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GLOBAL WARMING AND PROPERTY INTERESTS:

PRESERVING COASTAL WETLANDS AS SEA LEVELS RISE

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Introduction

This article explores an example of the challenge global warming presents to American property law. It is a first attempt to examine how law might keep pace with changing expectations about the stability and permanence of both natural systems and property interests. Over the past decade, coastal area managers and environmentalists have intensified their efforts to slow the draining, filling, and development that are primarily responsible for coastal marsh destruction.[2] These efforts are based on a heightened awareness of the value of wetlands ecosystems.[3] However, a new threat to coastal wetlands looms on the horizon that, ironically, could make futile all of the current protection efforts that limit draining and filling. Coastal wetlands may drown under rising sea levels.

Atmospheric models predict, and some evidence suggests, that the surge of carbon dioxide (and other trace gases) released into the atmosphere over the last century will contribute to a warming of the Earth's climate.[4] However, uncertainty exists over how significant the warming will be and over what period of time warming will occur.[5] As the Earth's temperature increases, sea levels will rise due to thermal expansion of water and melting of glacial and polar ice.[6]

Existing coastal wetlands, which are flooded periodically by tides, will be inundated by the sea under the standard global warming scenario. Under natural conditions, as seas rise, some coastal marshes can migrate landward of inundated wetlands and maintain a constant vegetated edge between fastland and open coastal waters.[7] Figure 1 (A - C)[8] shows how coastal wetlands can retreat with a moving shoreline if there is vacant upland.

However, in many places along the United States coast, property owners will have developed the area needed to support new "migrant" wetlands into uses that require dry land. To protect their investments, landowners may erect bulkheads to keep the rising waters out. As Figure 1 (D) shows, bulkheads create walls that will prevent wetlands from migrating. Restrictions on the development of existing coastal marshes will fail to achieve long-term wetlands protection if sea levels rise and landowners upland of the marshes build bulkheads. Policies that discourage or forbid landowners from erecting seawalls will reduce the amount of wetlands loss.[9] The central tension between the interests of landowners to maintain the dry character of their upland and the interests of the public to maintain a vegetated margin between sea and land will strain regulatory agencies and the courts.

Professor Michelman's classic view of just compensation as related to the disruption of security of property interests provides one perspective for examining this central tension.[10] A private landowner just upland of existing marsh may experience some demoralization due to dashed expectations about what actions she may take as the tide encroaches on her land. The case for compensation of economic loss from a bulkhead prohibition, however, is weakened if the landowner has early warning to adjust future expectations before they crystallize. Professor's Sax's treatment of the public trust doctrine provides a complementary perspective by focusing on the prevention of destabilizing disappointment of expectations held in common.[11] These expectations generally include the right to enjoy the coast and the environmental benefits it sustains. Passage must be cleared for the geographic movements of coastal wetlands induced by global warming if the public rights to marsh use are to be maintained.

This article grapples with one of the most vexing disruptions climate change will deliver by examining the law embodied in each of these two perspectives of expectations: just compensation required by the fifth amendment and the public trust doctrine. Part I reviews the possible policy approaches to address the wetlands migration problem. An effective government response will account for the uncertainty and take advantage of the advance warning of sea level rise. The next two parts focus on strategies to restrict private bulkheading, which are economically efficient, not costly to the government, and raise serious legal concerns. Part II discusses the implications of shoreline changes for the public trust doctrine. The public trust may allow or even impose a duty on governments to act to facilitate wetlands migration. Part III applies takings law and lays out the fifth amendment boundaries for restricting bulkheads without compensation. The application of these two areas of law to the problem of coastal wetlands protection and sea level rise highlights the challenges to traditional property interests that global climate change will bring.

Part IV returns to the central tension between concentrated private expectations and diffuse public expectations. Concern over the continuing viability of coastal ecosystems is only one of many policy problems that will press the government, including courts, to fairly balance competing interests. Global warming will stretch conventional notions of stability and natural change. The global warming debate continues to dominate scientific journals but enough is understood to call for an early response from government. Indeed, an early response will help clarify the expectations that are at the heart of property law. In the case of coastal wetland protection, early action will result in more marsh migration at less cost with the least disruption of settled property interests.

I. Policy Options for Protecting "Migrant" Wetlands

The probability of global warming over the next century and the resultant rise in sea levels present policy-makers and coastal managers with a novel problem. Instead of preserving an existing wetland that faces an imminent threat, these decision-makers must now contemplate protecting a potential new wetland from a future threat. The characteristic uncertainty and remoteness in time of events that will affect the viability of coastal wetlands during sea level rise[12] may require unconventional responses.

In an article describing the policy problem, the Environmental Protection Agency's James Titus characterizes three approaches to facilitate coastal wetland migration: prevent development, do nothing, and condition development on an agreement not to protect the property from rising seas.[13] The first category consists of policies to prevent development in areas likely to be inundated. This can be accomplished through purchase of property rights or regulation. If the government is able to prevent development on uplands adjacent to coastal wetlands, then there will be little investment for the owner to protect by constructing (and therefore little incentive to construct) a bulkhead as the sea level rises. A regulatory scheme that forbids development, however, may be costly to governments financially and politically. The financial costs may be imposed on the government if courts require compensation for the lost value of the property. If the government is not required to compensate affected landowners, the political costs to officials of decisions that reduce the value of constituents' property are likely to be high. This is particularly true in the case of coastal wetlands protection where the burdens are borne by a particular small group of citizens and the benefits are diffused throughout society.

Moreover, developed residential use of fastland before inundation would do little harm to subsequent migration.[14] Prohibiting current economic use of uplands results in a loss of the value that would be created by development with little benefit to future wetlands. Yet another weakness of the development ban strategy is that it does nothing to allow wetlands migration in areas with existing upland development.[15]

Governments often do nothing until a crisis motivates action. The second category of responses allows development on private property without intervention now, but requires abandonment when wetlands begin to encroach. However, the "do nothing" strategy merely postpones the difficult political and financial decisions surrounding coastal wetlands viability. The longer governments wait, the more development will occur and the greater stake landowners will have in protecting property with bulkheads.

The third strategy, to allow development on the condition that property not be protected from rising seas, is the most reasonable from an economic perspective. Titus proposes two methods for implementing this approach: ban bulkheads, or purchase future interests. Prohibiting bulkheads would allow fastland property owners to develop their property to whatever degree they wished, subject to the condition that any development not block wetland migration.[16] Government action today to prohibit bulkheads in the future has a low political and financial cost because there is not an imminent threat of inundation and because future interests are discounted. However, regulatory prohibition of bulkheads that is politically acceptable today may falter in the future as flooding occurs and landowners lobby to protect their property from an imminent threat.[17] Therefore, government may wish to take advantage of

discounted future property interests by purchasing them rather than imposing a regulatory prohibition, because the acquired interests may be more durable as the threat of flooding becomes more imminent.

The legal issues associated with the types of responses to sea level rise vary greatly in their complexity.[18] The responses that incorporate compensation to property owners face no legal hurdles. The power of eminent domain, which rests both in the federal and state governments, allows condemnation of private property for a public purpose. Wetlands protection is a legitimate public purpose.[19] Governments can negotiate a voluntary sale or compel sales through condemnation procedures.

If, however, the government opts to prohibit development or bulkheads through legislation or regulation, then the primary legal question is whether a local, state, or federal government is required to compensate affected property owners. Even though political considerations may warrant that coastal landowners be compensated for losses they suffer while facilitating wetland migration, the question is important because if the government is not legally required to make that compensation, its negotiating position will be stronger. The stronger the government's right to act without compensation, the more likely private landowners are to cooperate and the lower their reservation prices will be. The public trust doctrine, along with the law of nuisance, defines the existing public rights that limit certain uses of private property. If bulkheads or development are incompatible with the exercise of these public rights, then no compensation is required for regulatory restrictions. Takings law sets the

limits of governments' ability to interfere with private property for public purposes without just compensation.[20]

The following two parts of this article will focus on these legal issues that surround restrictions on bulkhead construction. An analysis of bulkhead prohibitions serves as a vehicle to explore questions relating to how property law will respond to climate change. It also embodies the specific legal problems that arise in implementing policies to protect coastal wetlands as sea levels rise. The article applies the law to bulkhead prohibitions for four reasons: 1) it is a realistic example of the kind of controversy that will arise from climate change that will press the boundaries of conventional property law; 2) it alters expectations of property owners well before inundation and the need for a bulkhead is imminent; 3) it is an efficient and politically feasible[21] response to the problem of potential wetland loss due to sea level rise; and 4) of all the possible responses to the threat of coastal wetland loss, it sits most squarely in the gray area between permissible and impermissible regulation without compensation, and therefore is a sensitive indicator of how far the law will allow governments and agencies to go.

II. The Public Trust Doctrine

The public trust is a legal doctrine with ancient roots that concerns the extent of generally inalienable common rights of the public to use or enjoy certain natural resources. All property owners control land subject to the public trust. Because coastal wetlands are valuable natural resources in which the public has an inherent substantial interest,[22] a government may be able to act within its trust responsibilities to address sea level rise. To the extent that a bulkhead restriction is an exercise of

trust rights that have always been implicitly reserved from fee titles by the public, then there is no taking of property requiring compensation under the fifth amendment. The public trust authority of government, though, is much narrower than its police power to protect the health and welfare of its citizens.

The law recognizes the coastline as a uniquely important location and grants the government special rights and responsibilities in coastal areas to act in the public interest. Navigation, commerce, and fisheries are traditional areas of public interest; however, conservation and aesthetics are gaining increasing recognition as elements of the public trust. Yet, there is no single public trust theory; different trusts operate for different resources and different sovereigns (state and federal). State and federal public trust doctrines are relevant to considering responses to sea level rise because the coast is an area where private lands traditionally have been subject to public rights. The protection of these public rights may be an affirmative duty for governments.

A. Federal Public Trust: The Navigational Servitude

Pursuant to the commerce clause of the U.S. Constitution, the federal government impresses a servitude on all navigable waters. To ensure free commerce, navigation, and fishing, the federal government can improve both inland and coastal waters by building dams, jetties, diversions, and other structures. A federal action that alters access to waters subject to the navigational servitude does not require compensation, even if the alteration completely deprives a littoral owner of all access to the waters. This is because the owner's title never encompassed a perpetual right to access navigational waters. Even when the government condemns fastlands for a

water-related project, compensation to the owner does not include the value of those lands attributable to their location near the water, such as for a port.[23]

The commerce clause, besides defining the scope of the federal navigational servitude, also defines congressional regulatory authority over navigable waters. This regulatory authority is broader than the navigational servitude[24] and its exercise by Congress may sometimes require compensation under the fifth amendment.[25] For instance, in Kaiser Aetna v. United States,[26] the Court ruled that a non-navigable private fish pond, when dredged and connected to the ocean to create a marina, is subject to the U.S. Army Corps of Engineers' regulatory authority. However, the pond is not subject to the federal navigational servitude, which would have required free public access to the marina without compensation to the owner.

