood. A well-planned transition should allow the state to better restore habitat, protect water quality, mitigate for flooded property, and protect remaining islands.

The need for selective and well-planned island flooding in the Delta stands in stark opposition to California's current legal framework and policies for the Delta, which generally approach the Delta's levee network as a homogenous system (Delta Levees Maintenance Subventions Program 1973; California Water Code Sections 12980–12985). Recent legislation (California Water Code Sections 85000–85350) has made some progress towards recognizing the Delta as a more complex system with the need for higher resolution management. To best manage a transitioning Delta, the state must continue this shift towards policies that acknowledge the Delta as a diverse and heterogeneous place, prioritize levee spending, and consider purposefully transitioning parts of the Delta into open water in a way that protects private rights and public interests.

This paper summarizes some legal and physical hurdles the state faces in purposeful island flooding in the Delta, and suggests near-term approaches for overcoming some of the most immediate legal hurdles. The discussion focuses on privately owned levees on the most economically unsustainable islands in the deeply subsided regions of the central and western Delta (Lund and others 2008). A brief discussion then follows on long-term strategies for optimizing native ecosystems, costs, protection for remaining islands, and mitigation for private losses.

STATE INVOLVEMENT IN LEVEE MAINTENANCE AND REPAIR

The Sacramento–San Joaquin Delta is one of California's largest water-management challenges. Freshwater from the Sacramento and San Joaquin rivers that flows through the Delta supplies water to over 25 million Californians and over a million acres of farmland. Failing Delta levees create a flood risk that threatens drinking and irrigation water quality, state infrastructure, and, in some cases, homes. The Delta's declining ecosystem also has prompted about

a 30% reduction in water exports for many agricultural and urban water users (DWR 2007). The state legally recognizes the Delta's importance to these various "interests of the public at large" (California Water Code Section 12982). State policy has generally been to assist in levee upgrade and repair, implicitly approaching each island as an equally important piece of the larger system.

The Delta Levees Maintenance Subventions Program, established in 1973 and amended in 1988 by the Delta Flood Protection Act, establishes a fund to be managed and distributed by the California Department of Water Resources (DWR) to maintain and upgrade non-project levees in the Delta (Delta Vision 2007). Reclamation districts, set up by the five counties that extend into the Delta, make yearly requests to DWR for subventions funding. The total of these requests is assessed, and DWR makes a recommendation on funding to the Central Valley Flood Protection Board. An attempt is made to apportion an equal percentage of each request to the districts. The Delta Levees Maintenance Subventions Program makes no attempt to prioritize assistance based on the needs or public worth of any individual district or island, but rather attempts to ensure equitable distribution of funds by applying this proportional distribution. The only exception is that the Board can apportion extra money to a "critical" levee if insufficient funds are available (California Water Code Section 12987 [f]).

Regardless of these upgrade and maintenance efforts, levees in the Delta fail often. Breaches have occurred 166 times in the past 100 years, almost all of which have been repaired. Typical state policy has been to pay for and manage the repair of the levee breach, and then require reclamation districts to pay for pumping water out of the island (Delta Vision 2007).

However, in recent years DWR has indicated a policy shift toward selective island repairs. In a Senate informational hearing on California's vulnerable levee system in 2006, a DWR deputy director stated:

"We are prepared to respond to a flooded island, stabilize the event, and use emergency contracting to do that. And then what we'd look for is to see if there is a

statewide interest to reclaim the island after we stabilize it.”

This policy shift is yet to be tested.

In some cases, islands have not been repaired following a flood. The two largest, Franks Tract in the 1930s and Mildred Island in 1982, were both abandoned after 2 years of consecutive flooding. The islands were repaired after the first year's flood, but reclamation districts faced prohibitive costs when another breach occurred only a year later (DWR 2009). Liberty Island failed in 1998. These cases illustrate the power of financial drivers in the Delta.

PHYSICAL IMPLICATIONS OF FLOODED ISLANDS: COMMON CONCERNS AND CURRENT KNOWLEDGE

As governing agencies and the scientific community grapple with the likelihood of increased flooding in the Delta, a multitude of concerns have surfaced about the possible negative effects of permanently flooding deeply subsided islands. Possible implications include invasive species expansion, water quality degradation, seepage on neighboring islands, and wave action against neighboring levees. While many of these concerns are valid, islands will not respond uniformly to flooding. Research and modeling efforts have shown, for example, that flooded islands might provide beneficial habitat for endangered species, and that salinity effects vary significantly based upon island and breach location (Fleenor and others 2008; Lund and others 2008; Moyle 2008).

Habitat Implications

One of the oft-voiced concerns about flooded islands in the Delta is that they are prone to invasion by non-native species, with Franks Tract as the best example (Cain 2006; Moyle 2008). These assumptions are a formidable political challenge in transitioning parts of the Delta to open water, especially regarding regulations such as the Endangered Species Act (ESA). Of all invasive species in the Delta, three seem to garner the greatest amount of attention and concern: the Brazilian waterweed (*Egeria densa*), the overbite clam (*Corbula amurensis*) and the Asian

clam (*Corbicula fluminea*). *Egeria* causes problems by trapping sediment and thereby decreasing turbidity, while at the same time providing easy cover-age for non-native predator species (Nobriga and Feyrer 2007; Kimmerer and others 2008). For some of the smaller desirable species such as the delta smelt that prefer a certain amount of turbidity, this both degrades their physical habitat while making them more vulnerable as prey. The clams, in turn, limit food sources for the Delta's fish by consuming large amounts of phytoplankton (Jassby and Cloern 2000; Lopez and others 2006).

