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

Robyn Suddeth
University of California, Davis Center for Watershed Sciences
rjsuddeth@ucdavis.edu

DRAFT

Abstract

The Sacramento-San Joaquin 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 towards 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 landowners 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 these and additional common, regulatory, statutory, and constitutional laws.

Introduction

California's Sacramento-San Joaquin 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 to 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 (UC Davis) report predicts that these pressures will likely transform parts of the Delta into open water within this century (Suddeth et al. 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 Levee Maintenance Subvention Program 1973; CA Water Code § 12980 - 12985). To best manage a transitioning Delta, the state must shift towards policies that acknowledge the Delta as a diverse and heterogeneous place, prioritize levee spending, and purposefully transition 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 et al. 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 percent 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"(CA Water Code § 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 Levee 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 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 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 (CA Water Code § 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 towards 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 two 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 to flooding uniformly. 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 (Moyle 2008; Lund et al 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 coverage for non-native predator species (Nobriga and Feyrer 2007; Kimmerer et al. 2008). For some of the smaller desirable species like 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 et al. 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 et al. 2002; Kimmerer et al. 2008; Kimmerer and Nobriga 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 et al. 2006; Kimmerer et al. 2008). Mildred is also a net producer of phytoplankton – an important food source for the Delta (Lucas 2002; Lopez et al. 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 sea water, 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 et al. 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 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, Delta Levee Engineer, personal communications 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 between DWR, the Natural Heritage Institute, and Central Delta Water Agency employees in this excerpt from a Senate informational hearing on California's vulnerable levee system:

> **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 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."

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 increase in invasive species and resultant ecosystem degradation
Water Quality	Increased salinity from ocean bromides and evaporation.	(1) Water shortage costs to upstream users and/or treatment costs for exporters, (2) Degradation of Central Valley farmland from salt intrusion
Wave Fetch	Increase in water surface area exposed to seasonal winds.	Increased wave action and erosion pressure on neighboring levees
Seepage Pressures	Increase in hydraulic head above possibly porous sands	Risk of seepage damage to neighboring islands

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.

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 and liability, the transition to selectively flooded islands is difficult 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. As such, it assigns directives that do not easily support a policy of prioritized upgrade, repair, or transition efforts. Regulatory law also presents challenges for a transition to flooded islands: open bodies of deep water have the potential to produce water quality and ecosystem problems that may not stand up to federal and state water quality legislation (Clean Water Act and Porter-Cologne Act) or endangered species acts. Finally, some legal common law risks exist for a state policy of selective island abandonment, the largest being the Constitution's takings clause in relation to negative externalities of flooded islands on neighboring islands, including seepage and wave effects.

Transitioning to a drastically 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 can take to overcome some initial political and legal hurdles. Three sets of state actions are identified for beginning a policy shift: (1) create 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; and (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 legislation 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.

Table 2: State Actions for a Transition Towards Flooded Delta Islands

Legal/Regulatory Barriers		***Action One:*** **Ensure Legal Authority**	***Action Two:*** **Acquire Permits to Experimentally Flood an Island**	***Action Three:*** **A Mitigation Plan for Private Landowners**
CA Water Law / Delta-Specific Legislation	**1. California Water Code Sections 12981 - 12983**	Legislature		
	2. Delta Protection Act of 1992	Legislature	Legislature	
	3. DPC Land Use & Resource Mgmt Plan	Delta Protection Commission		Delta Protection Commission
Regulatory Law	**4. Federal Clean Water Act**		SWRCB	
	5. Porter-Cologne Water Quality Control Act		SWRCB	
	6. Endangered Species Act		NMFS, USFWS, CFG	

	7. CEQA & NEPA		USFWS, EPA, CFG, NMFS, and others	
Common Law	**8. Takings and Nuisance theories**			Courts

Legend: Pink – Amendments to Current Law Will Likely be Required; Yellow – Unclear; Law Might Be Satisfied Without Changes; Green – No Amendments Necessary

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. NEPA = National Environmental Protection Act, CEQA = California Environmental Quality Act

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 still faces substantial barriers in California Water Code and Delta Protection Acts, although a few minor amendments allow some flexibility. Both the Delta Flood Protection Act and Water Code Sections 12981 – 12983 recognize the Delta as a place with inherent public value to the state and acknowledge each island's importance for stability. On the other hand, caveats have been inserted that admit the economic un-sustainability of some islands and seem to grant immunity to the state in its repair decisions for non-project levees (CA Water Code § 12981; Assembly Bill No. 955, 1985). 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.