The federal government could use the navigational servitude to prohibit a littoral landowner from erecting a bulkhead in navigable waters below the high tide line. No compensation would be required. The federal government could also use its broader commerce clause regulatory authority to ban fastland bulkheads; however, it would be required to compensate the landowner if the regulation resulted in a taking. As seas rise, there is no doubt about the federal government's ability to ensure that coastal wetlands be allowed to migrate. The difficult question is whether the federal government also could exercise its authority to prohibit bulkheads without compensating inundated landowners.[27] Would courts hold that the navigational servitude migrates inland as the seas rise?

Courts could decide the issue either way. Kaiser Aetna and its companion case, Vaughn v. Vermilion,[28] indicate that the U.S. Supreme Court will focus on past use of areas that become subject to the ebb and flow of the tides as a result of private construction. In both cases, a landowner altered property that was not navigable to make it navigable for private use. In both cases the court held that such improvements that neither divert nor destroy pre-existing waterways do not result in the extension of the federal navigational servitude to cover the new navigable waters.

These cases support the principle that property not previously subject to the navigational servitude will remain free of the servitude even if artificial construction exposes the property to the ebb and flow of the tides. Since construction of a bulkhead will prevent land from becoming subject to the ebb and flow of the rising tides, the land will remain free from the servitude. It is hard to see how a Court that does not recognize the migration of the federal navigational servitude to an area that becomes navigable-in-fact would extend the public trust to an area that is kept dry by a seawall.

On the other hand, Kaiser Aetna and Vaughn can be read to support the public policy of promoting enhancement of navigational waters. If the court had found that the navigational servitude had moved in these cases, property owners would be discouraged from expanding navigable waters because they could not capture the benefits. In a sea level rise scenario, it is the prevention of construction that will improve navigational waters. In Kaiser Aetna and Vaughn, inaction would not have resulted in an expansion of navigable waters. The Court did not wish to penalize enterprising landowners who expand navigable waters through construction. Where

inaction will result in rising sea levels enhancing navigational waters, however, the Court may find that the servitude moves regardless of construction activities. In a sense, this interpretation of the reach of the navigational servitude is tied to the "natural" reach of navigable waters in the absence of construction. Under this theory, a landowner should not be able to frustrate the reach of the navigational servitude by erecting a bulkhead. The Vaughn opinion left open the question of whether diversion or destruction of a pre-existing natural waterway in the course of construction would result in extending the servitude to the new navigable area created at the "expense" of part of the public servitude.[29] If harm to navigable waters extends the servitude, then bulkheading that results in the destruction of navigable waters (including wetlands) may be subject to the public trust.

B. **State Public Trust**

As inheritors of the sovereign rights of the Crown, the thirteen original states acquired ownership of all lands subject to the ebb and flow of the tide. The "equal footing" doctrine gives all other states the same rights as the original thirteen.[30] Therefore, upon statehood, each state received title to lands subject to the ebb and flow up to the normal high tide mark.[31]

States may own submerged tidelands regardless of their navigability.[32] However, "individual states have the authority to define the limits of the lands held in public trust and to recognize private rights in such lands as they see fit."[33] Nonetheless, all submerged tidelands, whether publicly or privately owned, are subject to certain public easements.[34] Where the federal public trust is primarily concerned with navigational issues, the state public trust is more expansive and is concerned with

a wide variety of interests including fishing, environmental quality, and recreation.[35] Therefore, state doctrines of public trust are more helpful in protecting the public interest in wetlands preservation than is the federal doctrine. State public trust is not a single doctrine, but fifty bodies of law created by each state.[36]

Mississippi's public trust in submerged lands, confirmed by the U.S. Supreme Court in Phillips Petroleum Co. v. Mississippi,[37] presents a useful illustration of the doctrine because the state is located on the Gulf of Mexico with extensive wetlands, and has a representative common law system (as contrasted with Louisiana's anomalous civil-law influenced system). In Mississippi the public has an interest in public bathing, swimming, recreation, fishing, environmental protection, and mineral development along the shore.[38] Despite the fact that Phillips Petroleum Co. had been paying property taxes on submerged lands for which it had recorded title, the U.S. Supreme Court held that the submerged lands (and their valuable mineral rights) belonged to the state of Mississippi, which had never granted Phillips Petroleum rights the company was claiming. Public trust interests do not lapse merely because a state has not previously asserted them.

The Mississippi Supreme Court, in Cinque Bambini Partnership v. State,[39] held that state public trust lands may be augmented by

> natural inland expansion of the tidal influence. . . . If over decades, . . . the tides rise -- that is, the mean high water mark rises (and there is reason to believe this has happened and may continue to happen) -- the inward reach of the tidal influence expands. . . . [T]he new tidelands so affected accrete to the trust.

On the other hand, artificially created water courses, inlets, marinas, and other non-natural alterations to private land do not cause ownership to pass to the state public trust even though they become subject to the ebb and flow of the tides. This finding was not appealed to the U.S. Supreme Court with the other issues in Phillips Petroleum.

In response to the Cinque Bambini/Phillips Petroleum rulings, the Mississippi legislature enacted a statute to fix permanently the boundaries between public and private lands.[40] The act requires the Secretary of State to prepare a map to mark trust land boundaries that will not move with rising sea levels.[41] The Secretary of State has challenged the constitutionality of the act based on a public trust theory in litigation that is now pending before the Mississippi Supreme Court.[42]

Regardless of the outcome of the Mississippi litigation, there is no existing state law doctrine that addresses a public interest in lands that lie below sea level but are not subject to the ebb and flow of the tides due to bulkhead protection. Nonetheless, Phillips Petroleum provides a clue as to how a Mississippi program to protect migrating wetlands might fare in the courts. The Phillips Petroleum Court stressed the importance of "honoring reasonable expectations in property interests."[43] In that case, Mississippi's long-standing claim of ownership of tidal lands made it unreasonable for Phillips Petroleum to assume that it held title. The Cinque Bambini opinion should put coastal owners on notice of the state's future interest in lands that will become tidal. Mississippi may honor this expectation by prohibiting bulkheads. The unprecedented scale of sea level rise due to global warming necessarily unsettles both public and private expectations. Policy-makers should begin to institute programs

to prohibit bulkheads sooner rather than later so that new expectations have a chance to settle before seas rise so high as to imminently threaten upland property.

To the extent that one could argue that sea level rise caused by the global warming is not a natural event, then the state may not be entitled even to newly submerged land according to Cinque Bambini's artificially created waters exception.[44] After all, global warming is a kind of nuisance caused by human activities that generate "greenhouse gases." But, unlike the artificial changes in navigable waters in Vaughn, where a responsible party is identifiable, the diffuse anthropogenic causes of global warming make allocation of responsibility for sea level rise difficult. Actually, the rate of sea level rise is a behavior more analogous to natural changes along the coast, such as subsidence, than to artificial changes, such as the construction of a marina or canal. Since sea level rise will occur slowly (over the course of decades) it may be regarded by courts as akin to natural change because of the gradual way the alteration to the shoreline occurs. The decisive factor in sorting out the legal response to sea level rise may be the longstanding principle that boundaries between land and water are inherently transient.[45] An owner near a body of water has always been on notice that property boundaries may change due to erosion, accretion, and reliction. Only sudden, avulsive changes in watercourses leave property boundaries unaffected. In explaining this rule, at least one court has noted that the underlying rationale is the pace of change.[46] Sea level rise induced by global warming would threaten coastal wetlands at a speed that would provide upland owners with a period of time of similar duration to landowners experiencing conventional erosion, accretion, and reliction to adjust their expectations.

C. **The Expanding State Public Trust**

Since the 1970s, many courts and commentators have argued that the public trust doctrines should reach beyond the federal navigational servitude and state ownership of submerged lands to protect public rights to certain natural resources incapable of or inappropriate for private ownership.[47] Some courts view the public trust as a dynamic doctrine to "be molded and extended to meet changing conditions and needs of the public it was created to benefit."[48] To the extent that the public has a reasonable expectation to enjoy the benefits of coastal wetlands, the trust can ensure that those wetlands do not disappear under the rising seas. As the modern public trust doctrines evolve along with the problems posed by global warming, the reach of public rights may extend to activities such as bulkheading that previously were unrestricted.

The past two decades have seen the greatest expansion of the public trust in recreation. Where the traditional public trust extended only up to the high water line and was concerned solely with navigation, commerce, and fishing, recent cases have expanded the trust to include dry sand areas of public beaches for recreation.[49] In Matthews v. Bay Head Improvement Ass'n,[50] the New Jersey Supreme Court confirmed that the public's right to use tidelands includes a variety of recreational activities[51] and found that the use of the dry sand beach above the high water mark extending to the vegetation line was necessary to the exercise of the public right. This ancillary right includes not only the use of the dry sand beach for access to the tideland, but also "the right to sunbathe and generally enjoy recreational activities."[52] The court declared that this right of use exists on private as well as public lands.[53] The court also limited the uses of privately-owned dry sand beach areas to those that

are "reasonably necessary" in light of the indivisibility of the foreshore and the fastland.[54]

The New Jersey Supreme Court's willingness to impose public rights on private lands to allow public enjoyment of existing public trust lands illustrates the flexibility of the doctrine. This flexibility holds promise for imposing public trust restrictions on fastlands located upland of existing coastal wetlands. The opinion reflects a practical attitude toward ensuring that the public trust be useable. Just as the public right to recreate along a tideland is frustrated if the public cannot use the adjacent dry sand beach, so the public's environmental and health interest in coastal wetlands will be frustrated if upland owners erect bulkheads that block marsh migration. The Matthews case demonstrates the willingness of a court to impose obligations on fastlands so that traditional public trust areas can serve their public purposes.

Wisconsin, in its celebrated opinion of Just v. Marinette County,[55] recognized that "the changing of wetlands and swamps to the damage of the general public by upsetting the natural environment . . . is not a reasonable use of that land which is protected from police power regulation."[56] In Just, a landowner was prevented from filling his property because it might diminish the ability of the wetlands to serve as a buffer for pollution. In applying the public trust, the court stressed the close interrelationship between wetlands and the integrity of navigable waters. The purpose of the ordinance upheld in Just was to "protect navigable waters and the public rights therein from the degradation and deterioration which results from uncontrolled use and development of shorelands."[57] The same rationale may be applied to a regulation restricting bulkheading.

California has a similar ecological interest in its public trust doctrine for tidelands. In Marks v. Whitney, an action to quiet title to settle a boundary line dispute, the California Supreme Court held that the littoral owner holds property subject to a public easement for navigation, commerce, and preservation. "[O]ne of the most important public uses of the tidelands . . . is the preservation of those lands in their natural state, so that they may serve as ecological units . . . ."[58] Explicit judicial recognition of this particular use of the public trust suggests that a ban on bulkheads, if justified to preserve marsh ecology, may be acceptable in states like California and Wisconsin.

It is important to recognize that there is a difference between prohibiting development of a tract of land because of its existing value as a wetland and prohibiting the erection of a sea wall because of a tract of land's potential to evolve into a wetland. An owner is on notice of the current natural character of her land but not necessarily of its importance as a future wetland if the sea level rises. This underscores the importance of a bulkhead prohibition that is implemented as soon as possible to allow ample time for reconciliation of expectations with the risks of global warming.

D. Enforcing the Public Trust

This discussion of the public trust has been focused on finding authority for willing state and federal governments to claim a public interest in protecting migrating coastal wetlands. However, the public trust sometimes is applied to compel a government to take or refrain from an action.[59] If the public trust is applicable to

wetlands migration, then there is precedent for a fiduciary duty of the government to act to prevent interference with the process.