While under some circumstances a newly flooded island might benefit invasive species, it is equally likely, under different circumstances, that a newly flooded island could instead provide important habitat or food sources for desirable species (Moyle 2008). Habitat varies significantly across the Delta, and the effect of open water depends on its location within the Delta, depth, proximity to the Sacramento and San Joaquin rivers, size, tidal influence, and a host of other factors (Lucas and others 2002; Kimmerer and others 2008; Moyle 2008). For example, Franks Tract's shallow depth and hydrodynamic conditions allow for invasion by *Egeria*, and the Asian clam, whereas Mildred seems to be too deep for *Egeria* and has limited clam populations (Lopez and others 2006; Kimmerer and others 2008). Mildred is also a net producer of phytoplankton—an important food source for the Delta (Lucas and others 2002; Lopez and others 2006; Moyle and Bennett 2008).

Given the importance of island location, depth, and breach configuration for the physical character of potential flooded habitat, as well as the uncertainty over how different species might respond to these variables, some ecologists are calling for the experimental flooding of an island, to gain a better understanding of how different species may respond to a given set of conditions (Moyle 2008).

Water Quality

Most water quality concerns about flooded islands relate to salinity intrusion, which can harm both export water users and in-Delta farmers. The fear

is that newly flooded islands will expand the tidal prism, bringing bromides from seawater, and that residence time of water will be much longer in deeper areas, increasing salt concentrations due to evaporation (SWRCB 2001). These increases in salinity translate into higher treatment costs for water exporters, shortage costs for upstream users who are then required to release more freshwater from reservoirs, or both.

Similar to potential habitat implications of a flooded island, salinity and water quality implications seem to be closely related to an island's location and relative exposure to various river flows and tides. A recent modeling study explored the salinity effects of different geographically positioned groups of flooded islands (Fleenor and others 2008). The analysis found that the eastern and southern groupings of flooded islands had very little effect on export salinities. Only failure of the western group of islands caused significant violations of water-quality standards. While not a comprehensive assessment of every island's importance to export water quality, this study implies that the effect of island flooding on water quality varies significantly with the flooded island's location and configuration.

Neighboring Islands

Finally, permanent flooding creates two possible negative externalities for neighboring islands: seepage and wave action. Seepage occurs when underground sand lenses coincide with a large elevation difference between surface water stage and water table elevations. Thus, flooded islands could exacerbate seepage problems on neighboring islands by increasing hydraulic head in these lenses. Planning for seepage mitigation is challenging because it is often unknown whether the soils underneath both islands are porous sands that are hydraulically connected (Todd Engineers 1998). However, such seepage may end after a short time as material from turbid Delta waters clog these porous sands, as often occurs when channels are dredged (Gilbert Cosio, MBK Engineers, pers. comm., 2008). Wave action is a concern because flooded islands increase open water fetch length. The longer and deeper the expanse of open water

in the same orientation as wind direction, the larger the waves can become. These waves add pressure to remaining levees.

As with habitat and water-quality concerns, the effect of flooded islands on neighboring islands will depend on their location and configuration—position relative to wind direction, breach locations (and hence flow velocities), and the locations of sand lenses all play an important role in determining the extent of potential damage from seepage or wind and wave action.

Summary: Physical Implications of Flooded Islands

Physical concerns about flooded islands, summarized in [Table 1](#), result in considerable resistance to experimentation that could give the state a more substantial understanding of flooded islands. This inertia is observed in the following interchange among DWR, Natural Heritage Institute, and Central Delta Water Agency employees in this excerpt from a Senate informational hearing on California's vulnerable levee system (CALDOC 2006):

Senator Florez: "Let me just ask [a question] of the panel. ... Senator Feinstein had made a comment about letting some of these islands go ... I think the thought was ... that we have to face reality. ... Comments on that from the panel?"

Mr. Nomenilli (Attorney for the Central Delta Water Agency): "... We don't think that's a wise way to approach it. ... When you fill up one of these islands with water it seeps into the adjoining islands and makes it much more difficult to maintain the adjoining levees and lands. Plus, if you're not real careful, the winds could break out of that ... and then you'd have a big inland sea ... with large waves."

Dr. Harder (Deputy Director for Public Safety, DWR): "Well, the points that Dante Nomenilli raised are quite true But we also note that that had already happened in the Delta. We've had islands fail; were never reclaimed; and yet the adjoining

Table 1 Physical concerns about flooded islands

Type of change	Direct physical effects	Beneficial use effects
Habitat	1. Possible loss of shallow-water habitat, and 2. Increase in deep open water habitat	Possible increases in invasive species and resultant ecosystem degradation
Water quality	Increased salinity from evaporation and landward penetration of seawater	1. Water shortage costs to upstream users and/or treatment costs for exporters, 2. Degradation of Central Valley farmland from salt intrusions
Wave fetch	Increase in water surface area exposed to seasonal winds	Increased wave action and pressure on neighboring levees
Seepage pressures	Increase in hydraulic head above possibly porous sands	Risk of seepage damage to neighboring islands

islands successfully are still there. ... So, we have to consider the impacts on the adjoining islands. We also have to consider the impacts to water quality. But changing land use in the Delta to reduce risks overall is going to be on the Table for discussion and has to be weighed.”