California's Water Code sometimes is 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. It is difficult to establish which language would hold more weight in court.

A few sections within the Delta Flood Protection Act of 1988 order the state explicitly to prioritize efforts in the Delta. Although the Water Code maintains legal precedence, the language in the 1988 legislation implies a trend towards 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" (§ 12313). Although this program is separate from and does not amend the Subventions Program, it is significant that the importance or degree of *public* benefit is placed above the *need* for protective work, implying a move towards 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, 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 towards 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. A policy shift will require the Delta Protection Commission to draft a new Land Use and Resource Management Plan that allows for substantial changes to Delta land use and levees. A new plan does not require legislative action or directive, so this should

be a relatively simple change should the commission be willing to work with the Delta's five counties in re-drafting the plan.

Ensuring legal authority for planned island flooding in the Delta is therefore not necessarily difficult from a legal perspective. A new land management plan seems necessary. Amendments to the Water Code that clarify legislative intent and recognize a need for diversified levee and island management could also be beneficial.

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 Clean Water Act, the federal Endangered Species Act, the California Environmental Quality Act, and the National Environmental Protection Act. 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 requires states to enforce their own regulations, the State Water Resources Control Board plays the biggest role in issuing water quality 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 State Water Resources Control Board wrote the Delta's Water Quality Control Plan (WQCP) itself in 1995 (rather than relegating this task to one of the regional boards). SWRCB's 1999 Decision 1641 is the water rights decision detailing how the plan's standards are to be met by various water users (Hanak 2008). It's completion followed five 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 (Bay Delta WQCP 1995; D-1641, SWRCB 2000).

The Delta Water Quality Control Plan presents three problems for a transitioning Delta. First, rising sea levels will make it increasingly difficult to

meet standards during some months, regardless of whether the number of flooded islands increases (Fleenor et al. 2008). Second, 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 et al. 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). And 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 State Water Resources Control Board (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 operational 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. The federal Endangered Species Act requires any land-altering project by a federal or state agency in or near a listed species' habitat to either: (1) Comply with Section 7 of the act through a "consultation" with either the National Marine Fisheries Service (NMFS) or the Department of Fish and Game (DFG), demonstrating no jeopardy to the listed species, or, if a "take" is likely, (2) Prepare a Habitat Mitigation Plan and apply for an "Incidental Take" Permit from NMFS through section 10. During Section 7 Consultation, the federal or state agency must issue a Biological Assessment (BA) of the project to assess potential harmful effects to critical habitat. NMFS and/or DFG then reviews the BA. If either the project agency or the regulatory agencies identify a potentially harmful impact to listed species, NMFS or DFG will issue a Biological Opinion and recommend "reasonable and prudent alternatives" to the proposed project. While not an insurmountable hurdle for flooded island experiments in the Delta, the ESA presents some significant planning challenges.

The Biological Assessment and Opinion process 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 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 Endangered Species Act 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). Section 10 of the ESA allows Fish and Game 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" (NMFS 2009):

> 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 California Department of Fish and Game, which in turn accepts applications from various scientific institutions, organizations, and other agencies in California. 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. However, given the high visibility of salmon and delta smelt issues in California, the state might be forced 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. Often, these two required documents are combined into one. As CEQA is generally broader and stricter than NEPA, an EIR typically covers most requirements of an EIS. While CEQA does not require a permit application for project completion, the EIR is subject to public review. Because of this environmental assessment process, decision-making power for these laws lies within a host of federal and state agencies, rather than with the SWRCB. These agencies are charged with conducting

studies and approving mitigation plans. In the Delta, they include the National Marine Fisheries Service (now NOAA fisheries), the Environmental Protection Agency, U.S. Fish and Wildlife Service, California Fish and Game, and many others.