The classic case of this fiduciary aspect of the trust is Illinois Central Railroad v. Illinois.[60] In that case, the state of Illinois revoked a grant it had made of a major section of the Chicago waterfront to the railroad company. The U.S. Supreme Court held the original grant invalid, stating that Illinois was powerless to alienate a natural resource as important as Chicago's harbor.[61] This principle may be relevant to wetlands migration. If a state fails to restrict bulkheads, it may be abdicating its fiduciary responsibility to protect tidal lands.

The migrating wetlands situation where government fails to act is different from Illinois Central, however, because there was an identifiable action by the Illinois legislature to which conflict of interest or failure of duty could be attached. Still, courts have compelled government authorities to act affirmatively on behalf of a public trust resource. As with the line of New Jersey cases expanding the public trust to include some interests on dry sand beaches, these fiduciary cases represent the leading edge of public trust law. As trends, they give greater impetus to state and federal governments to create regulatory systems that can keep pace with new threats to public resources.

In a series of cases involving water diversion for the City of Los Angeles, the California Supreme Court held that the public trust "is an affirmation of the duty of the state to protect the people's common heritage of . . . marshlands, and tidelands, surrendering that right of protection only in rare cases when the abandonment of that

right is consistent with the purposes of the trust."[62] The Court held that the city might have to reduce existing appropriative water rights to protect public trust values in Mono Lake. The city planned to increase future diversions even though past use of Mono Lake tributaries had reduced water levels to such an extent that habitat was threatened.

Another series of opinions, relating to U.S. Department of the Interior management of Redwood National Park,[63] found that the department failed to meet its fiduciary responsibilities to protect the park and required it to fulfill its trust by lobbying Congress for an expansion of park boundaries. The court ordered the department to report back to the court on proposals made for more park protection, more management authority, more money to purchase land, and more negotiation of cooperative agreements with neighboring timber companies (whose practices were causing erosion and sedimentation).

More recently, a different federal court suggested that the U.S. Department of Agriculture staff failed to act "with the degree of responsibility rightfully expected of them" when they did not assert federal reserved wilderness water rights in state stream adjudications.[64] The court concluded that it lacked the discretion to require that the Department assert federally reserved wilderness water rights."[65] However, the court ordered the Department staff to write "a memorandum explaining their analysis, final decision, and plan to comply with their statutory obligations regarding protection and preservation of wilderness water resources".[66] Although the tenth circuit vacated the lower court's judgement on ripeness and reviewability grounds, the opinions that address the merits of the public trust issue reflect the potential for citizen

enforcement. Just as a landowner has recourse in the courts for frustration of certain private expectations, so does the public for its trust interests. However, if the hurdles of ripeness and reviewability prevent citizens from compelling agencies to act to protect coastal wetlands until flooding is imminent, the public will have lost a crucial opportunity to confirm its interest before private interests crystallize and the equities shift.

III. The Takings Issue

In his famous 1922 opinion, Justice Holmes found that a Pennsylvania law restricting underground coal owners from mining some of their property was invalid without compensation to the owners for loss of their rights. He stated: "if a regulation goes too far, it will be recognized as a taking."[67] Although subsequent cases give us more guidance, Holmes' general statement accurately captures the ad hoc law of takings[68] -- there is no precise formula for determining whether a regulation, such as a bulkhead or development restriction, will lead to the taking of private property by its application.[69] (Courts seldom invalidate a regulation as unconstitutional on its face.)[70]

States, which have sovereign power to regulate land use for the health, safety and welfare of their citizens, confer regulatory authority on local governments to control land use. Many state governments reserve authority to regulate land use directly in areas of special concern, such as coasts. Both state regulations and local regulations based on enabling authority granted from the state must respect fifth amendment protections of property.[71] However, it is important to note that a landowner can also challenge a local regulation as not being within the scope of

powers granted to the local jurisdiction by state law. This issue is a matter of state law and does not arise in cases where the state directly regulates land use, such as actions by a state coastal zone management authority.

This analysis begins with a review of the constitutional law of takings and applies the doctrine to regulatory authority to prohibit construction of bulkheads. Next, it addresses the special case of conditioning building permits on agreements not to build bulkheads. The public trust doctrine provides authority and perhaps a duty to act to protect public expectations, whereas takings law restricts the power of governments to regulate without compensation to protect the expectations of property owners.

A. Takings Law and Anti-Bulkhead Regulation

It is impossible to convert into formula the narrative language of U.S. Supreme Court opinions describing the limits of the fifth amendment just compensation requirement. Generally, however, the Court's analysis tends to focus on three considerations.

1. The extent to which the regulation advances a legitimate state interest.
2. The extent to which the regulation denies all reasonable economic uses of the property.
3. Whether a physical invasion or outright seizure of a property interest occurs.

The following sections address each of these possible triggers for a taking.

1. Legitimate State Interest

The requirement that a regulation advance a legitimate state interest technically precedes the takings analysis. However, for practical purposes, it is part and parcel of the Court's analysis of a takings claim.[72] The consideration involves both identifying a legitimate interest and then showing the nexus between the regulation and the interest. If either a legitimate interest is lacking or the relationship between the state interest and the regulatory burden imposed on private property is too attenuated in a given case, a taking (or substantive due process violation) will result.

Although some state courts have found that preservation of land in a natural state is a valid state interest,[73] most courts look for interests that are more explicitly tied to human concerns. To the extent that coastal wetlands migration is important for fish spawning, for instance, a regulation advancing this interest is more likely to be upheld if it is based on maintaining fisheries (for humans) rather than merely protecting fish.[74] Protection of non-economic resources such as wildlife or aesthetics arouses more judicial scrutiny. Any legislative (or even administrative) finding that migration of coastal wetlands is in the interest of human health, safety, or welfare will help a regulation over the legitimate state interest hurdle. Such a finding can also be important to help demonstrate the nexus between the regulatory burden and the public interest advanced.

Still, the legitimate interests that may be served by regulation are broad and comfortably encompass the purposes of prohibiting bulkheads. The U.S. Supreme Court has upheld regulations designed to: preserve open space, avoid premature development, and prevent pollution and congestion;[75] protect wetlands;[76] and reclaim

disturbed land.[77] The Court has also indicated support for the legitimacy of a state interest in slum clearance[78] and aesthetic preservation[79]. If, however, a court suspects that the underlying purpose of an otherwise legitimate regulation is to reduce the value of property to make future public acquisition less costly, then it may view the application of the regulation as a taking.[80]

2. **Economic Impact**

Regulations may have significant adverse effects on the market value of property, but as long as they do not remove all reasonable economic uses of land, they may not constitute a taking. Sometimes the courts will view the economic consideration as two facets: the direct impact on the landowner, and the extent of interference with investment-backed expectation.[81] However, the distinctions between the two blur because the direct impact often coincides with frustration of expectation.[82] In examining the value left in property after regulation, courts adjudicating taking disputes often weigh the importance of the public benefits created by the regulation. Moreover, even if a prohibition of a land use results in a complete loss of economic value, courts will not find a taking if allowing the use would cause a public nuisance. The economic impact hurdle comes closest to the classic balancing test of public benefit versus private cost. It is a pragmatic standard to be applied to the particular facts of a case. [83] As a balancing test, the economic impact analysis offers the flexibility necessary to respond to the new clashes in expectations that climate change will instigate.

In Pennsylvania Central Transportation Co. v. New York City,[84] the U.S. Supreme Court upheld a New York City Landmarks Preservation Commission's ruling

that multistory office space could not be built above the designated landmark of Grand Central Terminal. The Court held that for the purposes of takings analysis, a single parcel should not be divided into discrete segments to determine whether

> rights in a particular segment have been entirely abrogated. In deciding whether a particular governmental action has effected a taking, this Court focuses rather both on the character of the action [discussed in the next section] and on the nature and extent of the interference with rights in the parcel as a whole.[85]

Thus, even if one portion of an interest in property is forfeited, the continued viability of other rights in the property bundle will prevent a taking.[86] Although Grand Central Terminal's owner was denied the ability to exploit fully the economic value of the property, it was still left with a viable economic use of the property. In other cases, severe restrictions on land use have been upheld where the only residual economic uses were agriculture, recreation or camping.[87] The smaller the portion of the land affected, the less likely the regulation is to be ruled a taking, even if it is quite restrictive.[88] A bulkhead ban applied to a small plot of land that will be inundated completely is much more vulnerable to a takings claim than one applied to a large plot, a portion of which will remain dry even in the absence of a bulkhead.

In Penn Central, city law permitted the terminal owner to transfer air development rights to nearby blocks. The Supreme Court indicated that this option helped preserve the economic value of the property. Nonetheless, the Supreme Court has upheld regulations that result in a severe loss in value with no transferrable development right compensation.[89] However, to the extent that fastland owners can be offered transferrable rights to offset the economic burden of a bulkhead ban,

regulatory authorities may increase the likelihood that a prohibition of bulkheads will be upheld. A transferable right might allow more intense development somewhere beyond the highest expected future high tide line in exchange for an agreement not to construct a bulkhead. Alternatively, landowners along the shore can be permitted to build at a higher density on any property that cannot be protected by a bulkhead. The danger with this incentive, of course, is that higher density development may increase the pressure on the government to retreat from its prohibitive policy in the future, as more valuable structures are threatened with abandonment. The effectiveness of transferable rights is, of course, limited to situations where there is a target area with demand for more intense development than is permitted by existing zoning.

When courts characterize a regulation as abating a public nuisance, rather than forcing a private landowner to provide a public good, economic impact is substantially less important.[90] A far greater diminution in value is likely to be upheld if the regulation is found to prevent a harm. The Wisconsin Supreme Court, in Just v. Marinette County, framed its wetland preservation language in terms of preventing harm ("despoliation") to public rights by limiting the use of private property.[91] A recent interpretation of Just confirmed that "the key to analyzing a claim that property has been taken . . . is the determination of whether the ordinance prohibits a public harm or provides a public benefit.[92] A bulkhead prohibition should likewise focus on the harm to public interests that result from activities resulting in marsh loss. That Just is often cited as a case affirming the public trust doctrine highlights the close link between the doctrine and the economic impact prong of takings analysis. If a government regulation prevents an activity by a landowner that would frustrate the

public from exercising its rights, then the prohibited activity can be characterized as a nuisance. Abatement of this kind of nuisance will not be a taking because of economic impact even if the property is rendered essentially worthless.

Commentators often question the distinction between the abatement of a nuisance and the provision of a public good.[93] Without a "benchmark of 'neutral' conduct which enables us to say where refusal to confer benefits . . . slips into readiness to inflict harms,"[94] it is impossible to classify a bulkhead prohibition in either category. From the perspective of private property interests, a bulkhead ban enables the public to benefit from a new coastal wetland by compromising the landowner's ability to maintain the character of the plot of land. From the perspective of public interests, bulkheading prevents continued use of the coastal wetlands and the larger areas they maintain with plants, fish, and water quality.

