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The Galveston Bay Wetland Crisis

The charges wetland advocates have long levied against the Galveston District of the U.S. Army Corps of Engineers have recently drawn national attention. Critics say the district willfully misinterprets recent court rulings when making jurisdictional calls. Here, a Texas biologist gives an in-the-field perspective on the Galveston District's post-SWANCC jurisdictional practices.

BY ANDREW SIPOCZ

This article focuses on the poorly drained Texas coastal plain lying below the elevation of 250 feet. Since the U.S. Supreme Court issued its 2001 decision in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (the SWANCC decision), the U.S. Army Corps of Engineer's Galveston District has excluded most of the coastal plain's freshwater wetlands from Clean Water Act protection. These wetlands have surface water connections and may be contiguous to navigable streams or bays. However, the Galveston District either does not to recognize the connections and contiguity (USACE 2005) or argues that if these exist, they are not sufficient grounds for asserting federal jurisdiction under the Clean Water Act (Anthamatten 2001). This article explains the district's past and present jurisdictional decisions and their consequences for the region's waters.

The Clay Plain

North of the city of Corpus Christi there are numerous rivers that spill from Texas's higher interior and run to its much flatter coast. Here they begin shedding their sediment loads and become unstable, wiggling, flooded behemoths. Over millions of years these wandering rivers produced a 7.3 million-acre plain covered by a maze of relic channels. This 100-mile-wide and 300-mile-long plain tips an average of 2 feet per mile into numerous bays in Texas and into the Gulf of Mexico. The area is best described as a "clay plain" (Smeins et al. 1991) and is characterized by poorly to very poorly drained soils, heavy vegetation, and a general lack of incised drainage. It is dominated by seasonally water-logged soils. Approximately one-third of the Clay Plain, or at least 2.45 million acres, was once covered by freshwater palustrine wetlands.

About half of these wetlands remained in 1992 (Moulton and Jacob 2000). The wetlands occurred in mud-filled relic river channels, wind-eroded circular depressions, and areas where relic-channel meander ridges created sumps by impeding drainage. The channels wound for miles, while the circular depressions averaged about 6 acres in size; both were generally less than 2 feet deep. The sump areas covered hundreds of acres and could reach 3 feet in depth.

Most of these marshlands, once home to many species of breeding waterfowl, were leveled and drained for rice farming during the World War II era. The remnants support a rapidly dwindling population of mottled ducks and blue-winged teal, as well as robust numbers of black-bellied and fulvous whistling ducks. Almost all of the heron,

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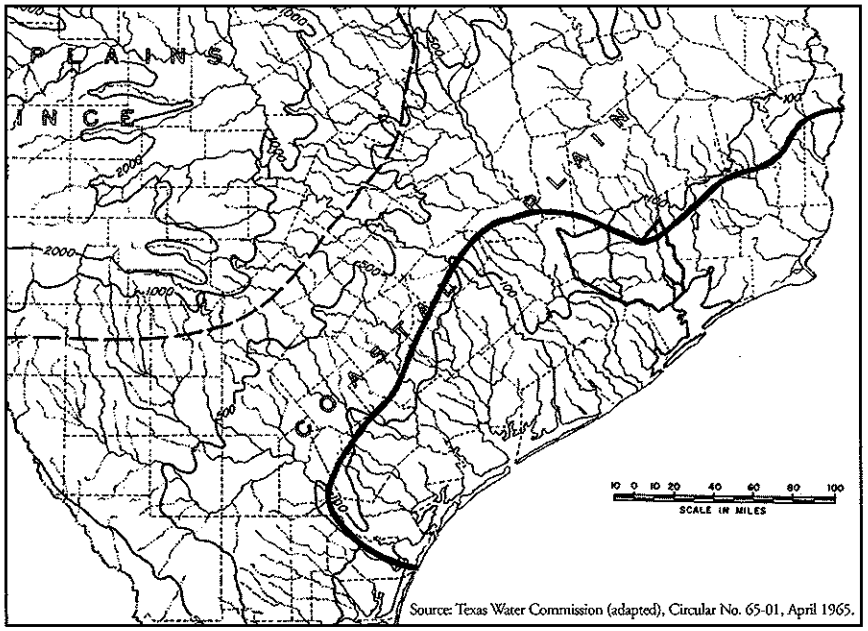


The Clay Plain, with Harris County and Galveston Bay outlined in black, covers 7.3 million acres.

egret, ibis, rail, stilt, and bittern species found in the United States can be found nesting or foraging in these wetlands.