Mr. Cain (Director of Restoration Programs, Natural Heritage Institute): “... If you just let it go, what you’ll get are places like Frank’s Tract, which is invested with aquatic weeds, which is a headache for boating and waterways to maintain. We need to think long and hard before we let something like that happen.”

While the concerns voiced above are a significant political obstacle to intentional island flooding, all current understanding of the Delta’s ecosystems, water quality, and levees indicates that the success and functioning of a future Delta will depend heavily on the location and configuration of flooded islands. A planned, monitored transition to a Delta with one or more purposefully flooded islands will likely prove more effective in protecting environmental and public interests than an unplanned, catastrophic transition. The state may decide, despite common fears, to begin prioritizing and categorizing islands, and conduct experiments that will help them better manage a future Delta with more open water. Such experiments might be best managed adaptively, employing a combination of hydrodynamic, water quality, and economic models and monitoring programs to help

identify and prepare for promising experiments and adjustments (Hollings 1978; Allan and others 2008). However, legal, institutional and political realities will largely determine the ability of the state to prioritize and effectively manage the landscape in this way (Allan and others 2008; Kallis and others 2009).

TRANSITIONING IN THE NEAR TERM

There are numerous questions about how the state might selectively transition some islands to open water. In terms of legal authority, the transition to selectively flooded islands is somewhat challenging because California’s Water Code lacks a clear expression of legislative intent, with some older language still presuming the Delta represents an undifferentiated system with universal needs and importance. However, recently added sections (California Water Code Sections 85000–85350) provide some clarification and add support to a policy of prioritized upgrade, repair, and transition efforts. Regulatory law also presents challenges for a transition to flooded islands: open bodies of deep water can produce water quality and ecosystem problems that may not stand up to federal and state water quality legislation (Clean Water Act and Porter–Cologne Water Quality Control Act) or endangered species acts. Finally, some liability risks exist for a state policy of selective flooding, the largest being suits for inverse condemnation and nuisance for harm that may be caused to neighboring islands including seepage and wave effects.

Table 2 State actions for a transition towards flooded Delta islands

Legal and regulatory barriers		Action one: Ensure legal authority	Action two: Acquire permits to experimentally flood an island	Action three: A mitigation plan for private landowners
California water law and Delta-specific legislation	1. California Water Code	Legislature		
	3. Delta Land Use and Resource Management Plan	Delta Stewardship Council and Delta Protection Commission ^a		Delta Stewardship Council and Delta Protection Commission
Regulatory law	4. Federal Clean Water Act		State Water Resources Control Board	
	5. Porter–Cologne Water Quality Control Act		State Water Resources Control Board	
	6. Endangered Species Act		NMFS and USFWS	
	7. California Environmental Quality Act and National Environmental Policy Act		USFWS, EPA, DFG, NOAA Fisheries, and others	
Condemnation	8. Nuisance laws			Courts

^a This change is currently ongoing and does not require additional legislative action.

Notes: Agencies in the boxes represent those with regulatory authority under the corresponding laws. Empty boxes indicate that the law has no bearing on that particular action. NMFS: National Marine Fisheries Service, USFWS: United States Fisheries and Wildlife Service, DFG: California Department of Fish and Game; EPA: Environmental Protection Agency; NOAA: National Oceanic and Atmospheric Administration – Fisheries (formerly the National Marine Fisheries Service)

Amendments to current law will likely be required

Unclear

No amendments necessary

Transitioning to a different landscape amidst these various concerns and challenges will require many careful and deliberate changes in state policy, planning, and law. This paper focuses on near-term actions the state could take to anticipate and prepare for the political and legal hurdles it will face throughout this transition. Three potential sets of state actions are identified to begin a policy shift:

1. Ensure legal authority and gather political will to prioritize individual islands in Delta land use and levee policy;
2. Acquire requisite project permits under the ESA, Clean Water Act (CWA), California Environmental

Quality Act (CEQA), National Environmental Protection Act (NEPA), and the Delta Protection Act, with an implementation and scientific plan for an experimental flooded island that addresses common legal and regulatory concerns;

3. Set up a framework for mitigating affected landowners.

Each set of actions faces a mix of challenges from existing state and federal legislation, either statutory, regulatory, or common law in nature. Table 2 summarizes these challenges, and separates those that seem surmountable without changes in written legis-

lation from those that probably require amendments. The following three sections discuss these actions, outline legal considerations for their implementation, and suggest approaches for overcoming barriers.

ACTION ONE: ENSURING THE LEGAL AUTHORITY TO SELECTIVELY REORGANIZE DELTA LAND USE

State policy changes will not occur unless state policymakers are fairly confident of significant protection against liability. Potential liability due to constitutional or statutorily based claims must be addressed. This section presents an overview of California's Delta-specific legislation, and analyzes its compatibility with state-planned island flooding.

A prioritized and differentiated land management plan for Delta islands faces some small barriers in California Water Code and Delta Protection Acts, but recent legislation (California Water Code Sections 85000–85350) gives significant direction to the Delta Protection Commission, while also creating a new Delta Stewardship Council. These amendments may be enough to give the state the legal authority to move towards a management plan in the Delta that includes reorganized land use and intentionally flooded islands, but additional amendments could strengthen the state's position.

Introductory sections in California's Water Code are sometimes conflicting, alternating between a mandate to protect the Delta's "levee system" and exceptions to that rule. Section 12981 is a good example of the internal push and pull between preserving the status quo and adjusting to new realities. It starts by asserting:

"In order to preserve the Delta's invaluable resources, the physical characteristics of the delta should be preserved essentially in their *present form*; and the key to preserving the delta's physical characteristics is the *system* of levees defining the waterways and producing adjacent islands" (emphasis added).