To the extent that the idea of preserving the natural character of land ever provided a stable benchmark[95] it surely will be cast adrift as sea levels rise. A court that views bulkheading as maintaining the nature of the fastland against sea level rise produced by anthropogenic greenhouse gases is likely to regard bulkheading as a strong right held by the landowner. On the other hand, a court that views bulkheading as resistance to the natural phenomenon of marsh migration, for which landowners have had ample notice, is likely to regard the construction as depriving the public of its right to the benefits of coastal wetlands it has always enjoyed.

Yet, courts do draw the harm/benefit distinction. Such widely cited cases as Miller v. Schoene, Hadacheck v. Sebastian, and Keystone Bituminous Coal Ass'n[96]

manifest Michelman's rule that no compensation is owed to a landowner when prohibited activities would have "either (a) interrupted someone else's enjoyment of an economic good, as should have been apparent; or (b) were of a sort which society had adequately made known should not become the object of expectations of continuing enjoyment."[97] Failure to provide a benefit becomes a nuisance when society has given the property owner ample warning of the benefits it expects. Certainly Penn Central had no duty to build Grand Central Terminal in the first place; however, as the building became admired as a landmark the company lost the right to alter it significantly. A court that upholds a regulation preventing alteration of a resource constructed by the owner (a historic landmark) can reasonably uphold a regulation preventing alteration of an ecological resource (e.g. a coastal wetland), even though the owner was unaware of the need to maintain the resource initially (when the terminal was built or the upland developed).

Governments that take action now to protect remaining marshes indicate their intentions now to ensure that these ecosystems survive sea level rise, and strengthen expectations to sustain the marine and estuarine uses that depend on marshes. To the extent that a bulkhead ban is the most narrowly drawn of the government's options to protect coastal wetlands (as opposed to a development ban which prohibits more than is necessary to allow future marsh migration), it may be more likely seen as abating a nuisance by responding directly to a new threat and not providing any new public benefits. A bulkhead restriction justified on nuisance grounds may secure greater credibility from a court if it is part of a larger program to remove any incentives existing marsh owners have to alter the ecosystem. The economic cost of a bulkhead ban today will not be borne by the landowner for decades, until the sea

level rises sufficiently to threaten property. The discounted value of the cost is likely to be small today. The sooner a bulkhead ban is enacted, the less the cost to the landowner and the greater the time available for adjustment of investment-backed expectations. A bulkhead ban passing constitutional muster today might fail if enacted instead at a later time when sea level rise is imminent.[98]

3. Character of Government Action

Where government regulation is of such a character as to physically invade or permanently occupy property, courts will find a taking even if the economic loss is small.[99] When a regulation creates a new easement for public use, it is a taking. In Kaiser Aetna v. United States,[100] the Court ruled that the Army Corps of Engineers could not prohibit, without compensation, a lagoon owner from excluding the public. The Court stressed the fundamental nature of the right to exclude others from private property and its violation by the imposition of the federal navigational servitude on a privately constructed lagoon.[101] Public use of airspace for plane flights has been held to constitute a taking of an air easement. In finding an easement taking, the Court stressed the unanticipated nuisance of the intrusion by low-flying aircraft.[102]

The Court has also found a physical invasion even when no easement for public access was implied in the government action. In Loretto v. Teleprompter Manhattan CATV Corp.,[103] the Court found a taking where a New York statute required apartment owners to allow cable companies to install small electronic facilities on their premises for a fee established by a commission. Determinative for the court was the character of the government action. The Court held that when the character is a permanent physical occupation, there is a taking without regard to

whether the action furthers a legitimate state interest or has only minimal economic impact on the owner. The Loretto Court did not consider, however, the case where a government action is a permanent physical occupation but its purpose is to abate a public nuisance. The cases discussed in the previous section of this article, such as Miller v. Schoene[104] suggest that the state interest in preventing nuisance allows physical destruction without compensation.

Once a court finds that a regulation effects a physical invasion, it becomes extremely likely that the regulation will be found to cause a taking unless it abates a public nuisance. A regulation that is found to exact a flowage easement for the sea over private property is more likely to be considered a taking than one that is found merely to restrict a seawall construction activity.[105] The takings view would focus on the permanent physical encroachment of water on the owners' property as a result of regulation. The permissible, non-compensatory regulation view would focus on the damage to public resources avoided by restricting the harmful practice of building a bulkhead. It would view a bulkhead prohibition not as imposing a flowage easement, but rather as preventing a property owner from diverting a naturally-formed body of water off her property.

The physical invasion rule yields results at odds with instinctive notions of fairness.[106] A nominal harm will be compensable if it is the result of physical presence despite the fact that a greater harm will go uncompensated if it involves a mere use limitation with no physical occupation. One basis for explaining the rule is that private expectations about property use focus on a right to exclude people or objects; therefore, frustration of that expectation is more serious than other forms of

regulation.[107] The tension between public and private expectations in this context will be manifest in the conflict over whether the right to exclude includes the right to prevent changes in the nature of land that would replace one ecosystem with another for which the public has an interest.

B. **Permit Conditions**

To the extent a government can ban seawalls outright, it certainly can condition permits on agreements not to construct bulkheads. However, the political and legal hurdles are likely to be lower for conditioning new building along the coast, where most development already is regulated.[108] Therefore, a coastal area that is not now highly developed may wish to pursue this path of less resistance. Building permits for new structures are issued by local authorities who may check to see that the proposed structure meets zoning requirements. In many jurisdictions, special subdivision/land development ordinances regulate major development activities and often require permit applicants to meet standards relating to environmental protection. Building on undeveloped land in coastal zones generally requires a permit from a state coastal zone management agency.[109]

In Nollan v. California Coastal Comm'n, the U.S. Supreme Court ruled invalid as an uncompensated taking a state coastal zone management agency's attempt to condition a building permit.[110] The dispute arose when the California Coastal Commission (CCC) conditioned a permit to replace a bungalow with a larger house on the dedication of an easement to allow public access along the portion of the dry sand beach owned by the permittee. The easement did not involve access to the beach from the street. The CCC argued that the condition was imposed to mitigate

the adverse impact of the new, larger house which would block public view of the beach, "psychologically" inhibit the public's recognition of its right of access, and increase private use of the shorefront. The Court found that the permit condition completely failed to further the legitimate state interest in public health, safety and welfare. Although the majority opinion stated that a permit condition must bear a substantial relationship to a valid public purpose, its actual holding that there was not even a rational relationship carries more precedential weight in defining the test.[111]

The Court acknowledged that the Nollans had no unfettered right to build whatever they wished on the property and that the CCC had a right to deny the permit if denial would further some legitimate public purpose.[112] A crucial aspect of the Nollan case is that the CCC had authority to deny the permit entirely.[113] However, a condition on the permit that is unrelated to preservation of the public right (of access, use, and view of the shore) that would be harmed by an unconditional permit is invalid. The CCC probably could have conditioned the permit on the provision of a public view or access to the beach.

A coastal management agency seeking to protect wetlands could condition a permit for development or construction on a prohibition of bulkheads.[114] Because the relationship between the presence of a bulkhead and the inability of wetlands to migrate inland is substantial, let alone rational, such a condition would meet the standard set by the Court in Nollan. Moreover, it is the development itself that would motivate a property owner to build a bulkhead in the first place.

Nollan is a case involving a physical seizure of a property interest: an easement for public access. The Court traditionally has viewed the right to exclude other people from using a tract as a particularly important property right protected by the fifth amendment.[115] A condition prohibiting bulkheads does not invade property by providing public access.[116] However, such a condition might result in an invasion by water. A court's determination of the legal nature of future flooding will be a strong indication of the court's opinion about the takings issue. A condition requiring the transfer of a future property right (for instance, a future conservation or flowage easement) to the government is more vulnerable to a takings claim than a condition preventing a landowner from building a seawall. Although the result may be the same in terms of current fastland being inundated, the legal effect of transferring a formal property right to the government is likely to tip the scales in favor of just compensation.[117]

The chief advantage of a policy to prohibit bulkheads on future development (as opposed to all property) is that it can be implemented using a pre-existing regulatory system to condition permits. Also, it explicitly ties investments in property improvements to the expectation that they must give way to migrating wetlands. However, these advantages come at a cost. Permits authorize a specific activity and do not preclude the same or subsequent owner of the property from returning to the permitting authority at a later date. Unless the permit condition runs with the land as a covenant, the fastland remains vulnerable to subsequent permits that allow bulkheads. However, the more tightly the permit condition runs with the land or effects a permanent prohibition, the more likely it will be seen by a court as a permanent physical occupation. It is important to recall, however, that even a

regulatory ban on all bulkheads is vulnerable to amendment should political pressure persuade the government authority to allow construction. Acquisition of the property interest by a relatively insulated party (such as a nongovernmental conservancy) provides the most durable wetlands protection if the financial resources are currently available.[118]

IV. Conclusion

Under the traditional view of the public trust, states that assert public ownership of intertidal lands may gain control of new wetlands if landowners let their property fall under the influence of the tide. This much is clear. The more difficult question is whether property owners may build seawalls to serve as shields from the reach of the public trust. The flexibility of the public trust doctrine and the application of takings law will determine whether coastal jurisdictions can implement bulkhead prohibitions without compensating landowners. States' public trust doctrines offer greater promise than the federal navigational servitude to address the public expectations to continue to enjoy the natural benefits of coastal wetlands.

Professor Sax describes the primary justification of the modern public trust doctrine that protects a wide variety of public resources as "preventing the destabilizing disappointment of expectations held in common but without formal recognition such as title".[119] Few courts have recognized explicitly such a broad public right over private property. Even those jurisdictions that have recognized broad public rights such as New Jersey, California, and Wisconsin give little indication that they would extend the right to landowners who wish to protect the existing character of their property. However, if the public trust lives up to its potential as described by

Sax, it may be an effective tool in the future as changing circumstances demand an explicit recognition of the public values served by threatened natural systems.[120] The most effective strategy today for encouraging evolution in the doctrine is to put private landowners on notice of the importance that the public places on coastal wetlands[121] and of the role that today's fastlands will play in the future viability of marsh ecosystems.

The same tension created by the conflict between public and private expectations will be evident in fifth amendment challenges to bulkhead restrictions. If the regulation is a standard exercise of police power (or commerce clause authority, in the case of federal regulation), not given special status by vindicating a public trust interest, then it must surmount the takings hurdles or offer compensation. The best rule of thumb for deciding whether outright prohibition of seawalls on fastlands would be a taking is to return to Justice Holmes' standard of a regulation that goes "too far." Whether a regulation goes "too far" depends on the circumstances of the particular case. A regulation that results in the taking of a small parcel, completely vulnerable to inundation, may not result in a taking when applied to a property large enough to retain fastland uses. A bulkhead prohibition will most likely be upheld if it:

- advances human health, safety, or welfare (including business) interests;
- is based on a legislative finding that explicitly ties the regulation to the health, safety and welfare interests;
- treats interference with a migrating wetland as a nuisance; and
- leaves a landowner with some viable economic use of her land (a regulation might offer examples of some permissible types of uses).