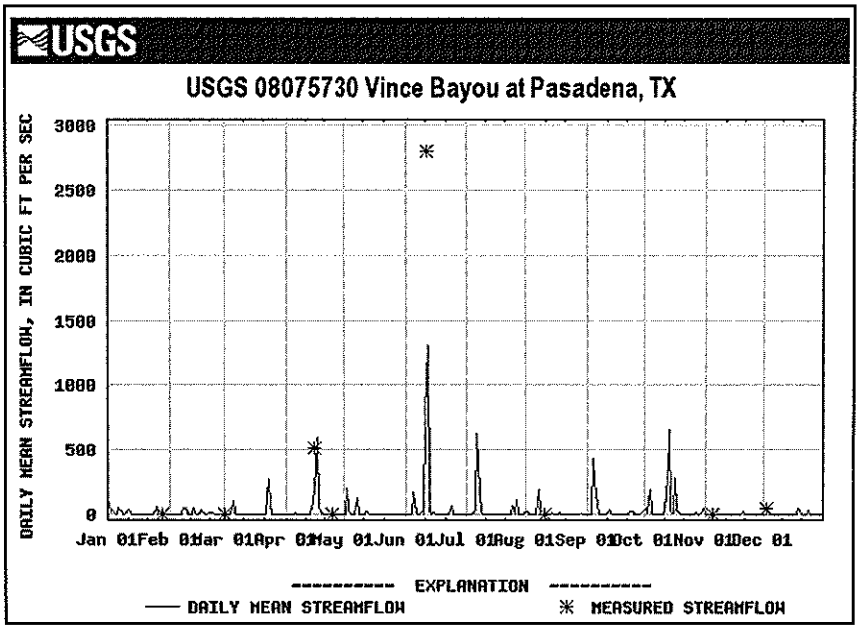
Geomorphically, the wetlands are most similar to those in California's lower vernal pool region. The Clay Plain wetlands, like the vernal pools, are the product of wind deflation acting on coastal terraces, and their hydrology is perched on the surface. Unlike California's vernal pools, Texas's wetlands may be ponded in the summer as well as in the winter and experience a much larger quantity of surface flow through them. These large flows allow fish seasonal access to the wetlands and thus preclude the development of the unique and often endangered fauna characteristic of California's vernal pools.

The extreme impermeability of the Clay Plain's soils prevents significant infiltration into groundwater, and consequently, a tremendous amount of the region's rainfall flows across its surface and into the coastal waters of Texas. For example, although Galveston Bay's watershed stretches from the Gulf of Mexico nearly to Oklahoma, one-third of its freshwater is supplied by locally generated surface flows from the Clay Plain. Each acre of undeveloped land in the Houston area produces about an acre-foot of runoff each year. The 52 to 45 inches of annual rainfall in the region produce multiple pulses of surface flow that gather in Clay Plain wetlands and then quickly feed into streams. The figure opposite is a hydrograph of a typical Clay Plain stream, Armand Bayou (misnamed on the graph), prior to watershed development. It records a series of these flow pulses, which often are above 500 cubic feet per second (cfs).

The Clay Plain is truly an amazing area, a tilted Everglades that drains sideways into the Gulf of Mexico. Yet it is only minimally described in most wetland texts. Moulton and Jacob (2000) provide the first comprehensive description of the region's wetlands. In fact, the lack of national attention paid to this remarkable wetland complex may have paved the way for the Galveston District's irregular post-SWANCC jurisdictional decisions.