CEQA's standards are much broader than the ESA's, and as such present a greater challenge in terms of the potential scope of an EIR. On the other hand, no specific project effect (such as taking of an endangered species) is explicitly prohibited under CEQA. EIRs serve as mitigation plans, similar to a Habitat Mitigation Plan under the ESA, but the definition of environmental impact by a project is much less focused than incidental take. In this way, the law has less potential to criminalize the progress of any given project.

CEQA could potentially halt progress for long periods of time, 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 Endangered Species Act, the state's best strategy with CEQA and NEPA will be to attempt to preempt possible concerns with a detailed, well thought-out 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 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 several property and common laws, particularly the Constitution's Takings Clause, extended to the states in Article 14, and common nuisance laws.

The Takings Clause states: "private property may be taken or damaged for public use only when just compensation is paid" (Littleworth and Garner 2007). Related to this clause, California's Water Code specifically acknowledges the burden placed on private property owners in the Delta for protecting various public interests. Section 12982 of the Water Code finds, "while most of the delta's levees are privately owned and maintained they are being subjected to

varied multiple uses and serve to benefit varied segments and interests of the public at large."

There are two possible kinds of taking: Regulatory and Inverse Condemnation. Regulatory implies that a government regulation, or law, directly damages or deems useless a citizen's private property. Inverse condemnation occurs when government action (or inaction) not directly related to private property nevertheless damages that property. Seepage and erosion present potential liability for the state from inverse condemnation lawsuits. Because economic impact is one factor considered when determining whether government action constitutes a taking of private property (Penn Central *vs.* City of New York 1978), seepage or erosion on an island that neighbors an intentionally created expanse of open water may give rise to a takings lawsuit if the public agency responsible for the flooding does not pay compensation.

Typically governments have some protection from takings suits in the form of tort immunity. The idea of tort immunity originated in federal water law with the Flood Control Act of 1928, Section 207c, in which Congress "ensured that by acting to reduce the risk of flooding … the federal treasury would not be exposed to damage suits by those who nonetheless might be flooded in the future" (Percy 2007). In California, however, the state does not enjoy the same amount of immunity as the federal government. While the California Water Code asserts in section 12983 that "the state does not thereby assume any responsibility for the safety of any delta levee against failure," this does not translate into immunity. This language was also written primarily in reference to the subventions program, and not for cases in which the state itself owns the island or levees.

Finally, nuisance theories 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 the California Tort Claims Act (Gov. Code sec. 835), under which plaintiffs must show that injury to their party 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. This requires more effort than a takings suit because economic impact is not necessarily enough, and it can be difficult to prove negligence.

Recent court cases give insight into local application and interpretation of these laws. A 2007 analysis shows that "the courts in California recently have issued a number of decisions holding the state liable when sections of the levees have failed. These opinions have applied the … takings clause, effectively eroding the doctrine of sovereign immunity historically associated with major flood control projects" (Percy 2007). An important example of this is the Paterno

Decision, in which the court "determined that when the public at large benefits from cost-savings realized by plans that involve deferring maintenance or accepting inferior levees, compensating the property owner who is damaged by those plans is fair" (Percy 2007). In other words, a public entity can be liable if a state-owned structure fails to function as it was intended due to an "unreasonable" plan (Paterno et al. *vs.* State of California et al. 2003). Unreasonableness is decided by the court, which weighs several different factors. Some of the factors explicitly articulated in the Paterno case are: (1) forseeability of harm to plaintiffs, (2) purpose served by the project, (3) feasible alternatives to avoiding the failure, and (4) distribution of damages among land owners (Paterno et al. *vs.* State of California et al. 2003). The Paterno case is especially relevant to this discussion because the state was held liable for a *cost-saving decision*, rather than any particular action. If the state is liable for economically justified *non*-action on their own levees, then a transitional period in which some islands are state-owned, but not yet flooded, is potentially risky.

