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**\*393 ECOLOGICAL PRESERVATION AS A PUBLIC PROPERTY RIGHT: AN EMERGING  
DOCTRINE IN SEARCH OF A THEORY**Alison Rieser [\[FN1\]](#)

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## I. INTRODUCTION

Due largely to recent decisions of the California courts, [\[FN1\]](#) the notion that the public has a right to expect certain lands and natural areas to retain their natural characteristics is finding its way into American law. [\[FN2\]](#) Through interpretation and expansion of the common law public trust doctrine, state courts are identifying governmental duties to redefine existing private property rights where such rights may threaten the ecological value of natural areas. [\[FN3\]](#) Courts have subjected to this special duty primarily properties **\*394** associated with navigable waters. [\[FN4\]](#) Litigants and state agencies, however, appear poised and willing to invoke the public trust doctrine with respect to a number of other resources unrelated to navigation. [\[FN5\]](#) Several public trust commentators--including Professor Joseph Sax, the modern doctrine's earliest and most prominent proponent--either urge or foresee a continuing expansion in the doctrine's scope. [\[FN6\]](#) Some predict that courts will eventually apply public trust protections to all waterbodies, as well as to such diverse resources as old growth forests, mountains, and wildlife. [\[FN7\]](#)

What do these resources have in common? What relationship, if any, do they bear to navigable waters and submerged lands, those resources traditionally associated with the public trust? Why is it necessary for courts to recognize public property rights to preserve natural conditions or ecological integrity? Despite the apparently basic nature of these questions, none of the recent commentaries or decisions suggesting the doctrine's expansion has adequately addressed them. Yet articulating a cogent rationale for including a particular resource within the doctrine's ambit would seem to be an urgent task for proponents of an expanded public trust doctrine. This rationale should encompass the subsidiary concerns commentators have raised including: possible conflicts with fifth amendment takings jurisprudence, [\[FN8\]](#) questions over which **\*395** sorts of democratic institutions are best suited for protecting public interests in ecological resources, [\[FN9\]](#) and the possibility that the police power may serve as an alternative source for a public trust right. [\[FN10\]](#) Without a theory for the inclusion of ecological integrity as a public trust right, [\[FN11\]](#) courts and commentators will continue to express skepticism about the expansion of the doctrine. [\[FN12\]](#)

In search of such a theory, this Article surveys a variety of sources. It finds a compelling rationale in the intersection of ecological and economic theories of natural resource use. Meaningful guidance is gleaned from the nature of ecological systems and its implications for management, as well as from the applied welfare economic methods for assessing the value of damaged natural resources under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") [\[FN13\]](#) and the Clean Water Act. [\[FN14\]](#)

Part I of this Article briefly reviews the public trust doctrine and some of the theories that support its more traditional applications, including one from a law and economics perspective. [\[FN15\]](#) It next considers the Mono Lake decision of the California Supreme Court. [\[FN16\]](#) That opinion is the most prominent instance to date in which ecological preservation has

been held to justify a potentially major change in vested private property rights. This inquiry leads to an examination of an earlier decision of the same court, the \*396 1971 decision in *Marks v. Whitney*. [FN17] The Mono Lake court relied upon *Marks* for the principle that preservation of ecological functions is within public trust rights.

Disappointingly, the *Marks* opinion provides little discussion of why ecological integrity should be included within the public's rights. In search of the missing rationale, Part II considers the potential influence of the social and political forces operating at the time of the *Marks* decision. Awareness of the principles of ecology was among the major forces that shaped political decisions of the mid- to late 1960's. [FN18] Broad citizen concern for San Francisco Bay led to the adoption of precedent-setting policies and institutions by the California legislature to deal with the rapid loss of San Francisco Bay's natural resources. [FN19] Bay-related litigation also influenced Professor Sax's selection of the public trust doctrine as the ideal tool for environmental protection through the courts. [FN20] This ecological awareness was reflected in the *Marks* decision and ultimately served as the principal rationale for the Mono Lake decision, which some commentators predict will in turn serve as precedent for further development of an ecological public trust right and governmental duty. [FN21]

Consideration of the scholarly commentary on the public trust doctrine in Part III identifies a number of ideas that could, with further development, explain or justify why the doctrine has expanded to embrace ecological integrity as a right. The principal sources explored in this Part are the commentaries of Professor Joseph Sax and his chief public trust critic, Professor James Huffman.