Policy-makers and coastal managers should use case law as a guide for implementing strategies that balance public and private expectations. However convoluted the legal fictions involved in applying takings and public trust doctrines, they are all designed to help answer the basic question: Whose expectations most deserve to be maintained? A synthesis of the views of Professors Sax and Michelman help probe the answer to this question at the core of property interests and their adaptability to a warmer world. Sax would maintain that the concentrated interests of the private landowner in keeping property dry should be given no more weight by courts than the diffuse interests of the public to keep using the resources dependent on marshes. The role of the legislature is to facilitate a resolution to the conflict in interests. Courts should require compensation of landowners only when the regulation prohibits an activity that would have no adverse spillover effects on other people's use of other resources.[122] If there are spillover effects, as surely is the case where property owners build bulkheads that squeeze out coastal wetlands, then courts should not second guess the balance between interests struck by the legislature.

Michelman would not require compensation for a regulation preventing a private activity that, "when the owner first began to orient his decisions towards" the activity, was evidently in conflict with crystallized expectations of others.[123] Early warning of the public expectations to maintain coastal wetlands, well in advance of inundation, serves to make the public interests evident and provides a nucleus for their crystallization. Policy-makers can take advantage of the current state of atmospheric and oceanograpic knowledge to act before private landowners settle in their expectations to build bulkheads in the future. The tension between public and private interests will play out in a race, not a tug-of-war. The interests that first

crystallize into settled expectations will pre-empt subsequently formed expectations from claiming superior legal recognition. Environmentalists and others concerned with coastal wetlands protection should be on notice that now is the time to consider adaptive strategies not just for economic efficiency reasons, but also for legal purposes.

The problem of coastal wetlands migration is just one of many new challenges that climate change presents. Solving problems relating to the modification of agriculture, protection of endemic species, and supply of fresh water will raise many of the same legal issues.[124] An early, effective, and equitable response will not just save some of our dwindling coastal wetlands; it will set the tone for public reaction to the many other uncertainties and environmental perturbations presented by global climate change.

Footnotes

1. Director, Natural Resources Program, Environmental Law Institute. I am grateful to the following people who nurtured the evolution of this article through conversation and comment: Dan Berger, Richard Collins, Michael Green, William Futrell, Cotton Harness III, Laura Howorth, Jenifer Kohout, James McElfish, Erik Meyers, Ronald Rychlak, Lisa St. Amand, James Titus, and Mark Trexler. This article was written with the support of EPA assistance agreement CR-813617-02. The views expressed in this article are solely the author's and not necessarily those of the Environmental Law Institute or the Environmental Protection Agency.

2. J. Kusler, Our National Wetland Heritage (1983) 6. See e.g. Maryland Chesapeake Bay Critical Area Protection Program, Nat. Res. §8-1801 et seq. (prohibiting construction within 1000 feet of a wetland); Me. Rev. Stat. Ann. Tit. 38, §480-A et seq. (setting strict standards for issuing construction permits along marine beach systems, which include wetlands); Louisiana Wetlands Conservation and Restoration Authority, 1989 La. Acts 6 (Second Special Session) (authority to develop and implement plans to conserve, restore, and enhance coastal wetlands).

3. Coastal wetlands comprise less than 5% of the 99 million acres of total wetlands in the co-terminus United States. Tiner, Wetlands of the United States: Current Status and Recent Trends (U.S. Fish and Wildlife Service, 1984) 28-9. U.S. Environmental Protection Agency, America's Wetlands: Our Vital Link Between Land and Water (1990) 12. Today, less than half of the United States' initial stock of coastal wetlands remains. Tiner at 36-37. A transition zone that is both land and sea, these sheltered waters provide habitat for fish, shellfish and waterfowl, protection from erosion and storm surges, and pollution control. J. Kusler, Our National Wetland

Heritage (1983) 7. The lure of the ocean draws people to the coast and pressure to build residential housing, resorts and marinas is growing rapidly. Tiner at 36-37.

4. The most recent and authoritative survey of the scientific data on climate change, by the Intergovernmental Panel on Climate Change, predicts a rise in global temperatures of 1°C by 2025 and 3°C by 2200. Intergovernmental Panel on Climate Change, Climate Change - The IPCC Scientific Assessment (1990) xxii. Computer models of climate change all predict significant increases in the rate of global warming over the next fifty years. The models predict a rise between 0.8 and 2.6°C. Jones and Wigley, Global Warming Trends, Scientific American, August 1990, at 91.

5. See Jones, supra, p. 91.

6. IPCC supra (10-30 cm over next four decades). MacDonald, Scientific Basis for the Greenhouse Effect, in Agricultural, Forestry, and Global Climate Change - A Reader (Congressional Research Service 1989) at 76 (at least one meter over the next century).

There is some dispute over the effects of global warming on the ice caps that adds yet another layer of uncertainty on making policy to deal with climate change issues. See the debate between Zwally, Growth of Greenland Ice Sheet: Interpretation, 246 Science 1589 (1989) and Douglas, et al., Greenland Ice Sheet: Is It Growing or Shrinking?, 248 Science 288 (1990) over whether the Greenland ice sheet is thickening.

7. The process of wetlands migration under natural conditions generally involves both migration to adjacent fastland as well as vertical growth through deposition of sediment and organic material.

It is important to note that sea level rise due to global warming will occur more rapidly than sea level fluctuations in the past. Therefore, coastal wetlands that maintained their areas in the past may not keep pace with current rising waters and will narrow. In some cases, depending on the slope of the shoreline profile, the wetlands may not be able to migrate at all. The description of the response of coastal wetlands to sea level rise is developed from: Greenhouse Effect, Sea Level Rise and Coastal Wetlands (J.G. Titus ed. 1988); Greenhouse Effect and Sea Level Rise: A Challenge for this Generation (M.C. Barth and J.G. Titus eds. 1984); Kearney & Stevenson, Sea Level Rise and Marsh Vertical Accretion Rates in Chesapeake Bay in Coastal Zone '85 (O.T. Magoon, et al. eds. 1985); National Research Council, Responding to Sea Level (1987).

8. From: Titus, Greenhouse Effect, Sea Level Rise, and Coastal Zone Management, 14 Coastal Zone Management J. 147, 157 (1986).

9. The Environmental Protection Agency estimates that even if no bulkheads were built to protect dry upland, a 50 cm rise in sea level would result in 17-43% loss of coastal wetlands. The same rise would result in 38-61% loss of wetlands if all dryland were protected by bulkheads. Environmental Protection Agency, The Potential Effects of Global Climate Change on the United States (1989) (For a 100 cm rise in sea level, coastal wetland loss is estimated at 26-66% if no shores are protected and 50-82% if all shores are protected.) These estimates of area of wetlands loss are deceptive in that many of the functions served by coastal marshes depend on shoreline length of wetland rather than area. For fisheries in particular, small differences in area lost could result in drastic ecological changes if the differences are accounted for by complete loss of shoreline coverage in some areas. Titus, Greenhouse Effect and Coastal Wetland Polices: How Americans Could

Abandon an Area the Size of Massachusetts, forthcoming in Environmental Management, Nov./Dec. 1990.

10. Michelman, Property, Utility, and Fairness: Comments on the Ethical Foundations of "Just Compensation" Law, 80 Harv. L. Rev. 1165 (1967). I have adopted Michelman's terminology in the language that follows.

11. Sax, Liberating the Public Trust Doctrine from its Historical Shackles, 14 U.C. Davis L. Rev. 185, 188 (1980); Sax, The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention, 68 Mich. L. Rev. 471 (1970). See also Sax's treatment of the compensation issue in Takings, Private Property and Public Rights, 81 Yale L. J. 149 (1971).

12. In some parts of the United States relative sea level rise, due to subsidence, loss of sedimentation, or erosion makes the problem of coastal wetland migration considerably more certain and immediate. For example, Louisiana, which has one third of all the coastal wetlands in the lower 48 states, is losing its coastal marshes at a rate of 25,000 acres per year. The causes are various, including subsidence due to extraction of oil, gas and groundwater, tectonic subsidence, and channelization and dredging of the Mississippi River by the Army Corps of Engineers. Tiner, supra., at 37-8; R. Chabreck, Coastal Marshes: Ecology and Wildlife Management (1988) 69-71; Dean, Louisiana Wetlands, a Critical Habitat, Founders, N.Y. Times, Nov. 20, 1990, at C1, col. 1.

13. Titus, Greenhouse Effect and Coastal Wetland Policy: How Americans Could Abandon an Area the Size of Massachusetts, forthcoming in Environmental Management, Nov./Dec. See also Sax, untitled, unpublished typescript (1989) for a discussion of the legal and policy issues.

14. Most residential development, if abandoned when inundated, would decay and not impede the migration of wetlands. At some level of intensity, however, durable structures and the pollution associated with development might create problems for migration. Titus, Greenhouse Effect and Coastal Wetland Polices: How Americans Could Abandon an Area the Size of Massachusetts, forthcoming in Environmental Management, Nov./Dec. 1990.

15. Approximately one seventh of the east and gulf coasts are developed. Titus, et al., Greenhouse Effect and Sea Level Rise: Potential Loss of Land and the Cost of Holding Back the Sea, in press Coastal Management (1991). The author has found no estimate of the proportion of this developed area that lies directly above coastal wetlands.

16. In this article, the term "bulkhead" refers to any structure blocking wetlands migration regardless of whether the structure serves some other purpose.

17. See Sax, supra note 16 for a discussion of the durability of prohibitions. When Hurricane Hugo slammed into South Carolina in October 1989, it transformed a future threat of coastal storm damage into an immediate one. The hurricane halted implementation of the 1988 Beachfront Management Act, S.C. Code Ann. §48-39-270 et seq., which prohibited new construction or replacement of destroyed buildings in a "dead zone" twenty feet back from the primary dune. The law would have prevented rebuilding on approximately 20 of the 150 properties damaged by the hurricane and was already hobbled by about 45 takings challenges to the application of the construction prohibitions seaward of the primary dune. The state legislature amended the law in June, 1990 to eliminate the "dead zone" prohibitions and allow for variances under certain circumstances. The 1990 amendments also implemented a

version of the third response strategy by prohibiting new bulkhead construction, bulkhead strengthening, and bulkhead rebuilding. S.C. Code Ann. §48-39-290(B)(2).

Maine regulations implementing its coastal construction permit system attempt to accommodate sea level changes by prohibiting construction that may reasonably be expected to experience damage from shoreline changes within 100 years. Me. Rev. Stat. Ann. Tit. 38, §480-A et seq.; Code of Maine Rules, Ch. 355, §3(A)(2). Furthermore, "if the shoreline recedes such that the coastal wetland . . . extends to any part of the structure, including support posts, for a period of six months or more," then the structure must be relocated. Id. §3(B)(1)(b). Because the Maine coast has so little marsh area, there are few affected landowners.

See notes x-y and accompanying text for a description of the legislative response in Mississippi to overturn the results of an expansive judicial interpretation of public ownership of tidelands.

18. Of the seven options that Titus, supra note x, lays out, one (#5, rely on economics) involves no increased regulation or acquisition of property. The only possible legal issue involved in this laissez-faire option is the fiduciary duty of the public trust doctrine discussed at notes x-y and accompanying text. Three options (#2, buy coastal land now; #4, buy property when seas rise; and #7, leases) involve either voluntary negotiation or forced sale. The principal legal concern with these options is the relevant authority's power of eminent domain. This issue is addressed in note 20 and accompanying text. The (#7) lease option can be implemented by governments through purchase (or condemnation) of the fee simple absolute property and then lease-back of property for a term of years. Titus' alternative option of "converting" fee simple absolute ownership to a leasehold would certainly result in a taking unless compensation were provided. The remaining two options (#1, prohibit

development and #6, prohibit bulkheads) raise the question of whether these restrictions can be implemented without compensation to property owners. Parts II and III of this article focus on this issue.