Another relevant example 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 1999). Prospect Island is currently on the market for one dollar – a price indicative of the legal vulnerability and complexities attached to such restoration attempts in the Delta.

Currently, DWR is being sued by 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 are making their case based upon takings and nuisance laws. They make 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 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 State Water Project operations, water passed through the channels near Jones Tract and increased levee 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 takings clause 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 to compensate landowners should seepage or erosion occur. 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, identifying recommended changes for those codes or regulations that seem amendable.

Table 3: Legal Challenges to Intentional Island Flooding and Suggested Changes

Legal / Regulatory Barriers	Changes Needed?	Responsible Public Entity	Suggested Amendments and/or Preparation
1. CA Water Code Sections 12981 - 12983	Maybe	Legislature, Governer	(1) Eliminate language that requires the Delta be "preserved in its present form", and (2) Recognize that land use change is inevitable and managed change is preferable
2. DPC Land Use and Resource Mgmt Plan	Yes	DPC	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 or (2) Prepare several detailed Habitat Mitigation Plans and apply for a regular Incidental Take Permit
4. Bay-Delta Water Quality Control Plan (& D-1614)	Yes	SWRCB	Change salinity standards
5. Takings Law	No	DWR or Other State Agency	Prepare mitigation criteria for flooded landowners and landowners on nearby islands.

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.

More significant language will need to be added to the Delta Protection Commission's Land Use plan for the Delta. As it stands, the plan mandates general levee maintenance without regard to individual island assessments, and only has one caveat for the possibility of flooded islands in the form of reservoirs. A new plan should be drafted to 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 et al. 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 Endangered Species Act 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.

References

1. "The Sacramento-San Joaquin Delta", Chapter 10 of the California Water Plan Update, Bulletin 160-93, October 1994,
2. Bini, Luis Mauricio and Thomaz, Sidinei Magela; "Prediction of Egeria najas and Egeria densa occurrence in a large subtropical reservoir (Itaipu Reservoir, Brazil-Paraguay)", *Aquatic Botany* Volume 83, Issue 3, November 2005, pp. 227-238
3. Cain, John, "Technical Memorandum #3: Analysis of an Adaptive Management Framework to the Flooded Island Pre-Feasibility Study", Natural Heritage Institute, 2006

4. California Water Code Sections 12980 – 12995
5. California Department of Boating and Waterways Egeria Densa Control Program (EDCP), "Second Addendum to 2001 Environmental Impact Report with Five-Year Program Review and Future Operations Plan", December 8, 2006
6. Delta Protection Commission, Delta Flood Protection Act of 1988
7. Delta Vision Context Memorandum – Flooding and Delta Levees, 2007
8. DWR, "Comparison of Major Levee Breaks in the Delta", www.water.ca.gov/floodmgmt/dsmo/sab/drmsp/docs/Comparison_of_Major_Levee_Breaks_in_Delta.pdf
9. DWR December 14, 2007 Statement Regarding Wanger Decision, www.water.ca.gov/news/newsreleases/121707statement.pdf
10. Doremus, Holly, "Adaptive Management, the Endangered Species Act, and the Institutional Challenges of 'New Age' Environmental Protection", *Washburn Law Journal* Vol. 41 pp. 50-89, 2001
11. Fleenor, William E., Hanak, Ellen, Lund, Jay R., and Mount, Jeffrey R., "Delta Hydrodynamics and Water Salinity with Future Conditions", Comparing Futures for the Sacramento San Joaquin Delta, Technical Appendix C, 2008
12. Jassby, Alan D. and Cloern, James E., "Organic Matter Sources and Rehabilitation of the Sacramento-San Joaquin Delta (California, USA)", *Aquatic Conservation: Marine and Freshwater Ecosystems,* Vol. 10, p. 323—352, 2000
13. Hanak, Ellen and Lund, Jay, "Policy and Regulatory Challenges for the Delta of the Future", Comparing Futures for the Sacramento San Joaquin Delta, Technical Appendix A, 2008
14. Kimmerer, Wim; Brown, Larry; Culberson, Steven; Moyle, Peter; Nobriga, Matt; Thompson, Jan; "The State of Bay Delta Science 2008 Chapter 4: Aquatic Ecosystems", The CALFED Science Program, 2008
15. Littleworth, Arthur and Garner, Eric, California Water II, Solano Press 2007
16. Lopez, Cary B., Cloern, James E., Schraga, Tara S., Little, Amy J., Lucas, Lisa V., Thompson, Janet K., Burau, Jon R., "Ecological Values of Shallow-Water Habitats: Implications for the Restoration of Disturbed Ecosystems", *Ecosystems*, Vol. 9, pp. 422-440, 2006
17. Lucas, Lisa V., Sereno, Deanna M., Burau, Jon R., Schraga, Tara S., Lopez, Gary B., Stacey, Mark T., Parchevsky, Konstantin V., Parchevsky, Vladimir P., "Intradaily Variability of Water Quality in a Shallow Tidal Lagoon: Mechanisms and Implications", *Estuaries and Coasts*, Vol. 29, No. 5, p. 711-730, October 2006
18. Lucas, Lisa V., Cloern, James E., Thompson, Janet K., and Momsen, Nancy E., "Functional Variability of Habitats Within the Sacramento—San