SWANCC and Clay Plain Jurisdictional Calls

More than 20 years ago, the Galveston District described the Clay Plain wetlands as "perched" above the region's rivers and bays. The term "perched" indicated that the wetlands did not share the same water surface elevation as the area's navigable waterways, and so were physically separated or "isolated" from those waters (i.e., were non-adjacent)—and thus were beyond federal jurisdiction. After the 1985 Supreme Court decision in *U.S. v. Riverside Bayview* that extended Clean Water Act jurisdiction beyond traditionally navigable waters to essentially all wetlands, the district used the same "perched" reasoning to label Clay Plain wetlands as "isolated," thereby qualifying them to be filled under the nationwide permit program. Following the 2001 SWANCC decision, all Corps districts were instructed not to change existing policy with regard to isolated waters. In a memo subsquently issued to staff, the Galveston District formalized its definition of isolated waters as including "perched" wetlands (Anthamatten 2001) and immediately withdrew Clean Water Act jurisdiction from most Clay Plain wetlands. By the district's own estimate, this decision withdrew protection from 40 percent of the wetlands in the district. A preliminary review of National Wetland Inventory data indicates that approximately 1,004,000 wetland acres, 47 percent of all of the coastal wetlands

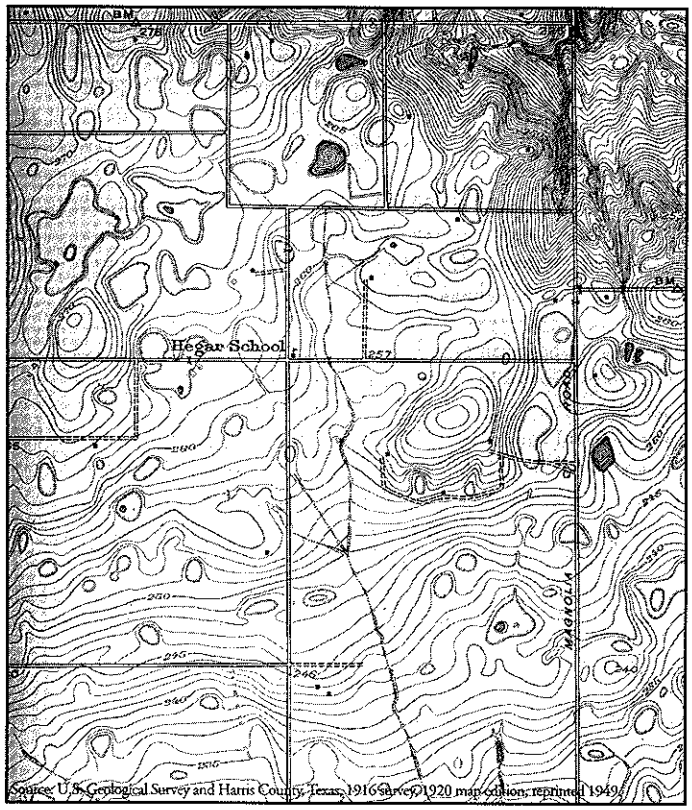


in Texas and their associated functional values, are no longer protected (Moulton et al. 1997).

The SWANCC decision, however, did not reverse *U.S. v. Riverside Bayview*, and the Seattle, Los Angeles, Norfolk, Chicago and many other Corps districts used surface water and short groundwater connections as the "significant nexus to interstate commerce" necessary to justify assertion of Clean Water Act jurisdiction over wetlands. The Galveston District, however, did not assess Clean Water Act permit sites for such hydrologic connections. The district interpreted the SWANCC decision far differently, stating that the decision restricted the district's authority to only those wetlands geographically connected, or adjacent, to navigable waters. This definition seems to be an attempt to maintain consistency with the definition articulated more than 20 years ago that cast Clay Plain wetlands as "perched" and "isolated."

The district views even large surface water flows between wetlands and the region's streams and bays as insufficient grounds for jurisdiction (Harkinson 2005). For example, prior to the SWANCC decision, the district issued a permit authorizing placement of fill into a wetland with a documented surface water connection to Buffalo Bayou, a large stream that winds through Houston and into Galveston Bay (USACE 2001), and required mitigation. Following the SWANCC decision, the Galveston District decided that the wetland at issue was non-jurisdictional, and required the mitigation bank that had supplied credits for the permit to refund its transaction to the permittee.

Clay Plain wetlands are hydrologically linked to downstream waters. Recent Supreme Court holdings in *U.S. v. Deaton* and *U.S. v. Rapanos* support the Corps districts that extend Clean Water Act jurisdiction over such hydrologically connected wetlands. The incongruous situation in Texas places coastal water quality at risk as well as imperils the flood protection services and fish and wildlife productivity provided by a million acres of wetlands.