19. Wetland protection falls comfortably within the bounds the Supreme Court has established to limit what constitutes a public purpose. United States v. Riverside Bayview Homes, 474 U.S. 121 (1985) (upholding Army Corps' authority to require a permit to fill in a wetland). Cf. Berman v. Parker, 348 U.S. 26 (1954) (Upholding condemnations to redevelop blighted urban areas as within the broad state power to act on behalf of the public welfare).

20. U.S. Const. amend. V (No person shall "be deprived of life, liberty or property, without due process of law; nor shall private property be taken for public use, without just compensation."); U.S. Const. amend. XIV, §1 (No state shall "deprive any person of life, liberty, or property, without due process of law.").

21. See discussion of South Carolina and Maine law supra note x.

22. Important wetland functions include flood control; habitat for fishing, hunting, and recreation; and sediment, erosion, and pollution control. See J.A. Kusler, Our National Wetland Heritage: A Protection Guidebook (1983) 1-7.

23. United States v. Rands, 389 U.S. 121 (1967) (holding that the value of a riparian owner's rights of access to navigable waters are not compensable under the fifth amendment).

24. In fact, Congress' authority to regulate interstate commerce is much broader than the federal navigational servitude. Not only can Congress regulate waters that are non-navigable, it can regulate virtually any class of economic activities that cumulatively affect interstate commerce. Wickard v. Filburn, 317 U.S. 111 (1942) (upholding regulation of farmer's production of wheat for his family's consumption);

United States v. Darby, 312 U.S. 100 (1941) (upholding exclusion of certain goods manufactured by factories violating labor standards from interstate commerce).

25. See notes x-y and accompanying text for an analysis of when the compensation requirement is triggered.

26. 444 U.S. 164 (1979)

27. A landowner who delays in building a bulkhead and finds her property partly under water during high tide may lose the right to exclude the sea from that area. See notes x-y and accompanying text. The following discussion concerns the situation where a landowner builds a bulkhead before the property is inundated.

28. 444 U.S. 206 (1979)

29. 444 U.S. at 208-10 (remanding to the fact-finding court the question of whether existing navigable waters were destroyed or diverted). The parties settled before the question was decided.

30. Pollard's Lesee v. Hagan, 3 How. 212 (1845)

31. Shively v. Bowlby, 152 U.S. 1 (1894). By extension of the English law doctrine, states also received title to beds underlying navigable waters not subject to the tide. The Propeller Genesee Chief v. Fitzhugh, 12 How. 443 (1852).

32. Phillips Petroleum Co. v. Mississippi, 484 US 469 (1988) (the state public trust applies to all submerged lands subject to the ebb and flow of the tide).

33. Phillips Petroleum Co., 484 U.S. at 475.

34. See e.g. People v. California Fish Co., 138 P. 79, 88 (Cal. 1913) (private ownership subject to a paramount right to use by the public); Bell v. Town of Wells, 57 U.S.L.W. 2590 (Maine Sup. Jud. Ct. No. 5029 3/30/89) (intertidal landowners hold title in fee subject to public easements). The Maine ruling is ironic because the

state's severe restrictions on coastal development been upheld in Hall v. Board of Environmental Protection, 528 A.2d 453 (Me. 1987).

35. Phillips Petroleum, 484 U.S. at 476 "[S]everal of our prior decisions have recognized that the States have interests in lands beneath tidal waters which have nothing to do with navigation."). See e.g. Marks v. Whitney, 6 Cal.3d 251, 259-60, 491 P.2d 374 (1971) ("There is a growing public recognition that one of the most important public uses of the tidelands -- a use encompassed within the tidelands trust -- is the preservation of those lands in their natural state, so that they may serve as ecological units for scientific study, as open space, and as environments which provide food and habitat for birds and marine life, and which favorably affect the scenery and climate of the area.")

36. Generally, though, state public trust lands extend from the mean high tide line (otherwise known as the mean high water mark) seaward to the three mile territorial limit. This public trust land includes tidelands (otherwise known as foreshore) from mean high tide to mean low tide and submerged lands seaward of the low tide. Existing wetlands generally occur in tidelands. Comment, Public Access to Private Beaches: A Tidal Necessity, 6 U.C.L.A. J. of Envtl. L. and Pol'y 69. See Conners and Krumholz, Legal Status of Tidal Flats in Massachusetts, in Intertidal Flats: Their Value And Legal Status (The Sounds Conservancy, Inc. July 1990) 35. In states such as Massachusetts, where colonial grants included littoral property to the extreme low water mark with a public easement for fishing, fowling, and navigation, the State does not own intertidal flats but may act to preserve the easement.

37. 484 U.S. 469 (1988). See Huffman, Phillips Petroleum Co. v. Mississippi: A Hidden Victory for Private Property?, 19 Envtl. L. Rep. (Envtl. L. Inst.) 10051 (1989); Kosloff, Phillips Petroleum Co. v. Mississippi: Is the Public Trust Becoming

Synonymous with the Public Interest? 18 Envtl. L. Rep. (Envtl. L. Inst.) 10200 (1988) for an excellent analyses of the significance of the case.

38. Treuting v. Bridge and Park Comm'n of City of Biloxi, 199 So. 2d 627, 632-33 (Miss. 1967); Miss. Code Ann. §§ 49-27-3 and -5(a) (Supp 1985) (cited in by Cinque Bambini Partnership v. State, 491 So. 2d 508, 512 (Miss 1986), aff'd sub nom. Phillips Petroleum, 484 U.S. 469 (1988)).

39. 491 So. 2d 508, 519-20 (Miss. 1986), aff'd sub nom. Phillips Petroleum Co., 484 U.S. 469 (1988).

40. Public Trust Tidelands Legislation, Miss. Code Ann. §§29-15-1 et seq. (Supp. 1989).

41. Miss. Code Ann. §29-15-7 (Supp. 1989).

42. Byrd v. State (Chancery Ct., Harrison County Civ. No. 17-879), on appeal to Miss. Supreme Ct. (Nos. 90TS-692 and 9OTS-714). See also Rychlak, U.S. Thermal, Expansion, Melting Glaciers, and Rising Tides: The Public Trust in Mississippi, forthcoming in Mississippi College Law Review. Rychlak attributes passage of the 1989 law to political pressure from coastal property owners.

43. Phillips Petroleum Co. v. Mississippi, 484 U.S. at 482 (1988).

44. Cinque Bambini Partnership, 491 So. 2d 508, 520 (Miss. 1986).

45. See Rychlak, supra note x.

46. Strom v. Sheldon, 12 Wash. App. 66, 527 P.2d, 1382 (1974).

47. The seminal article that reinvigorated the public trust doctrine is Sax, The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention, 58 Mich. L. Rev. 473 (1970). See also Sax, Liberating the Public Trust from Its Historical Shackles, 14 U.C. Davis L. Rev. 185 (1980); Stevens, The Public Trust: A Sovereign's Ancient Prerogative Becomes the People's Environmental Right, 14 U.C. Davis L.

Rev. 195 (1980); Comment, The Public Trust in Tidal Areas: A Sometime Submerged Traditional Doctrine, 79 Yale L.J. 762 (1970). Criticizing the expansion of the public trust doctrine at the expense of private property rights are Huffman, Avoiding the Takings Clause Through the Myth of Public Rights: The Public Trust and Reserved Rights Doctrines as Work, 3 Fla. St. U. L. Rev. 171 (1987); Rose, The Comedy of the Commons: Custom, Commerce, and Inherently Public Property, 53 U. Chicago L. Rev. 711 (1986).

The most widely cited court decision implementing the broader notions of the public trust is National Audubon Society v. Superior Court of Alpine Co., 33 Cal. 419, 658 P.2d 709, cert. denied 104 S. Ct. 413 (1983) (incorporating public trust considerations into the existing state system of water rights by balancing reasonable, beneficial uses of water with competing public interests such as environmental protection). The California Court noted that the purpose of the public trust evolves in tandem with changes in public uses and values. See National Audubon Society v. Department of Water, 858 F.2d 1409 (9th Cir. 1988) for the latest case in the ongoing Mono Lake controversy.

48. Borough of Neptune City v. Borough of Avon-by-the-Sea, 61 N.J. 296, 309, 294 A.2d 47, (1972) (quoted in Matthews v. Bay Head Improvement Ass'n, 471 A.2d 355, 365 (N.J.), cert. denied 105 S.Ct. 93 (1984)). See also, Marks v. Whitney, 491 P.2d 374, 380, 2 ELR 20049 (Cal. 1971) ("The public uses to which tidelands are subject are sufficiently flexible to encompass changing public needs."); Cinque Bambini Partnership v. State, 491 So.2d 508, 512 (Miss. 1986), aff'd sub nom. Phillips Petroleum Co., 484 U.S. 469 (1988) (holding that the purposes of the public trust, including environmental protection and preservation, "evolved with the needs and

sensitivities of the people -- and the capacity of trust properties through proper stewardship to serve those needs.")

49. See e.g. Matthews v. Bay Head Improvement Ass'n, 471 A.2d 355, 365 (N.J.), cert. denied 105 S.Ct. 93 (1984). See also Tucci v. Salzhauer 40 A D2d 712, 336 NYS 2d 721, 723 (2d Dept. 1972), affd. 33 NY 2d 854 (1973) (confirming the public's right to use the foreshore for "bathing," "lounging and reclining"). Not all states share an expansive view of the public trust. For instance, Massachusetts courts have defined public rights to intertidal flats narrowly. The public may use the water but has no right to the land underneath for bathing, collecting, or even walking. Opinion of the Justices, 365 Mass. 681, 686-689 (1974). The Maine supreme court recently found unconstitutional the Public Trust Intertidal Land Act, which declared an unlimited public right to use intertidal land for recreation. Bell v. Town of Wells, 57 U.S.L.W. 2590 (Maine Sup. Jud. Ct. No. 5029 3/30/89) (holding that a legislative declaration that extended the public trust beyond the traditional public easements for fishing, fowling, and navigation was a physical invasion of property and therefore a taking).

50. 471 A.2d 355 (N.J.), cert. denied 105 S.Ct. 93 (1984).

51. See Borough of Neptune City v. Borough of Avon-by-the-Sea, 294 A.2d 47 (N.J. 1972).

52. 471 A.2d at 364

53. The defendant in Matthews was a non-profit corporation that acted as a quasi-public association. The court's language regarding purely private dry sand beaches is dictum. 471 A.2d at 367.

54. 471 A.2d at 369.

55. 201 N.W.2d 761 (Wis. 1972).

56. 4 Env't Rep. Cas. (BNA) 1841, 1844-45.

57. 201 N.W. 2d 761, 4 ERC at 1842 (Wis. 1972); see also M&I Marshall & Ilsley Bank v. Town of Somers, 414 N.W.2d 824 (Wis. 1987) (reaffirming the vitality of Just and stressing the public harm/public benefit test).