Joaquin Delta: Restoration Implications", *Ecological Applications* Vol. 12, pp. 1528 – 1547, 2002
19. Lund, et. al, Comparing Futures for the Sacramento San Joaquin Delta, Public Policy Institute of California, 2008
20. Moyle, Peter B., "The Future of Fish in Response to Large-Scale Change in the San Francisco Estuary, California", American Fisheries Society Symposium, 2008
21. National Marine Fisheries Service, "Application Instructions for a Permit for Scientific Purposes or to Enhance the Propagation or Survival of Threatened and Endangered Species", US Department of Commerce
22. National Marine Fisheries Service ESA 4(d) Rules, www.nwr.noaa.gov/ESA-Salmon-Regulations-Permits/4d-Rules/, accessed 2009
23. National Oceanic and Atmospheric Administration, "50 CFR Part 223 Endangered and Threatened Species; Salmon and Steelhead; Final Rules", *Federal Register*, July 10, 2000
24. "Percy, Michael J., "Delta Levees – Tort Immunity vs. Takings Liability", Real Property, Probate and Trust Journal, Fall 2007
25. Roberts, Stephen S., Department of Water Resources Division of Planning and Local Assistance, Draft Executive Summary – In-Delta Storage Program State Feasibility Study, 2004
26. Ruhl, J.B., "Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act", *Kansas Law Review* Vol. 52 pp. 1249-1284, 2004
27. Section 21080.22 of the California Public Resources Code, Delta Protection Act of 1992
28. Senate Committee on Governmental Organization Informational Hearing on: "California's Vulnerable Levee System: Where and When Will Disaster Strike?", May 16, 2006, Senator Dean Florez, Chair
29. State Water Resources Control Board, Board Meeting Session – Division of Water Rights, February 15, 2001, "Consideration of Adoption of Water Right Decision Approving Water Right Applications for the Delta Wetlands Project"
30. Suddeth, Robyn, Mount, Jeffrey R., and Lund, Jay R., "Levee Decisions and Sustainability for the Delta", Comparing Futures for the Sacramento San Joaquin Delta, Technical Appendix B, 2008
31. SWRCB, Revised Water Right Decision 1641, March 2000
32. Todd Engineers, "Preliminary Seepage Analysis Prospect Island, California", Prepared for: U.S. Department of Justice, May 1998
33. USACE, Final Ecosystem Restoration Report and Environmental Assessment/Initial Study, Prospect Island CA, July 1999
34. Van Vleck, Deukmejian, and Kennedy; California Department of Water Resources, Sacramento-San Joaquin Delta Emergency Water Plan – Report to the Legislature – December 1986