To promote further theoretical development, Part IV examines two somewhat unconventional sources for theories that might justify a public property right in ecological preservation: ecology and economics. The section outlines the major processes and characteristics of ecosystems, which have important implications for the management of natural resources. As illustrated by salt marsh \*397 processes, such ecosystem characteristics indicate the management perspectives and behaviors necessary to realize the full benefits of a functioning ecosystem. Efforts to protect salt marshes have been largely responsible for the incorporation of ecological preservation standards into United States law. Indeed, the wetland ecosystem has been the intended beneficiary of some of the most extensive governmental policies and regulatory programs, as well as the subject of a considerable body of case law and commentary, much of which has relied upon public trust theories. [FN22]

To understand the nature of human interactions with ecological systems, the Article then surveys a number of economic theories that explain why rational individual behavior often leads to the destruction of these systems. It explores values human society derives from these natural systems through analysis of policies and methods used in the Natural Resources Damages Assessment Program. This program, recently created under CERCLA and the Clean Water Act, attempts to flesh out the meaning of public trusteeship in the context of recovery for lost public values. [FN23] It may also provide a methodology for quantifying public damages from natural resource injuries. In turn, this methodology may help us to understand why ecological resources should be subject to a public property right.

The Article concludes with some thoughts on the implications of a public property right in ecological integrity under the public trust doctrine and recommendations that may help ensure its development as a coherent doctrine in American law.

## II. THE PUBLIC TRUST DOCTRINE: WHY NAVIGATION, FISHING, AND RECREATION?

Courts and commentators often cite English common law principles, based loosely upon Roman law, as the roots of the public trust doctrine. [FN24] Under these early notions, resources such as rivers, the sea, and the seashore were seen as incapable of ownership. [FN25] \*398 The spin purportedly added by English common law was that the Sovereign could and, in fact, did own these resources. [FN26] However, this ownership was limited in nature; the Crown could not grant these properties to private owners if the effect was to interfere with the public's interests in navigation or fishing. [FN27] Resources

that were suitable for these uses were deemed to be held in trust by the Crown for the benefit of the public. [\[FN28\]](#)

The classic theory supporting inclusion of navigable waters within a public trust was described in a nineteenth-century decision of the U.S. Supreme Court:

Lands under tide waters are incapable of cultivation or improvement in the manner of lands above high water mark. They are of great value to the public for the purposes of commerce, navigation and fishery. Their improvement by individuals, when permitted, is incidental or subordinate to the public use and right. Therefore the title and the control of them are vested in the sovereign for the benefit of the whole people. [\[FN29\]](#)

None of the judicial examinations and very little of the recent scholarship on the public trust doctrine have explained why these principles arose and what function they have served in the development of legal and social institutions. What is needed is a functional \*399 theory to explain the doctrine's role in ordering societal interests, particularly with respect to institutions of property. [\[FN30\]](#)

Since the doctrine has taken the form of a property interest held by the public at large, one that constrains both private and governmental actors, any comprehensive understanding of its function must be capable of explaining the doctrine in relation to alternative forms of resource allocation: private property or governmental ownership. Need for such an understanding is especially acute because the public's property interest in trust resources is neither private nor governmental ownership. [\[FN31\]](#) The commentary to date, with one exception discussed below, has not explained why this non-private, non-governmental form of property should exist. Instead, the work has centered on supplying a rationale for expanded use of an ancient doctrine--which originally emerged for purposes quite different from those of current proponents [\[FN32\]](#)--to promote public access and protection of natural resources. Before developing their particular ideas about where the public trust doctrine now fits in our legal system, most commentators have been content to recite what has become the standard, though not uncontroversial, history of the doctrine's development and importation into American law. [\[FN33\]](#)