58. 491 P. 2d 374, 380 (Cal. 1971).

59. The trust may also be applied to compel a landowner to abate an action that causes damage to public rights along the coast. Comment, Public Trust in Tidal Areas, 79 Yale L. J. at 788 (1970) (citing J. Gould, A Treatise on the Law of Waters §27 (1900).)

60. 146 U.S. 387 (1892)

61. The Illinois legislature has run a foul of the public trust doctrine repeatedly for attempting to convey land under Lake Michigan. Lake Michigan Federation v. United States Army Corps of Engineers, 31 Env't. Rep. Cas. (BNA) 1860 (N.D. Ill. 1990) (legislature in properly conveyed 18.5 acres of lakebed to Loyola University for park and athletic facilities); People ex. rel. Scott v. Chicago Park Dist., 66 Ill. 2d 65, 360 N.E. 2d 773 (1976) (legislature may not convey 194.6 acres of lakebed to U.S. Steel Corp.).

62. National Audubon Society v. Superior Court, 33 Cal. 3d 419, 189 Cal. Rptr. 346, 658 p. 2d 709, cert. denied, 464 U.S. 977 (1983). Other states have recognized the exception to the rule against alienation of the public trust in the event the transfer is for a public purpose. See e.g. City of Milwaukee v. State, 193 Wis. 423 (1927) (upholding Milwaukee's grant to a steel company to develop a public harbor)

63. Sierra Club v. Department of Interior, 424 F. Supp. 172 (N.D. Cal. 1976), 398 F. Supp. 284 (N.D. Cal. 1975), 376 F. Supp. 90 (1974). See Wilkinson, The Public Trust Doctrine in Public Land Law, 14 U.C. Davis L. Rev. 260 (1980) for a probing analysis of these cases.

64. Sierra Club v. Block, 622 F. Supp. 842, 865 (D. Colo. 1985); Sierra Club v. Lyng, 661 F. Supp. 1490 (D. Colo. 1987); vacated, Sierra Club v. Yeutter, Nos. 88-2777, -2871, -2920, -2922 (10th Cir., Aug. 10, 1990) (finding agency action unreviewable and case unripe).

65. This conclusion is in line with earlier cases involving nonassertion of federal reserved water rights. Sierra Club v. Andrus, 487 F. Supp. 443 (D.D.C. 1980), aff'd. sub. nom. Sierra Club v. Watt, 659 F. 2d 203 (D.C. Cir. 1981) (holding that Interior's failure to assert federal reserved water rights had a rational basis because none of the relevant energy developers had acquired vested water rights and the ultimate relief sought was being obtained through other administrative means.)

66. When the Forest Service prepared a mere two-page plan in response to the Court's order, the court agreed that the plan exhibited no real analysis and ordered preparation of a new one. Sierra Club v. Lyng, 661 F. Supp. 1490 (D. Colo. 1987), vacated on other grounds, Sierra Club v. Yeutter, Nos. 88-2777, -2871, -2920, -2922 (10th Cir., Oct. X, 1990).

67. Pennsylvania Coal Co. v. Mahon, 260 U.S. 393, 413 (1922) (finding that application of a state statute that substantially furthered an important public policy constituted a taking because it so frustrated investment-backed expectations). Cf. Keystone Coal Assoc. v. DeBenedictis, 480 U.S. 470 (1987).

68. Pennsylvania Central Transportation Co. v. New York City, 438 U.S. 104, 124 (1978) (the Court will focus on the particular circumstances of an application of a challenged public action),

69. A regulation also will be invalid if it deprives a landowner of property without due process of law. Because the due process protection in the fifth amendment embodies similar safeguards as the just compensation requirement, courts generally fail

to distinguish between the two grounds when overturning regulations. Want, The Taking Defense to Wetlands Regulation, 14 Envtl. L. Rep. (Envtl. L. Inst.) 10169 (1984). Therefore, the takings issue as defined in this paper includes substantive due process concerns which tend to focus on the rational relationship between the regulation in question and a legitimate government interest (e.g. a state's interest in health, safety and welfare of its citizens).

70. See e.g., Hodel v. Virginia Surface Mining and Reclamation Association, Inc., 452 U.S. 264 (1981) (emphasizing that takings analysis must be conducted with respect to specific property and the values affected by the particular circumstances of the application of the law). See also United States v. Riverside Bayview Homes, supra note x.

71. U.S. Const. amend XIV, §1 extends the application of the fifth amendment to the states.

72. Pennsylvania Central Transportation Co. v. New York City, 438 U.S. 104, 127 (1978) ("[a] use restriction on real property may constitute a 'taking' if not reasonably necessary to the effectuation of a substantial public purpose"); Agins v. Tiberon, 447 U.S. 255, 260 (1980) (a law is "a taking if the ordinance does not substantially advance legitimate state interests").

73. The most famous case is Just v. Marinette Co., 201 N.W.2d 761 (Wis. 1972) which upheld an ordinance prohibiting a landowner from filling a wetland. "The ordinance . . . preserves nature from the despoilage and harm resulting from the unrestricted activities of humans." 201 N.W.2d at 771. See notes x-y and accompanying text.

74. Public expense for maintenance of fisheries may be avoided by maintaining wetlands. See Moskow v. Com'r. of Dept. of Env. Management 427 N.E. 2d 750

(Mass. 1981) (holding that a restrictive order issued pursuant to the Inland Wetlands Act was not a taking because the Act is reasonably related to the goals of flood and pollution control and the interference was not that extensive).

75. Agins v. City of Tiburon, 447 U.S. 255 (1979) (upholding a zoning ordinance limiting the number of buildings a plaintiff could construct on his property and deferring to legislative findings).

76. United States v. Riverside Bayview Homes, 474 U.S. 121 (1985) (upholding wetlands protection regulation under the federal Clean Water Act).

77. Hodel v. Virginia Surface Mining and Reclamation Ass'n, 452 U.S. 264 (1981) (upholding specific provisions of the Surface Mining Control and Reclamation Act).

78. Berman v. Parker, 348 U.S. 26 (1954) (upholding an exercise of eminent domain stating that redeveloping a blighted urban area is a legitimate police power interest).

79. Penn Central, supra.

80. See e.g. cases cited by Sax, Takings and the Police Power, 74 Yale L.J. 36, 47 (1964).

81. See e.g. Connolly v. Pension Benefits Guaranty Corp., 475 U.S. 211, 225, 226 (1986) (where the Court relied on three distinct factors of "particular significance" (economic impact, interference with investment-backed expectations, and character of the action) to determine that imposition of withdrawal liability does not constitute a taking).

82. This is true in the Pennsylvania Central case discussed below. There the Court found that the regulation did not interfere with Grand Central Terminal's present uses or prevent Penn Central from realizing a "reasonable return" on its investment. 438 U.S. at 136. See also Florida Rock Indus. v. U.S., No. 266-82L (U.S. Cl. Ct. July 23, 1990) at 8 ("In focusing on the extent to which the government's action has denied

plaintiff the economic viability of its property the court may combine the first two of these factors (economic impact and investment-backed expectations.)").

83. See Radin, The Liberal Conception of Property: Cross Currents in the Jurisprudence of Takings, 88 Colum. L. Rev. 1667, 1680-84 (1988) (contrasting standards with rules). But see Michelman, supra note x at 1233 (arguing that the diminution in value test is not so much a sliding-scale standard but rather a rule that measures "whether or not the measure in question can easily be seen to have practically deprived the claimant of some distinctly perceived, sharply crystallized, investment-backed expectation.").

84. 438 U.S. 104 (1978).

85. 438 U.S. at 130-31. See also Keystone Coal Assoc. v. DeBenedictis, 480 US 470, 491 and 498 (1987).

86. This will generally not be true if a court finds a physical invasion, discussed in the following section. See Nollan, 483 U.S. 825, 831 (1987) (holding that a public easement across a portion of the owner's property constitutes a compensable taking because it can be characterized as a "permanent physical occupation" of the property); Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 417, 434 (1982) (holding that constitutional protection of property does not depend on the size of the area affected if the area is affected by a physical occupation).

87. Claridge v. State Wetlands Board, 485 A.2d 287 (N.H. 1984) (camping use for land is reasonable economic use); Turnpike Realty v. Town of Dedham, 284 N.E.2d 891 (Mass. 1972), cert denied 409 U.S. 1108 (1973) (agriculture or recreation are uses sufficient to surmount the takings hurdle); Turner v. DelNorte County, 24 Cal. App. 3d 311 (1971) (recreational use sufficient).

The recent Claims Court decisions, Florida Rock Indus. v. U.S., No. 266-82L (U.S. Cl. Ct. July 23, 1990), and Loveladies Harbor, Inc. v. U.S., No. 243-83L (U.S. Cl. Ct. July 23, 1990), holding that denials of FWPCA §404 permits resulted in compensable takings by denying owners economically viable uses of their property are a departure from this line of cases and the ones cited infra note 41.

In Florida Rock, the Court found insufficient evidence of a "solid and adequate" market for the property without a FWPCA §404 permit despite a number of written offers for purchase and the speculative investment present in the area. In Loveladies Harbor, the Court was unmoved by the fact that only 5% of the property was affected by the permit denial and that the claimant enjoyed a substantial economic gain from the 80% of the property that had been developed.

88. A regulation that affects a tiny portion of the property, however, may still be a taking if it fails one of the other two considerations. See supra note 38.

89. Cases quoted favorably by Penn. Central, 483 U.S. at 131 include Euclid v. Ambler Realty Co., 272 U.S. 365 (1926) (upholding a regulation causing 75% diminution in value of property); and Hadacheck v. Sebastian, 239 U.S. 394 (1915) (upholding a regulation causing 87.5% diminution in value). See also the more recent case of Keystone Bituminous Coal Ass'n v. DeBenedictis, 107 S. Ct. 1232 (1987).

90. Keystone Bituminous Coal Ass'n v. DeBenedictis, 107 S.Ct. 1232, 1246, n.22 (1987) (abatement of public nuisance to promote safety is not a taking even if it destroys the value of property); Mugler v. Kansas, 123 U.S. 623 (1887) (state prohibition on sale of alcohol to protect public health and safety that ruined plaintiff's business is not a taking). "Regulations safeguarding the public's interest in being protected from injurious uses would obviously be insulated from characterization as a

taking." Orion Corp. v. State, 747 P.2d 1062, 1083 (Wash. 1987) (citing Keystone and Mugler).

91. "What makes this case different from most condemnation or police power zoning cases is the interrelationship of the wetlands, the swamps and the natural environment of shorelands to the purity of the water and to such natural resources as navigation, fishing, and scenic beauty." 201 N.W.2d 761 (Wis. 1972) (See notes x-y and accompanying text, supra for a discussion of the public trust aspect of Just.) See also Miller v. Schoene, 276 U.S. 272 (1928) (upholding an order by a state entomologist, acting pursuant to a state statute, requiring landowners to cut down their cedar trees, which produced a disease fatal to apple trees located nearby.); Hadacheck v. Sebastian, 239 U.S. 394 (1915) (upholding a local decision to ban a brickyard because of the nuisance it created to surrounding residences that were erected while the brickyard was operating).