Note how the Delta's levees are referred to as a "system" to be preserved in "present form" – a

strong directive to maintain the status quo and ignore variability between islands. This is contradicted in the next sentence by a 1985 amendment to Section 12981 (Assembly Bill No. 955), which reads: "However, the Legislature recognizes that it may not be economically justifiable to maintain all delta islands," thus allowing discretion in changing the status quo. Such conflicting language is not uncommon in introductory statutes, however, and newly-added sections in the California Water Code (Sections 85000–85350) have taken a step towards more substantive directives.

A few sections within the Delta Flood Protection Act of 1988 order the state explicitly to prioritize efforts in the Delta. The language in the 1988 legislation implies a trend toward recognition of the legitimacy of selective land use in the Delta. In the Act, the Department of Water Resources is ordered to "develop a list of areas where flood control work is needed to protect public facilities or provide public benefits [which] shall establish a priority for the areas based upon both of the following: (1) the importance or degree of public benefit needing protection (2) the need for flood protective work" (Section 12313). Although this program is separate from and does not amend the Delta Levees Maintenance Subventions Program, it is significant that the importance or degree of public benefit is placed above the need for protective work, implying a move toward justified spending and away from uniform subsidies for levee upgrades. It follows that if an island better serves the public interest as open water, then planned and intentional breaching could be justified under the Delta Flood Protection Act, especially if a catastrophic breach might harm both public and private property.

In 1992, the Delta Protection Act codified at Public Resources Code Sections 29700 et seq. (different from the Delta *Flood* Protection Act) established the Delta Protection Commission (DPC), tasking them with the development of a Land Use and Resource Management Plan for the Delta. The current plan contradicts the trend in legislative language toward more flexibility in Delta management, and instead gives generalized directives to local Delta governments without recognizing a need for prioritized

policy. Counties and reclamation districts are ordered to “ensure that Delta levees are maintained to protect human life, to provide flood protection, to protect private and public property, ... to protect water quality in the State and federal water projects, and to protect recreational use of the Delta areas.” The only exceptions are for “water reservoir and habitat development that is compatible with other uses” (Delta Protection Act). Although the term reservoir does imply flooded islands, it also implies extensively managed systems and other environmental side effects linked to reservoir operations, thus limiting options for a future Delta.

Recent legislation, however, tasked a newly-established Delta Stewardship Council with the creation of a replacement Delta Plan, that allows for substantial changes to Delta land use and levees (Section 29722.5, California Public Resources Code). California Water Code Section 85305 requires the plan to “attempt to reduce risks to people, property, and state interests in the Delta by promoting... strategic levee investments” and Section 85306 further requires that priorities be recommended for “state investments in levee operation, maintenance, and improvements in the Delta, including both levees that are a part of the State Plan of Flood Control and nonproject levees.” Ensuring legal authority for planned island flooding in the Delta is, therefore, not necessarily difficult from a legal perspective (as long as compensation is paid for the taking of the flooded land). A new land management plan, while needed, is already legally mandated and underway. It remains to be seen how far this plan will go in changing the way Delta levees and islands are managed.

ACTION TWO: ACQUIRE PERMITS TO EXPERIMENTALLY FLOOD AN ISLAND

Because intentional island flooding is preferable to unplanned flooding, the state will have to assign a lead agency and help fund some island flooding “projects.” Permits will be required and will depend on the physical effects of those projects. Acquiring the permits needed to flood a chosen experimental island pits the state against significant regulatory challenges, due largely to the physical concerns and

implications of flooding a subsided island. More specifically, potential configurations of flooded islands will have to conform to the Porter–Cologne Water Quality Act, the federal CWA, the federal ESA, CEQA, and NEPA. Compliance with these laws is likely to require some changes to current standards.

Water Quality Legislation

Perhaps the most challenging regulations involve existing water quality acts. Because the federal Clean Water Act delegates authority to the states to issue National Pollutant Discharge Elimination System (NPDES) permits and to establish water quality standards, the California State Water Resources Control Board and regional water resources control boards have principal authority over water quality under both federal and state law. California’s own state permits for discharge are called Waste Discharge Requirements (WDR). Typically, the state or regional water resources control boards will issue joint NPDES/WDR permits. Section 303 of the federal Clean Water Act’s anti-degradation policy mandates that state standards be sufficient to maintain existing beneficial uses of navigable waters, preventing degradation. Because of the Delta’s broad importance, the SWRCB wrote the Water Quality Control Plan for the San Francisco Bay and Sacramento–San Joaquin Delta Estuary (WQCP) in 1995 (rather than relegating this task to one of the regional boards). SWRCB’s 1999 Decision 1641 is the water right decision that details how the plan’s standards are to be met by various water users (Hanak and Lund 2008). Its completion followed 5 years of hearings that sought to implement the standards created in 1995. In it, maximum salinity and other chemical compound concentrations are established to protect drinking water and agricultural beneficial uses (Littleworth and Garner 2007). Environmental beneficial uses are protected with flow and cross-section prescriptions (SWRCB 1995, 2000).

The WQCP presents three problems for a transitioning Delta:

1. Rising sea levels will make it increasingly difficult to meet standards during some months, regardless of whether the number of flooded islands increases (Fleenor and others 2008).