\*400 One exception to this trend is an article by Professor Carol Rose, [\[FN34\]](#) in which she explores use of the public trust doctrine as one of three means by which certain property has been found to have vested in neither private nor governmental hands but in an unorganized public. [\[FN35\]](#) She questions how an idea of collective ownership in an unorganized public should coexist with a concept that private ownership is essential for productivity, the dominant tenet of Anglo-American property law. [\[FN36\]](#) Rose views as insufficient the economic-theoretical idea that certain "plenteous goods" are exceptions to the general principle of exclusive control, where the costs of privatization outweigh the gains from husbandry. [\[FN37\]](#) The resources historically considered public under the public trust doctrine, tidal waters and submerged lands, could be and in some instances were reduced to exclusive possession. [\[FN38\]](#)

Rose finds a somewhat better explanation for public ownership in the concept of market failure, the recognition that in some situations the impediments to exchange require governmental management if socially optimal allocations of resources are to result. [\[FN39\]](#) For instance, in cases of natural monopolies, public goods, and externalities, high transaction costs or the presence of large numbers of small stakeholders make market transactions or private collective action to foster optimum resource utilization improbable. On the other hand, when a governmental entity operates an important element of the infrastructure as a monopoly it can realize economies of scale. [\[FN40\]](#)

However, Rose does not accept these concepts as adequate explanations for the particularly striking feature of certain "inherently \*401 public property," including public trust resources like navigable waterways. Why should they be subject to collective ownership by an unorganized public? [\[FN41\]](#) Such property is not governmentally owned, in the sense that it can be managed and disposed of at the government's discretion; on the contrary, the government may have obligations to preserve

the property for the public's use. [\[FN42\]](#)

By examining older cases employing the doctrines of prescription, custom, and the public trust, Rose identifies the promotion of commerce as an alternative justification for the recognition of property rights in the unorganized public. She refers to this function as the "comedy of the commons." [\[FN43\]](#) Commerce produces favorable outcomes through its infinite "returns to scale" [\[FN44\]](#) and its promotion of social interaction among "members of an otherwise atomized society." [\[FN45\]](#) The ability of certain properties--for example, lands beneath waterways--to foster these attributes of commerce justified vesting property rights to them in an unorganized public. Thus, roadways and waterways became "managed commons." [\[FN46\]](#) The usual costs associated with governmental ownership did not arise because customary practices, which eventually ripened into common law rules, prevented congestion and wasteful practices. [\[FN47\]](#) A principle of public use also ensured against the dangers of privatization--holdouts and monopolies--that either prevented or threatened to skim off the surplus resulting from a property's most valuable use as a place for social communication and exchange. Public ownership allowed the public to benefit from the value it gave these resources by virtue of their non-exclusive, open access use, that is, a creation of "publicness." [\[FN48\]](#) To Rose, recent public trust cases recognizing public rights of use in privately owned, dry sand beaches may be a modern version of the comedy of the commons; the public trust doctrine in the twentieth \*402 century allows a particular resource to achieve its highest value by opening it to the general public. [\[FN49\]](#)

Is it possible to view present-day court decisions employing public trust doctrine to preserve ecological integrity as recognizing the scale returns--that is, the greater value due to non-exclusive use--that come with public concern for ecological interdependency? [\[FN50\]](#) When courts find private property subject to a public right in the integrity of a natural area, are they responding implicitly to a sense that private owners can "hold out" and deprive the public of its highly valued ecological resources by threatening to destroy natural areas? [\[FN51\]](#) Can we describe ecological preservation, like nineteenth-century commerce, as an "educative and socializing institution," [\[FN52\]](#) that promotes and reinforces social responsibility to both present and future generations, allowing people to get along better with one another, and therefore requiring the physical location of these resources to be public property? [\[FN53\]](#) To determine whether the emerging doctrine subverts private property rights, as opponents of public trust expansion suggest, [\[FN54\]](#) or is instead a new \*403 staging of the "comedy of the commons," we turn first to the decisional law of California. [\[FN55\]](#)

### III. Mono Lake and Marks v. Whitney: Why Is an Ecological Public Trust Emerging?

#### A. The Mono Lake Decision

Resolution of the seemingly intractable clash between Los Angeles' growing water demand and the natural environment of the Mono Basin required the California Supreme Court to harmonize the "teachings and values" underlying both the public trust doctrine and the appropriative water rights system. [\[FN56\]](#) Although the two doctrines have evolved separately, the court found both were part of "an integrated system of water law." [\[FN57\]](#) The integration gave the state continuing supervisory authority over water allocation decisions in order to protect public trust uses. With this power, California had a duty to reconsider earlier administrative decisions approving diversions of the four Mono Lake tributaries into works supplying Los Angeles with fresh water. [\[FN58\]](#)