92. M & I Marshall & Isley Bank v. Town of Somers, 414 N.W.2d 824, 830 (Wis. 1987).

93. Michelman, supra note x at 1199 and 1201; Sax, Takings and the Police Power, 74 Yale L.J. 36, 48-50 (1964).

94. Michelman, id. at 1197.

95. See e.g. Just, 4 Env't Rep. Cas. (BNA) at 1844 (upholding zoning designed to "prevent harm to public rights by limiting the use of private property to its natural uses").

96. See note x supra for the holdings in these cases.

97. Michelman, supra note x at 1241.

98. A bulkhead ban enacted today also may provide the government an advantage if the statute of limitations for filing a takings claim is triggered by the enactment. By

the time inundation occurs, landowners may be precluded from asserting a taking that actually occurred decades ago. See Shostak and Barrett, Valid Existing Rights on SMCRA 5 J. Min. L. & Pol'y 585, 618-19 (1989-90) (discussing the trigger for statute of limitations for taking claims under the Surface Mining Control and Reclamation Act).

99. Penn Central, supra at 124 ("A 'taking' may more readily be found when the interference with property can be characterized as a physical invasion by the government . . ."); Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 417, 426 (1982) ("[W]hen the physical intrusion reaches the extreme form of a permanent physical occupation, a taking has occurred"). See also, Hodel v. Irving, 481 U.S. 704 (1987) (application of federal law requiring any small undivided fractional interest in Indian land to escheat to the tribe rather than descend by intestacy or devise resulted in a taking of decedents' property rights in violation of the fifth amendment).

100. 444 U.S. 164 (1979). See discussion supra note x and accompanying text.

101. For a discussion of the federal navigational service, see notes x-y supra and accompanying text.

102. Griggs v. Allegheny County, 369 U.S. 84 (1962); U.S. v. Causby, 328 U.S. 256 (1945).

103. 458 U.S. 417 (1982).

104. 276 U.S. 272, supra note 43 and accompanying text.

105. See United States v. Cress, 243 U.S. 316 (1917) (landowner whose property was partially flooded because of a dam constructed by the federal government to improve navigation is entitled to compensation in exchange for relinquishing a flowage easement); Pumpelly v. Green Bay Co., 13 Wall 166, 20 L Ed. 557 (1872) (construction of dam that flooded property effected a taking).

106. Michelman, supra note x at 1226-29 (showing that it is also at odds with the utilitarian justifications for takings law); Sax, supra note x, 74 Yale L.J. at 46-48.

107. See also Radin, supra note x at 1680-84 (the basis for bright line rules is a fear of uncontrollable, arbitrary decisions by judges).

108. In Nollan v. California Coastal Comm'n., the Supreme Court indicated that although a permit conditioned on an easement might be valid given a substantial relationship to a state interest, an easement required by a blanket regulation would result in a taking. 483 U.S. 825, 831 (1987) ("Had California simply required the Nollans to make an easement across their beachfront available to the public on a permanent basis in order to increase public access to the beach, rather than conditioning their permit to rebuild their house on their agreeing to do so, we have no doubt there would have been a taking.") Nonetheless, blanket regulation of land uses that seem more severe than a bulkhead prohibition have been upheld by the Supreme Court. See supra note x.

109. The federal Coastal Zone Management Act (CZMA), 16 U.S.C. §§1451-1464 creates a voluntary program to encourage states to exercise their own authority to establish and implement coastal management plans (CMPs). The CZMA is not a grant of regulatory authority over private property to states. States with CMPs approved by the federal government receive financial assistance and can prohibit (subject to the veto of the U.S. Secretary of Commerce) federal activities not consistent with the CMP. This provision gives states with CMPs leverage to affect activities requiring federal permits, such as dredge and fill operations. CZMA encourages states to plan how development should occur in a coastal zone where land use has a direct impact on coastal waters. 16 U.S.C. §1453.

110. 483 U.S. 825 (1987).

111. The requirement of a "substantial relationship" is often associated with strict scrutiny, which is a test of close analysis that serves to preserve substantive values of equality and liberty. When strict scrutiny is the standard of review, a regulation is usually struck down. Tribe, American Constitutional Law 1000-1001 (1978). The standard due process and equal protection test for constitutionality requires only a finding of a "rational relationship." See Sax, Property Rights in the U.S. Supreme Court: A Status Report, 7 U.C.L.A. J. of Envtl. L. & Pol'y 139, 140 (1988).

112. 483 U.S. at 836. In Hall v. Board of Environmental Protection, 528 A.2d 483 (Me. 1987), the Maine Supreme Court upheld denial of a permit to re-build a house lost to coastal erosion. The permit denial did not make the property substantially valueless because the family had been occupying a motor home on the lot during the summer. Id. at 454.

113. In fact, without the power to deny the permit, the agency may have no authority to condition the permit. The Nollan opinion offered no guidance for determining whether an agency has the power to deny a permit in a particular case. It is likely that the three factors discussed in the previous section would determine the issue. In this respect, the special case of permit conditioning folds into the general regulatory takings analysis.

114. This assumes, of course, that wetlands migration is a legitimate public purpose. See text and notes at x, supra, for discussion of the legitimacy of wetlands protection.

115. Nollan observes that the right to exclude others is "one of the most essential sticks in the bundle of rights that are commonly characterized as property." 483 U.S. at 831 (quoting Kaiser Aetna v. United States, 444 U.S. 164, 176 (1979)). The Nollan Court also observed that where permanent physical occupation occurs, giving individuals the permanent and continuous right to traverse the property, a taking

occurs. 483 U.S. at 831-32 (citing Loretto v. Teleprompter Manhattan CATV Corp., 458 U.S. 419, 432-33 (1982). See discussion supra at notes x-y and accompanying text.

116. Eventually, though, as tidelands migrate onto private property, public rights to use the tidelands might also migrate onto the property. See discussion of state public trust, supra notes x-y and accompanying text.

117. If the government builds a dam, for instance, it is required to compensate landowners for the right to flood their land above the natural high water. United States v. Cress, 243 U.S. 316 (1917).

118. See supra note x (discussing durability).

119. Liberating the Public Trust Doctrine from its Historical Shackles, 14 U.C. Davis L. Rev. 185, 188 (1980).

120. See Borough of Neptune City v. Borough of Avon-by-the-Sea, 294 A.2d 47, 54 (N.J. 1972) (quoted in Matthews v. Bay Head Improvement Ass'n, 471 A.2d 355, 365 (N.J.), cert. denied 105 S.Ct. 93 (1984)).

121. A serious commitment to planning, regulation, and acquisition to protect existing marshes will bolster a government's case that private actions that doom wetlands are contrary to a significant public interest.

122. Sax, 81 Yale L.J. at 164, supra note x.

123. Michelman, supra note x at 1242.

124. Analogous legal questions will arise from other consequences of global climate change, such as: Who will bear the costs of maintaining corridors for plants and animals to migrate as climatic zones shift? Under what conditions can farmers seed cloud to maintain historic levels of rainfall?

EVOLUTION OF A MARSH AS SEA LEVEL RISES

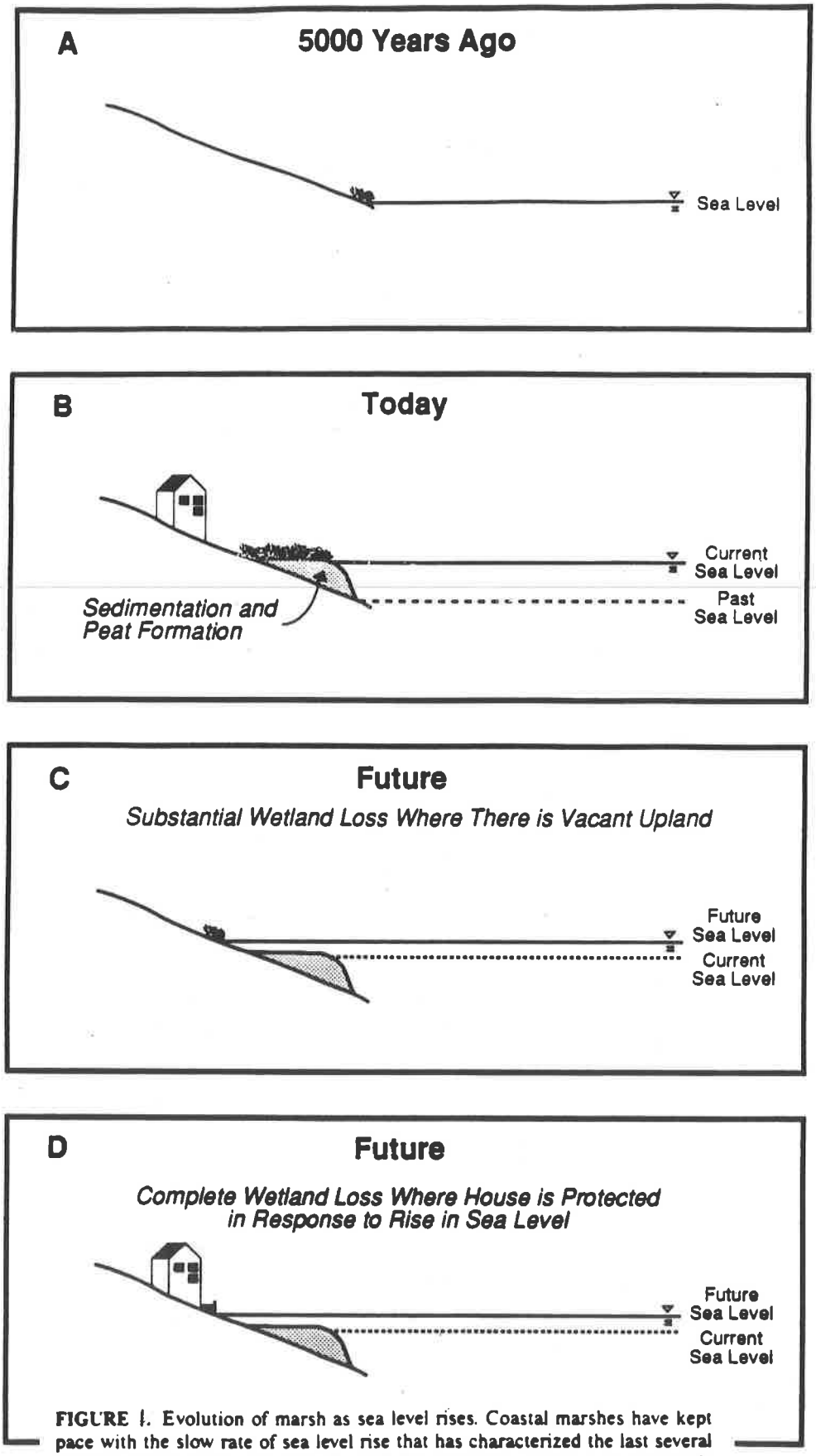

FIGURE 1. Evolution of marsh as sea level rises. Coastal marshes have kept pace with the slow rate of sea level rise that has characterized the last several thousand years. Thus, the area of marsh has expanded over time as new lands were inundated. If in the future, sea level rises faster than the ability of the marsh to keep pace, the marsh area will contract. Construction of bulkheads to protect economic development may prevent new marsh from forming and result in a total loss of marsh in some areas.