2. These standards presume the Delta is still depended upon for water exports. The state will likely have to either end exports or build a peripheral canal at some point in the next century (Lund and others 2008), moving most agricultural and urban beneficial uses outside of the Delta's influence and rendering some standards unnecessary. The exceptions to this are the in-Delta farmers whose water supply might be harmed. It is also largely unknown on a local scale the exact effect that any one island will have on water quality if it floods. The long-term change in salinity and other 'pollutant' concentrations will depend on several complex technical factors, including the amount and type of organic compounds present in the island's soil at time of flooding, breach locations, flow into the island, location of the island, tidal influence, depth, and more. Modeling is beginning to provide more detailed insight, but has further to go before it can provide the numbers needed to affirm compliance. Furthermore, the current water quality plan does not allow for the possibility of very different salinity requirements for competing beneficial uses. As discussed earlier, some ecologists believe that the Delta's native species are better adapted to habitat that varies significantly in salinity throughout the year, which pits ecosystem beneficial uses against urban and agricultural uses (Moyle and Bennett 2008).
3. Finally, there is a chance that some flooded islands would violate water quality standards for a short time as agricultural soils leak chemicals and organic compounds, even if their flooding would be compatible with current standards in the long run (SWRCB 2001). No current regulatory method deals with this kind of short-term violation.

In 2001, the SWRCB considered a proposal for the Delta Wetlands Project, which planned to turn two Delta islands into reservoirs and another two islands into marshland for habitat mitigation. The preliminary SWRCB decision on the proposal provides helpful insight into the complexity of water quality regulation. The SWRCB set forth several opera-

tional instructions for the reservoir islands, including detailed and complex adjustments such as:

"The Project shall not cause at any time an increase in chloride concentration at any of CCWD's (Contra Costa Water District's) intakes of more than 10 milligrams/liter, ... Project diversions shall not exceed 1000 cubic feet per second when the 14-day running average of X2 is greater than 80 km, ... [and] Permittee shall not discharge when reservoir dissolved oxygen is less than 6.0 mg/L without prior authorization [and] shall not cause channel dissolved oxygen to fall below 5.0 mg/L."

While the project received preliminary approval, the significance of this example is that the proposed flooded islands were reservoirs. The project was approved under state water quality standards with the presumption that intakes, diversions, and flows could be constantly adapted to meet specific criteria. The SWRCB would have a much harder time approving of a project that did not have the same level of ability to monitor and control the concentrations of various "contaminants" in and around the area.

To deal with that kind of uncertainty, allow for experimentation, better reflect physical realities like sea level rise, and perhaps allow short-term violations in light of a long term goal, the State Water Resources Control Board (as agent for both the federal and state water quality plans) will have to introduce some flexibility into the Delta's Water Quality Management Plan. Otherwise, the state will not have the freedom to optimally plan for flooded islands, nor learn from its first attempts.

Endangered Species Legislation

The federal and state Endangered Species Acts (CESA and ESA) pose challenges to experimental flooded islands as well, although none are as daunting as water quality legislation. Because the federal ESA is more comprehensive and strict than its state-written counterpart, it is the focus of this discussion. Section 7 of the Endangered Species Act requires all federal agencies with jurisdiction over any project

that may affect a listed species or its critical habitat to consult with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS) to ensure that the project “is not likely to jeopardize the continued existence” of the species or adversely modify the habitat that is essential to the survival and propagation of the species. In the case of a flooded island that was not intentionally bought and flooded by a state agency (likely the Department of Water Resources [DWR]), the U.S. Army Corps of Engineers (USACE) will gain jurisdiction as the island is transformed from private land to waters of the United States (Brian Gray, Professor of Law, U.C. Hastings pers. comm., 2010). During Section 7 Consultation, DWR or the USACE will have to issue a Biological Assessment (BA) of the project to assess potential harmful effects to critical habitat. NMFS and/or USFWS then reviews the BA. If either the project agency or the regulatory agencies identify a potentially harmful impact to listed species, NMFS or USFWS will issue a Biological Opinion and recommend “reasonable and prudent alternatives” to the proposed project. The Biological Opinion may include incidental take authority that allows the federal agency or its permittees to “take” a specified number of the protected species as an unavoidable incident to the project, as long as the incidental taking is not likely to jeopardize the survival and propagation of the species as a whole.

Sections 9 and 10 of the Act prohibit any person—including state agencies and private parties—from “taking” a listed species. Following a definition of take by the U.S. Supreme Court in the Sweet Home case in 1995 (Babbitt v. Sweet Home Chapt. Comms. for Ore. [94-859] 515 U.S. 687), NMFS and USFWS have interpreted the take prohibition as including modification of critical habitat that actually kills members of the protected species. Relevant entities therefore must prepare a Habitat Conservation Plan (HCP) and apply for an “Incidental Take” Permit from NMFS or USFWS before altering critical habitat in the Delta. While not an insurmountable hurdle for flooded island experiments in the Delta, the ESA presents some significant planning challenges.

The consultation and HCP processes for a flooded island project in the Delta could prove difficult. Few

studies have been done on the potential habitat and ecosystem implications of flooded islands for delta smelt and salmon (both listed), and those that exist aren’t necessarily conclusive. A 2002 study asserted that flooded islands “could significantly affect food resources for pelagic fish species,” but whether that effect is positive or negative depends on the geometry, hydrodynamics and community ecology of that particular island (Lucas 2002). Terrestrial habitat is more clear-cut, but it is presumably possible to choose islands that are not critical to listed bird and terrestrial species.