\*404 Early in its discussion of the public trust doctrine, the California court stated that the doctrine's protections extend beyond navigation, commerce, and fishing to recreational and ecological values: "The objective of the public trust has evolved in tandem with the changing public perception of the values and uses of waterways." [\[FN59\]](#) The court cited Marks v. Whitney [\[FN60\]](#) as authority, finding the language in that decision of "special importance to the present setting":

In administering the trust the state is not burdened with an outmoded classification favoring one mode of utilization over another. 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. [\[FN61\]](#)

**\*405** The Mono Lake plaintiffs sought protection of "the scenic views of the lake and its shore, the purity of the air, and the use of the lake for nesting and feeding by birds." [\[FN62\]](#) Applying the rationale of *Marks v. Whitney*, the court found it "clear that protection of these values is among the purposes of the public trust." [\[FN63\]](#)

The court saw its decision as consistent with historical protections applied to navigable waters. This protection may simply include constraining activities in non-navigable tributaries when they threaten public trust values in navigable waters. [\[FN64\]](#) On the other hand, the court itself suggested that a somewhat broader rationale than navigation was at work. It concluded that, under the principles of *Illinois Central R.R. Co. v. Illinois* [\[FN65\]](#) as adopted by the California courts, the state has a duty "to protect the people's common heritage of streams, lakes, marshlands and tidelands." [\[FN66\]](#) This language suggests that the court was tacitly recognizing the public nature of these resources and finding their best use to be as public property given that non-commodity values invested by individuals were highest if these resources retained their natural state. Alternatively, the court may have been applying something akin to Sax's "gifts of nature's bounty" rationale. [\[FN67\]](#) This suggestion is bolstered by the court's recognition that Mono Lake's ecology, not its navigability, was clearly the plaintiffs' primary concern. [\[FN68\]](#)

**\*406** Most jurisdictions incorporating ecological protection into the purposes of their public trust doctrine have cited the seminal California decision in *Marks v. Whitney*. [\[FN69\]](#) Perhaps the most recent and notable example is *Phillips Petroleum Co. v. Mississippi*. [\[FN70\]](#) In *Phillips Petroleum* the U.S. Supreme Court indirectly recognized an ecological dimension to the public trust doctrine by finding that the geographic reach of the modern public trust doctrine is a function of state law. The decision affirming Mississippi's inclusion of non-navigable tidelands within the trust, reasoned that the chemical and biological unity of all tidal waters warranted the state's expansive definition of public tidelands. The opinion implicitly recognized that ecological boundaries have replaced navigability tests in defining the doctrine's geographic scope. [\[FN71\]](#)

#### B. *Marks v. Whitney* and the Struggle for San Francisco Bay

If *Marks v. Whitney* is the source for the principle that ecological integrity is a public property right, can that decision also provide a theoretical justification for the doctrine? Marks owned property, including tidelands, on the west side of Tomales Bay under a 1874 patent. A small part of this patent adjoined nearly the entire shoreline of Whitney's upland property. Marks wanted to fill and develop these tidelands. Whitney opposed this filling on the grounds it would cut off his access rights as littoral owner and his rights as a member of the public in tidelands and navigable waters covering them. In response to Marks' suit to quiet title to his tidelands, Whitney sought a declaration that Marks' tidelands were burdened with a public trust easement as well as certain prescriptive rights.

**\*407** The Marks court took judicial notice of public trust burdens on private titles to tidelands. [\[FN72\]](#) The court also noted that the area's growing population, which increased shoreline development because of demand for recreational property, made the issues in Marks important to the public. [\[FN73\]](#) In the passage quoted in Mono Lake, the Marks court found that ecological preservation is a public use encompassed within the tidelands trust. [\[FN74\]](#) However, the Marks court cited no specific authority for this proposition, simply noting, the "growing public recognition" that preservation of naturally functioning ecological units is a key public use for tidelands. [\[FN75\]](#)