This one-foot contour interval topographic map, produced in 1920, illustrates the typical wetland configuration and drainage patterns in northwestern Harris County, Texas.

Consistency Over Reason

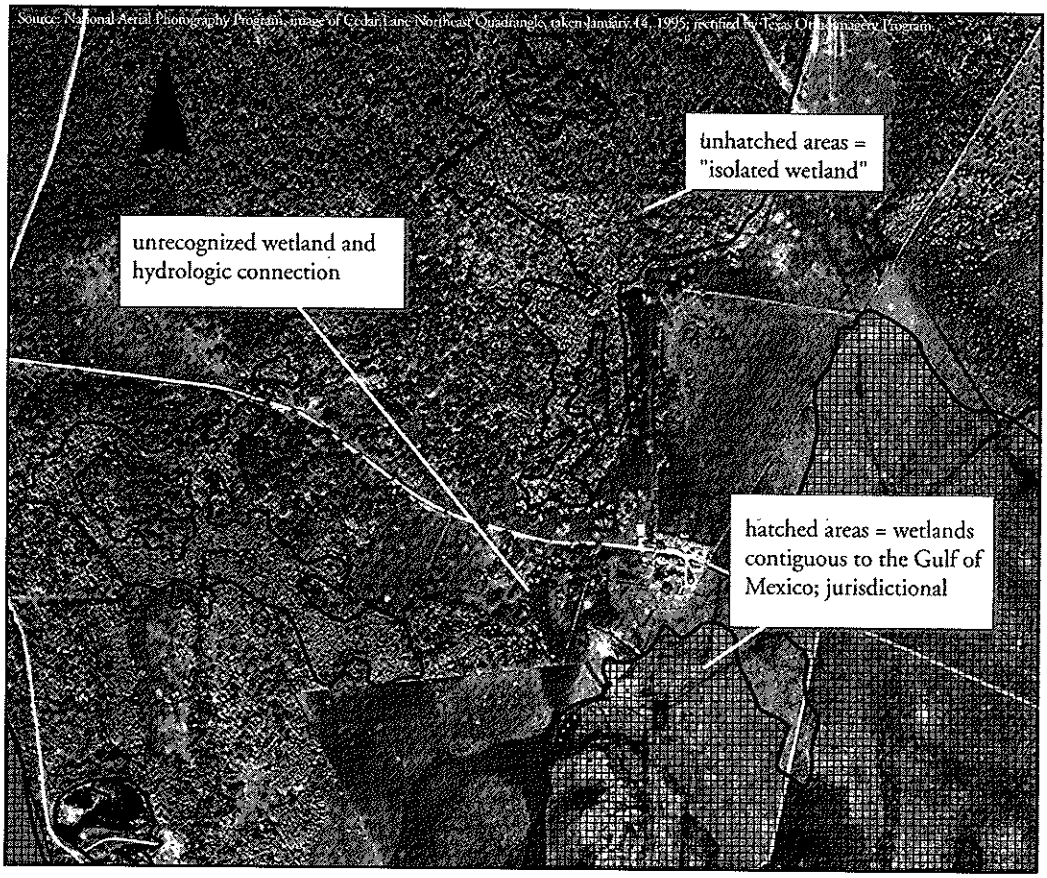
The Galveston District's interpretation of the SWANCC decision requires wetlands subject to Clean Water Act jurisdiction to be contiguous to navigable waters, or to be connected to navigable waters via a waterway that exhibits a bed, a bank, and an ordinary high-water mark. Water flowing across uplands or through channels without a bed, a bank, or an ordinary high-water mark is considered non-jurisdictional sheet flow (Anthamatten 2001). This interpretation, which returns the district to the situation that existed before *U.S. v. Riverside Bayview*, is a much narrower view of wetland jurisdiction than the interpretation supported by *U.S. v. Deaton* and *U.S. v. Rapanos*, and ignores physical and scientific information.

Clay Plain wetlands are not only connected via surface flow to the region's navigable waters during parts of the year; most are also contiguous wetland tributaries of those waters. These facts should allow the wetlands to meet the Galveston District's jurisdictional standards—except that prolonged inundation and flow in portions of the wetlands occur only during the winter.