Of course, experimentally flooding an island is the best way to truly monitor and assess species’ responses to a set of location-driven variables, such as tidal influence, breach configuration, and depth. The ESA is not well equipped to deal with the uncertainties inherent in this needed form of “adaptive,” or experiment-driven, ecosystem management. Jeopardizing any number of a listed species is simply not allowed (unless granted an Incidental Take Permit, Section 10). A good example of this push and pull between resource managers (and scientists) and the ESA is the U.S. Bureau of Reclamation’s Glen Canyon Dam experiment in 1995 (Doremus 2001). The Bureau had planned a large-scale flow release experiment designed to model a pre-dam flood, with the intention of reforming some of the canyon’s disappearing beaches and native fish habitat. Flood planners ran into a roadblock in the form of an endangered ambersnail that lived in riparian vegetation downstream of Glen Canyon Dam. At first, the Arizona Department of Fish and Game wanted all snails located below predicted flood stage lines to be moved to higher, safer ground before the experiment could commence. This proved near impossible, as the snails were still dormant and very difficult to locate. Eventually, a compromise was reached whereby the Bureau was forced to relocate only a small percentage of the snails (Doremus 2001).

This anecdote demonstrates the rigidity of the federal ESA and its conflict with experimental or adaptive management approaches, while also providing precedent for compromise between the act’s regulatory agencies and other resource managers. However, this particular case differs from the Delta. First, the

ambersnail was hardly a politically relevant species of concern, whereas salmon and even delta smelt now both carry heavy weight as species that are emotionally significant to many Californians. Second, snails are decidedly easier to locate, move, and monitor than most fish species. Therefore, a compromise was not a logistical nightmare for either DFG or the Bureau. Such a simple compromise might not be available for any large Delta experiments of potential risk to listed fish species.

However, such a compromise may not be necessary for a flooded island experiment. Despite its apparent rigidity, some flexibility has been worked into the ESA. In 1982, a significant amendment granted NMFS the power to issue certain exceptions for scientific purposes (Ruhl 2004). As mentioned earlier, Section 10 of the ESA allows DFG or NMFS to issue Incidental Take Permits allowing the take of a specified number of a listed species given a suitable habitat conservation plan that details mitigation efforts among other factors. One type of Incidental Take Permit has been created specifically for scientific researchers. As outlined here in the “Application Instructions for a Permit for Scientific Purposes”:

Under Section 10(a)(1)(A) of the Endangered Species Act of 1973 (ESA), NMFS may issue permits for scientific research purposes or to enhance the propagation or survival of species listed as threatened or endangered under the ESA. The authorization provided by these permits exempts the permit holder from the prohibitions of ESA Section 9, in particular those dealing with take.

Another, newer form of introduced flexibility in the ESA exists in the form of special “4(d)” permits, issued by NMFS to the DFG, which in turn accepts applications from various scientific institutions, organizations, and other agencies in California (NMFS 2000). These permits, however, only apply to certain “evolutionary significant units” of listed salmon and steelhead species, and unlike Section 10 take permits for scientific purposes, 4(d) permits must be renewed yearly (NOAA 2000). Created in 2000, the 4(d) rule formulated a new approach to take prohibitions, applying prohibitions to “all actions *except*

those within 13 ‘limits’ to the rules where the specified categories of activities contribute to conserving listed salmon” (emphasis added) (NOAA 2009). These “limits” thus act as exceptions for any projects falling under their description. Two of these limits are potentially applicable for a flooded island experiment: (1) “Limit for Scientific Research Activities Permitted or Conducted by the States” and (2) “Limit for Habitat Restoration” (NOAA 2000). However even if granted, a 4(d) permit will not be helpful should any delta smelt or other listed species also be at risk.

With these permit options and a precedent for compromise, it seems that the Endangered Species Act is certainly not an impassible obstacle to an experimental flooded island in the Delta, but rather presents planners with preliminary studies and detailed application procedures to navigate. The state may want to start with a well thought-out draft of its experimental design for a flooded island, including planned mitigation and adaptation options should listed species not react favorably. With such a plan, a compromise might be reached similar to that achieved for the Glen Canyon Dam flow studies. Given the high visibility of salmon and delta smelt issues in California, the state will need to apply for a Section 10 incidental take permit before being granted permission under the ESA to breach any levees.

The California Environmental Quality and National Environmental Protection Acts

Like the ESA, CEQA and NEPA both require an environmental assessment of a project before it can begin (Littleworth and Garner 2007). CEQA requires an Environmental Impact Report (EIR), (very similar to an Environmental Impact Statement under NEPA), that identifies potential environmental impacts of a desired project. Where, as commonly occurs in the Delta, the project includes both state and federal actors or decision-makers, these two documents are often combined into one. As CEQA is generally broader and stricter than NEPA, an EIR typically covers most requirements of an EIS. Moreover, under both CEQA and NEPA the lead agencies usually will consult with the other agencies that have jurisdiction over the project during the environmental assessment

process. These agencies give advice from the perspective of their own legal mandates – for example NOAA may evaluate an EIR for compliance with the ESA. Other agencies that would likely be consulted for a flooded island project include the Environmental Protection Agency, U.S. Fish and Wildlife Service, and the California Department of Fish and Game.