Perhaps the Marks court was responding to Professor Sax's call for judicial intervention to protect ecological values. The court was certainly familiar with Professor Sax's 1970 article. In support of taking judicial notice of public trust burdens on

tidelands titles, the court referred to a "critique" by Professor Sax of the lower court decision dismissing the public trust claim. Despite this reference, the court does not clearly indicate whether its ruling was influenced by Sax's reasoning. [\[FN76\]](#)

The Marks court was aware of the relevance of its decision to pending and future controversies over the development of all tidelands and submerged lands in the state, including litigation then pending over property rights in tidelands of San Francisco Bay. [\[FN77\]](#) Several amici curiae specifically addressed the issue. [\[FN78\]](#) The state Attorney General appeared in his capacity as chief law enforcement \*408 officer as well as on behalf of the State Lands Commission and the Bay Area Conservation and Development Commission ("BCDC"). Additional amici included the Sierra Club and an association of private landowners with interests in patents to San Francisco Bay tidelands.

Statutory mandates also contributed to the broader picture. The 1965 McAteer-Petris Act [\[FN79\]](#) prohibited dredging and filling in San Francisco Bay. Moreover, the statute required the BCDC to prepare a comprehensive, enforceable plan for conservation of the Bay's waters and to control the development of its shoreline. [\[FN80\]](#) Although the McAteer-Petris Act did not apply to the tidelands of Tomales Bay at issue in Marks, the policies and goals of the law could indirectly have influenced the outcome of that case.

Language in the McAteer-Petris Act demonstrates that the central ideas of ecology had captured the public's imagination, [\[FN81\]](#) fueling citizen efforts to protect the Bay by imposing a framework of public planning and decisionmaking: [\[FN82\]](#) \*409 The Legislature hereby finds and declares that the public interest in the San Francisco Bay is in its beneficial use for a variety of purposes; that the public has an interest in the bay as the most valuable single natural resource of an entire region, a resource that gives special character to the bay area; that the bay is a single body of water that can be used for many purposes, from conservation to planned development; and that the bay operates as a delicate physical mechanism in which changes that affect one part of the bay may also affect all other parts. It is therefore declared to be in the public interest to create a politically-responsible, democratic process by which the San Francisco Bay and its shoreline can be analyzed, planned, and regulated as a unit. [\[FN83\]](#)

Given the similarity in language between the legislation and the Marks opinion, it seems clear that the court was influenced by the same ideas and forces that led to adoption of the legislative policies of the McAteer-Petris Act: recognition of a broad interrelationship among natural resources, their susceptibility to piecemeal destruction, a concern for future generations and cognizance of the irreplaceability of the natural functions and values of the Bay. [\[FN84\]](#)

After Marks [\[FN85\]](#) the California court continued to expand application of the public trust doctrine to non-tidal waters such as lakes, providing the same public recreational and preservational rights. [\[FN86\]](#) \*410 These opinions demonstrate a continued concern with the ecological aspects of natural resources. For example, in Fogarty, the court referred to the fragility and complexity of public trust resources and their richness in biological diversity. [\[FN87\]](#) Using a metaphor from America's favorite pastime, the court justified keeping public trust properties in their natural state, recognizing that "if nature bats last, wetlands may be the natural team's designated hitter." [\[FN88\]](#) In *City of Berkeley v. Superior Court of Alameda County*, [\[FN89\]](#) the court again confirmed Marks while applying the doctrine to filled, privately owned tidelands.

#### IV. THEORETICAL ARGUMENTS FOR THE PUBLIC TRUST: POINT AND COUNTERPOINT

Whether or not Professor Sax's 1970 article [\[FN90\]](#) directly inspired the ecological awareness reflected in Marks v. Whitney, it is clear that his analysis has not gone unheeded. [\[FN91\]](#) However, most recent applications of the public trust doctrine aspired to goals like that articulated in *Illinois Central*, the "lodestar in American public trust law": [\[FN92\]](#) to prevent privatization of natural resources that are subject to diverse public uses. [\[FN93\]](#) This desire for free public access underlying the public trust doctrine is different from a goal of preserving natural ecological functions. [\[FN94\]](#) Thus, a remaining

question focuses on whether Sax's theoretical justification for a right of public access to trust resources also supports the somewhat incompatible public right of ecological preservation. Does the latter \*411 goal have anything to do with the philosophical principles of democracy? To explore this question, this Part compares Sax's democracy thesis with criticisms leveled by James Huffman. Huffman's critique of Sax suggests that an anti-democratic, elitist impulse animates public trust doctrine applications.