The 1987 Corps wetland delineation manual specifies that jurisdictional wetlands must be continuously flooded or saturated for two weeks or more during the "growing season" (Studt 1991). The portions of the swales that connect Clay Plain wetlands to navigable waters are flooded for long, continuous periods predominantly during the winter. The Galveston District considers this the *non-growing* season, and therefore determines that these portions of the connecting swales are uplands that constitute breaks in wetland contiguity. However, the Corps' 1987 manual also states that the "growing season" persists in a region until near-surface soil temperatures drop below 41 degrees Fahrenheit. Published data illustrates that this drop never occurs in the Galveston District (USDA 1997). Growing-season conditions exist throughout the year, and the prolonged inundation of Clay Plain wetlands at any time during the year should be sufficient grounds for jurisdiction. This temperature data has been brought to the district's attention (Miller 2004), but district staff will not use the information to change jurisdictional interpretations. To maintain consistency with its previous decisions and policy, the Galveston District must ignore solid scientific data.

To further complicate matters, man-made ditches dissect the Clay Plain. Settlers and drainage engineers long considered the natural swale systems infuriatingly slow, and so constructed a vast network of ditches to promote drainage. Ditches intersect many of the natural drainages that lead from Clay Plain wetlands before those drainages can reach a jurisdictional stream or bay. The Supreme Court's holdings in both *Rapanos* and *Deaton* affirm that ditches are surface water connections that provide a nexus to Clean Water Act jurisdiction. The Galveston District in most instances does not

consider ditches legitimate nexi. The district counts as hydrologic connections only those ditches that replace a named stream as depicted on U.S. Geological Survey maps, or those that exhibit a bed, a bank, or an ordinary high water mark—features absent from many of these frequently maintained ditches. Thus, the district views most ditches as jurisdictional dead ends, despite their obvious purpose of shunting water as directly as possible from wetlands into streams and bays.



This photo of Clay Plain wetlands was taken in January, a wet time of year. Water flows from north (top) to south (bottom). Roughly 820 acre-feet of water flows from the "isolated" wetlands annually. The Galveston District does not recognize as jurisdictional the swale connecting the "isolated" wetlands and contiguous, jurisdictional wetlands, characterizing the connection as non-jurisdictional sheet flow. However, many experts would agree that the swale meets the three criteria for jurisdictional wetlands specified in the 1987 Corps delineation manual.

Hydrologic Connectivity Is Unmistakable

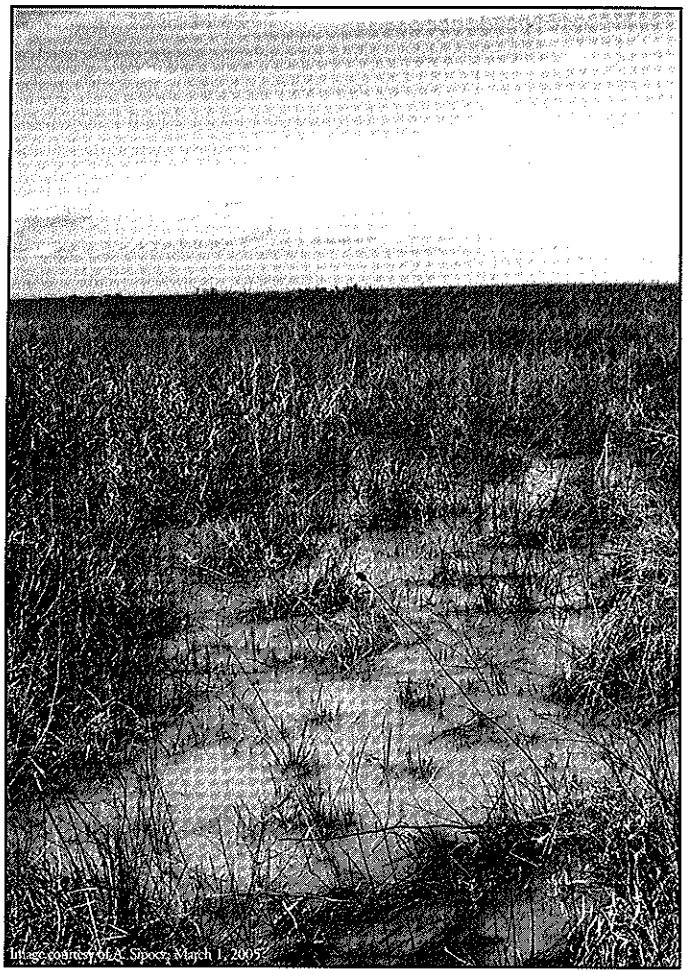
The primary way in which Clay Plain wetlands affect downslope navigable waters is by providing pollution filtration, a widely acknowledged wetland function. There is clearly a need for such filtration services.