In contrast to the Endangered Species Act, neither NEPA nor CEQA contains categorical limitations on federal or state actions in the Delta. No specific project effect (such as the alteration of habitat) is explicitly prohibited under CEQA. Rather, CEQA requires that impacts be mitigated to a less than significant level, and that any such mitigation plans presented in an EIR be “fully enforceable through permit conditions, agreements, or other legally-binding instruments” (14 C.C.R. §15126.4).

CEQA could potentially delay a project, as a multitude of issues can arise in the public review portion of an EIR drafting. An example of CEQA’s breadth came up at a recent Bay-Delta Conservation Plan scoping meeting, in which mosquitoes (vectors) were mentioned as a negative impact from certain restoration efforts involving an increase in water surface area for some parts of the Delta. Thus, an almost limitless number of issues might mire the progress of an experimentally flooded island. As with the ESA, the state’s best strategy with CEQA and NEPA will be to attempt to preempt possible concerns with a detailed, thorough plan informed by all relevant scientific knowledge.

ACTION THREE: A MITIGATION PLAN FOR PRIVATE LANDOWNERS

The hydrodynamic and water quality implications of flooded islands extend beyond the Delta’s ecosystem and water exporters. Potential seepage and wave erosion on surrounding levees would be negative externalities for land owners whose islands become newly exposed to open water, requiring a monetary investment for mitigation. If the state buys or otherwise attains several islands in the Delta for eventual flooding, it assumes important obligations as a property owner. Because of the potential for an economic impact on neighboring private property, the state

might face some liability risk from inverse condemnation claims. Inverse condemnation occurs when government action (or inaction) damages private property. However, California case law has provided a slight buffer for state agencies against liability risk in flood control cases by applying a “reasonableness rule.” While this necessity that plaintiffs show the public entity acted unreasonably does not grant complete government immunity, it slightly reduces the assumed liability risks of a project with flood control components.

In general, inverse condemnation is interpreted as a strict liability cause of action (Rayl and Kuhn 2009), and relies on the federal Constitution’s “Takings Clause,” which states: “nor shall private property be taken for public use without just compensation.” This clause was extended to the states in the federal Constitution’s 14th Amendment. Classically interpreted, inverse condemnation requires any government agency that has harmed or “taken” private property for a public purpose to pay just compensation to the affected landowner, the idea being that no citizen should bear a disproportionate economic burden for a public project. The necessity for compensation in these cases is irrespective of the government’s intent or public motivation for whatever project it was that caused the damage.

In California, however, inverse condemnation has been interpreted differently when in a flood control context. A series of cases has set up what is known as the “reasonableness rule”: For a government agency to be held liable for damages, plaintiffs must demonstrate that it acted unreasonably in its implementation of flood control and further that the private landowner had taken reasonable steps to protect his/her property (Rayl and Kuhn 2009; Hauselt v. Butte County 2009 172 Cal. App. 4th 550; Paterno 2003 113 Cal. App. 4th 550; Locklin v. City of Lafayette 7 Cal. 4th 1994). An exception to this was made in *Akins v. State of California* (1998) 61 Cal. App. 4th 1, where strict liability was applied because the government intentionally flooded private property that was not historically subject to flooding, in order to protect other property (Hansen 2009).

Interpretation of these cases becomes interesting for a flooded Delta island. For the purposes of this dis-

cussion, it is assumed that the owner of the flooded island has already been properly compensated for his (now underwater) land. In addition, all land in the Delta was historically subject to flooding (which of course depends on one's definition of "historically"). The intentional flooding of several Delta islands has a flood control component in that money previously spent on levee maintenance on those islands is then freed up for perhaps more effective maintenance on remaining islands. On the other hand, neighboring islands may face increased flood risk to their levees from erosion and seepage, and flood control would certainly not be the only government motivation for experimental flooding of Delta islands. If a landowner on a neighboring island brought an inverse condemnation claim against either the DWR or other agency (whichever "owned" the flooded island), the court would have to weigh those various factors in determining reasonableness. It is difficult to say, based on previous court decisions for very different scenarios, what the holding in such a case would look like. This topic seems in need of further research and discussion by legal experts, and is something the state will need to explore before proceeding down a path towards island flooding.

Nuisance laws present another potential avenue for neighboring private landowners to seek compensation from the state. The basic premise is that as a property owner, you have a responsibility to maintain your property so that it doesn't interfere with a neighbor's. For public entities, this common law rule was codified in California's Code of Civil Procedure (CCP Section 731). Finally, the California Tort Claims Act (Gov. Code Section 835) provides another theory under which private citizens can seek compensation for damages to their property by a government agency. Plaintiffs must show that injury was caused by a "dangerous condition of public property," and further that the dangerous condition was negligently caused by the public entity. For a flooded island, a neighboring landowner would have to show that the state's actions (flooding an island) posed a serious danger to his or her property.

A relevant example of the potential impact of inverse condemnation and nuisance liability is the preliminary SWRCB decision on the Delta Wetlands

Project. Regarding concerns from private landowners on neighboring islands, the SWRCB asserted its authority to "in the public interest, prevent potential damages to neighboring landowners by requiring financial assurances and by requiring design sign-offs on construction and seepage designs by licensed professional engineers." As such, the SWRCB ordered Delta Wetlands to establish and put money into a Seepage and Monitoring Fund and maintain one million dollars in a Remedial Actions Fund to pay for the "cost of corrective actions in response to complaints of harm to other entities caused by project operations" (SWRCB 2001). Finally, the U.S. Army Corp of Engineers' (Corps) experience with Prospect Island provides another example, in which liability concerns eventually caused the Corps to abandon plans for a shallow water restoration effort and re-drain the island. Seepage complaints were brought forth by landowners on Ryer Island during the environmental assessment process and, even though engineers could not prove that seepage on Ryer Island was a direct result of Prospect Island flooding, the Corps eventually decided that mitigation planning and funding for potential seepage problems outweighed potential benefits of the project (USACE 2001). Prospect Island was for a long while on the market for one dollar – a price indicative of the legal vulnerability and complexities attached to such restoration attempts in the Delta.