#### A. Sax's Democracy Rationale

Sax's central thesis is that the public trust doctrine is a medium for judicial democratization of decisions affecting natural resources. He argues that the democratic process does not always fully consider the public interest with respect to certain resources. [FN95] Therefore, the judiciary must have a legal doctrine with which it can intervene to ensure full consideration of the public interest. [FN96] This argument is institutional, rather than a property rights inquiry, and focuses on the respective roles of legislative and judicial institutions. In contrast, property rights concerns center around relationships between individuals or between an individual and the state.

How does one know when a public decision has failed to include adequately the public interest? Providing a little guidance, Sax lists a few indices of "democratic failure" that would justify judicial intervention: the decision involves concessions to development interests that have limited visibility to the general public, [FN97] the decision process provided unequal access to and influence over decisionmakers, [FN98] and the decision was characterized by excessive localism or parochial perspectives. [FN99] Resources entitled to judicial democratization under this formulation: (1) are important to a free society, (2) are "so particularly the gifts of nature's bounty that they ought to be reserved for the whole of the populace," [FN100] and (3) "have a peculiarly public nature" such that "their adaptation to private use" is inappropriate. [FN101] While these characteristics seem too broad to give us specific guidance on the particular resources \*412 that should fall within the doctrine's reach, Sax's exploration of the doctrinal development in three jurisdictions, particularly his discussion of California, provides a somewhat clearer idea of the nature of these resources. [FN102] For this analysis, we return to the shorelands of San Francisco Bay.

According to Sax, California's public trust doctrine developed largely as a result of litigation over the resources of San Francisco Bay. [FN103] Because the Bay provided such an apt model, Sax implies that similar physical resources are particularly appropriate subjects for judicial intervention to democratize the decisionmaking process. Decisions made solely by the holders of private property rights in such resources can have significant and direct effects on public users. [FN104] In his view, this element of commonality should signal the court that these decisions, whether by private parties or by government agencies, are unlikely to reflect a sufficiently broad range of public interests in resource use. [FN105] Instead, these decisions are likely to suffer from excessive localism. Any decision allocating a widely-used resource to private interests should be suspected as a democratic failure unless it was made pursuant to a plan adopted by a body having a broad geographic constituency and representing a range of uses. [FN106] Sax suggests that the San Francisco Bay Conservation and Development Commission ("BCDC") meets this criterion. [FN107]

The primary justification for judicial scrutiny, therefore, lies in the shortcomings of conventional methods agencies employ to appraise resource decisions involving diffuse public benefits. These agencies do not often undertake cost-benefit analyses that identify all public gains and losses, thus informing allocative decisions. Sax suggests that the judicial skepticism reflected in the public trust doctrine will lead to better public decisions, where \*413 better information about benefits and losses is made available to both decisionmakers and citizens. [FN108]

In a 1980 article, *Liberating the Public Trust Doctrine from Its Historical Shackles*, [FN109] Sax adds another element to his theory. He argues that the public trust doctrine is necessary to "prevent the destabilizing disappointment of expectations held

in common, but without formal recognition such as title." [\[FN110\]](#) Sax continues:

[T]he public trust doctrine should be employed to help us reach the real issues--expectations and destabilization--whether the expectations are those of private property ownership, of a diffuse public benefit from ecosystem protection or of a community's water supply. The historical lesson of customary law is that the fact of expectations rather than some formality is central. [\[FN111\]](#)

Sax notes that actions threatening to destroy certain resources are "destabilizing forces that prevent effective adaptation." [\[FN112\]](#) Moreover, Sax finds stability a persistent concern of the legal system, signifying "a commitment to evolutionary rather than revolutionary change." [\[FN113\]](#)

In emphasizing stability, Sax offers a key to public trust cases not explicitly concerned with ensuring public access to a particular resource, such as Mono Lake. [\[FN114\]](#) Like management practices for fisheries and forestry, the legal system should provide sustained yields for common holdings through the preservation of stability. Nature's bounty deserves this protection because, under common principles of justice, it is not the product of any person's labor, cultivation, or discovery. [\[FN115\]](#)