In 2002 the Galveston Bay Estuary Program reported that runoff pollution is the major source of pollution in the bay (Lester and Gonzalez 2002). The coastal plain of Texas supports the United States's fourth largest metropolitan area, Houston. The air pollution produced by this metropolitan area includes nitrogenous compounds, heavy metals, volatile organic compounds, and dioxins. These pollutants are constantly deposited onto the surrounding land and become a constituent of rainfall runoff. Most area soils are unsuited for septic systems, but such systems are widely used on the urban fringes, causing partially treated sewage to rise to the land's surface during wet periods. Cattle are ubiquitous on undeveloped lands. Local streams, such as Armand Bayou, are fed almost entirely by polluted runoff and wastewater effluents.

The wetlands that cover the Clay Plain are an ecologically beneficial means of mitigating this pollution. Clay Plain wetlands consist of densely vegetated seasonal and semi-permanent marshlands, flatwoods, and hardwood swamps. Long-term platinum electrode studies show that alternating periods of soil reduction and oxidation occur frequently and year round in these wetlands; this alternation is necessary for most wetland pollution-reduction mechanisms to occur. Moreover, a 2002 study found that Clay Plain wetlands intercept pollutant-laden runoff before the runoff enters larger waterbodies (Sipocz 2002). The study mapped all of the surfacewater flow paths in four undeveloped, representative areas of the Clay Plain. It found that 52 to 90 percent of the runoff leaving the watersheds first passes through supposedly "isolated" Clay Plain wetlands. This study is now documenting the flow volume from those wetlands. Examples of early observations include 5-cfs flows (following a light rain) into an embayment from a collection of roughly 180 acres of isolated wetlands, and a 10-cfs flow into a large river from a marsh embedded in several hundred acres of upland prairie following a 1-inch rain onto saturated ground. The flows from these wetlands are sufficient to allow fish tolerant of low dissolved oxygen, such as carp, gar, bowfin, and numerous minnow species, to inhabit the deeper wetlands seasonally. This research confirms the direct connections between Clay Plain wetlands and interstate waters and clearly supports arguments for considering these wetlands jurisdictional.

Rapidly Vanishing Wetland Resource

The Galveston District, like all Corps districts, now records its isolated wetland determinations. District records often state that wetlands were found to be isolated because no hydrologic connection existed (USACE 2005). This statement may be accurate per the district's own definitions, but it is



Water flows from an "isolated" wetland at the bottom of a watershed in Attwater National Wildlife Refuge in Austin County, Texas.

not an accurate characterization of ecological realities.

Houston's growth has rapidly accelerated since the late 1990s and is now swallowing vast amounts of land for development every year. A nearly completed study has found that at least 12 percent of all the palustrine wetlands in Harris County, a 1.1 million-acre area wrapped around Galveston Bay, were destroyed between 1992 and 2002 by urban development (Jacob and Lopez 2005). Most of these losses probably occurred during the latter half of the study period, when the area's housing market boomed—and that boom has only accelerated since the end of the study. The population on the upper Texas coast is expected to double in the next 50 years. The infrastructure to support these additional people will require significant land area and water resources.

When I began work in Texas I had hoped to recompense some of the wetlands my grandfather and great-grandfather destroyed during the drainage of the Great Kankakee Marsh in Indiana. I was amazed and excited by the great flows of freshwater that tropical downpours sent coursing through the region's vast marshlands. Few of the nation's wetland experts are even aware that Texas still has a million acres of coastal marsh and flatwoods inland of its estuaries, that wood storks and white pelicans can be easily observed 30 miles west of Houston, or that more white ibis nest here than in the Everglades. Booming coastal development in Texas, combined with the Galveston District's arbitrary interpretations of Clean Water Act jurisdiction, will soon erase many of these wetlands—and burden the region with increased flooding, more polluted streams and bays, and the loss of its fish and wildlife resources. ■

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