Recently, DWR was sued by Burlington Northern Santa Fe Railway Company (BNSF Railway Co.) for damage to infrastructure during the flooding of Jones Tract (BNSF Railway Co. et al. vs. DWR et al., pending Superior Court lawsuit). Even though Jones Tract is not a state-owned island, and DWR paid to have the water pumped out and the breach repaired, the plaintiffs made their case based upon inverse condemnation and nuisance laws. They made two arguments:

1. By giving money through the subventions program, DWR assumes an obligation to maintain the levees (probably not a strong argument in that California Water Code Sections 12983 and 12984 explicitly say that the state does not assume any responsibility for the levees by giving money for their upkeep); and
2. Because of SWP operations, water passed through the channels near Jones Tract and increased levee

Table 3 Legal and regulatory challenges to intentional island flooding and suggested changes

Legal and regulatory barriers	Changes needed?	Responsible public entity	Suggested amendments or preparations
1. California Water Code Sections 12981–12983	Maybe	Legislature, Governor	1. Eliminate language requiring the Delta to be "preserved in its present form" and 2. Recognize that land use change is inevitable and managed change is likely to be preferable
2. Land Use and Resource Management Plan (revisions due Jan. 1, 2012)	Yes, and already required by law	Delta Stewardship Council	Address the need for an experimentally flooded island, and acknowledge that not all islands are economically sustainable
3. Endangered Species Act	No	DWR or other state agency	1. Apply to NFMS for a Section 10 Permit for scientific purposes and 2. Prepare several detailed Habitat Mitigation Plans and apply for a Section 10 Incidental Take Permit
4. Bay-Delta Water Quality Control Plan (and Decision 1614)	Yes	SWRCB	Change salinity standards to allow for more adaptive management
5. Inverse condemnation liability	No	State agency	Prepare mitigation criteria for flooded landowners, and landowners on nearby islands

- Amendment(s) helpful.
- Amendments necessary.
- No amendments necessary.

erosion. This second argument is essentially a claim of inverse condemnation, and illustrates the type of case that might be presented to the state under a flooded island scenario.

State policymakers will have to seriously consider the inverse condemnation and nuisance laws as they plan for a transitioning Delta, and do their best to preempt such claims with preventative mitigation. The Delta Wetlands example gives some guidance. A plan for flooded islands must clearly articulate expected economic effects on private property, and provide clear methods or guidelines for determining the amount and distribution of reasonable compensation to landowners should seepage or erosion occur. This will likely require additional review of the implications of inverse condemnation and nuisance theories as applicable to flooded islands by a qualified legal scholar or consultant. During the Prospect Island proceedings, several seepage mitigation plans were suggested, including interceptor wells and gravel seepage blankets. Similarly, the Delta Wetlands Proposal laid out two wave run-up mitigation measures: strengthen surrounding levees with rock armoring or create a

setback levee before flooding the interior island. Both proposals can be used as potential guidelines for the future.

CONCLUSION: A SUMMARY OF PROPOSED CHANGES

The legal challenges to a planned transition in the Delta are not trivial, but several changes the state can make in the near term could ease the process. [Table 3](#) summarizes these findings and identifies useful changes to the pertinent codes and regulations.

California’s Water Code has some room for more flexible management, but the language is sometimes contradictory and does not convey clear legislative intent. This gives the power of interpretation to the judge in any lawsuit. It would be beneficial for the state to amend some of the language in Sections 12981, 12982, and 12983. Sentences mandating that the Delta be preserved in its present form (12981) might be removed. It also would be helpful to add an additional finding that flooding in much of the Delta is inevitable, with an accompanying acknowledgement that planned flooding is preferable to unplanned flooding. Such amendments are not easy, but are not unprecedented.

The new Delta land use plans prepared by the Delta Protection Commission and the Delta Stewardship Council should prioritize land use in the Delta based on specific physical, cultural, biologic, and economic aspects of each island. The plan should also identify needed areas of research for islands that might be flooded.

Regulatory law poses the largest legal challenge for a transitioning Delta. Specifically, it seems that the Bay-Delta Water Quality Control Plan will need amending for many reasons, regardless of whether islands are to be flooded (Hanak and others 2008). For the long term, salinity standards are unrealistic in several ways, and some flooded island projects may need a means of short-term exceptions or mitigation plans to deal with agricultural and organic soils. The ESA creates a paradox in that the only way to know whether specific flooded island configurations will really harm listed species is to flood some islands for experimentation. We do know, however, that the current Delta configuration is clearly not beneficial for endangered species. The state may want to prepare a detailed Habitat Mitigation Plan, and apply for take permits for scientific purposes, and perhaps also a 4(d) permit.

Finally, a new state policy in the Delta will have to carefully account for private property losses from changes in land use and levee maintenance. There is already precedence for how best to compensate such losses, but a specific set of criteria should be developed for any flooding project that may go forward. These compensation costs will have to be factored into the decision of whether flooding the island makes sense for the state economically.

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