Sax's democracy rationale and corollary concern for stability approaches a theory supporting public rights in the preservation \*414 of ecological integrity. [\[FN116\]](#) The doctrine strives to maintain a broad range of benefits and beneficiaries enjoying a natural resource. Natural resources often have their broadest uses in a natural state. [\[FN117\]](#) Two attributes account for such broad use: the physical fact of resource commonality and the extraordinary diversity that many natural systems demonstrate. An estuary illustrates these characteristics: supporting and providing fisheries, diverse recreational opportunities, scenery, and wildlife habitat. When this kind of resource is altered or destroyed to support a private use, the new use benefits a small class of people, at the expense of a wide variety of uses. Sax suggests that when a decision promises to bring about this kind of transition, whether with respect to aquatic or terrestrial resources, courts should require a demonstration that the change promotes an important public purpose. [\[FN118\]](#)

#### B. Huffman's Limited-Democracy Critique

Over the last several years, Professor James Huffman has criticized the public trust doctrine and, by association, those who propose its use and expansion. [\[FN119\]](#) Based on an analysis of his articles, Huffman apparently wants to reveal the hidden policy agenda of public trust proponents and to debate with them the merits of the consequences for democratic principles that he believes flow from their proposals.

Huffman's criticisms of Sax's public trust arguments fall into two categories. First, he argues that the doctrine reflects the subjective preferences of Sax and those who follow his ideas. Second, the reasoning threatens to replace democratic, legislative decisions \*415 with these subjective, and in some cases, minority preferences. [\[FN120\]](#) Huffman believes that although public trust proponents claim to be motivated by the public interest and to reject self-interest, their own self-interests are key. [\[FN121\]](#)

To Professor Huffman, the democracy rationale rings hollow. Interests Sax identifies as requiring judicial protection, like fishing and navigation, are not "at the heart of every call for freedom" [\[FN122\]](#) as Sax has claimed. What is at the heart of freedom is what those activities symbolize in American history: free enterprise, commerce, and the right of every individual to share in the exploitation of nature's bounty. Public property rights, from which modern public trust rights seem to have evolved, were created in the Colonial period to prevent the King from hoarding all natural resources for the Crown, not to protect them from destruction by commercial exploitation. [\[FN123\]](#)

With respect to the water rights analogy, Huffman argues that private rights in water were made usufructuary not to facilitate

their regulation for the general public benefit, but to promote investment and economic productivity through water use, as well as in recognition that they are migratory and evanescent resources in which full title is impractical. He criticizes Sax for purposefully misleading readers about the nature of American water law. [\[FN124\]](#)

Huffman's most serious criticism is his argument that Sax's approach would expand the power of the courts, which are counter-majoritarian institutions, in order to limit the powers of a more democratic political institution, the legislature. The idea of courts correcting failures in representative democratic processes respecting natural resources appalls Huffman. [\[FN125\]](#) He notes that no \*416 provision is made to correct judicial failures, nor are there defined standards for courts to use in judging the propriety of resource allocation decisions. [\[FN126\]](#) He notes that Sax offers no model or criteria for making these public trust judgments which have the power economic efficiency concepts springing from welfare economics. [\[FN127\]](#) Unlike those of Richard Posner, [\[FN128\]](#) Sax's principles are not predictive of a result of a properly functioning democratic process.

Huffman emphasizes Sax's failure to define the sort of democratic failures justifying judicial intervention. He suggests that the only real test is whether Sax and other public trust groupies like or do not like the resulting resource allocation. He calls Sax's democracy argument "a smoke-screen for a doctrine" [\[FN129\]](#) that gives some losers at the resource allocation table a second chance to argue their own interests. [\[FN130\]](#) The only losers who can have a second chance, however, are those who share values Sax cherishes; for example, those reflected in the California and Wisconsin decisions. [\[FN131\]](#)

Huffman likewise dismisses Sax's rationale concerning the destabilizing disappointments of expectations held in common. He sees no connection between this rationale and Sax's democracy argument. [\[FN132\]](#) In fact, he notes a contradiction: presumably a properly functioning democracy can upset expectations and destabilize society. [\[FN133\]](#) Instead, Huffman states that Sax must have intended the destabilization analysis to serve as an independent rationale for judicial intervention on behalf of natural resources. For instance, in a particular case there may have been no democratic failure, but the effect of a decision nevertheless destabilizes public expectations. [\[FN134\]](#)

Huffman also faults the necessarily subjective definition of what is in the public interest, [\[FN135\]](#) including determinations of what \*417 constitutes settled expectations held in common. According to Huffman, the public trust doctrine is not a value-neutral doctrine, but instead a doctrine which serves the interests of those with a particular conception of the public interest. [\[FN136\]](#) Huffman questions the failure to protect or even address private expectations. He also challenges what he perceives as a biased, subjective view of social stability that is promoted by Sax. If Sax is really concerned about the problems of local autonomy in a highly integrated, national political and economic system, Huffman believes this problem should be addressed head-on rather than obscured behind the public trust doctrine. [\[FN137\]](#)

### C. The Search Continues

The theories of Sax and Huffman both lack an explicit consideration of the particular social goods at issue in ecological resource allocation decisions. Sax's theory and Huffman's critique each fail to identify values fundamentally at issue in these cases and to discuss, in this light, the relative merits of private and public decisionmaking. Although Sax refers to a societal expectation that ecosystem functions will continue--for example, a lake will continue to be a "lake"--he does not develop this idea in more specific terms that clarify why these resources cannot be subject solely to private decisionmaking. Huffman's defense of private property, especially in its relationship to individual liberties, fails to account for the interdependence of natural systems and the vital role that human actions play in maintaining and altering these systems. [\[FN138\]](#) Huffman might respond that if destruction of such functions results from the institution of private property, that is the necessary price we must pay for a fundamental commitment to freedom. However, such a response would be unsatisfactory because it accepts as the cost of freedom loss of an environmental network necessary for survival and the enjoyment of freedom.

Sax's theory falls just short of an explanation for the property right nature of the public expectation in ecosystem preservation. Sax's notion of "expectations held in common" appears too broad \*418 and subjective unless it is narrowed to signify a public expectation that no irretrievable changes will be made to a natural system, that enough of it will remain intact so its functions can continue. Similarly, Huffman's critique neglects the effect private property can have on ecosystem functions and the values the public gives these systems. Continuing the search for a more satisfactory account of property rights in natural systems, we turn to the sciences of ecology and economics.

## V. EXPLORING NEW SOURCES FOR A THEORY: ECOLOGY AND ECONOMICS

Starting from the premise that a system of property rights is an essential institution for allocating limited resources in society, review of the public trust doctrine shows that property rights can be held by private individuals, by the government, and by the general public. Moreover, because property is a bundle of entitlements, one or more of these parties may simultaneously hold an interest in different attributes of a resource. After examining how natural systems function and considering their vulnerability in the context of incomplete property rights and market failure, we can identify several justifications for a public ownership interest in the ecological integrity of a natural resource.

### A. Characteristics of Ecological Systems

The characteristics of naturally-functioning ecosystems determine the scope and type of public property rights necessary to maintain the systems' integrity. The science of ecology [FN139] is still relatively young and its ability to predict how natural systems will react to various human inputs or manipulations is limited. [FN140] Even as the science matures, natural systems will continue to upset \*419 predictions of disturbance effects and consequently inhibit accurate assessments of their costs. Despite the limitations of environmental science, however, we can identify aspects of natural systems whose integrity we seek to maintain. This interest may only find sufficient protection through the recognition of a public property right therein. [FN141]

Natural systems produce a variety of societal benefits which ordinarily flow well beyond the system's physical boundaries. Frequently, the net value of a natural area is concealed because it registers only with a particular season or over a long period of time. Wetlands are a case in point. They have obvious virtues as aesthetic, open-space resources, and as wildlife habitat. [FN142] Less obvious are the duties they perform in providing water purification, flood protection, entrainment of pollutants, and the recharge of underground water sources. [FN143] Their ecological functions and interrelationships are more subtle than those of the upland and so tend to go relatively unnoticed. The benefits they produce are enjoyed by everyone in common, but by very few in particular. Consequently, valuing wetlands in the aggregate, as a system, is difficult.

Ecosystems, including salt marshes and other wetlands, are characterized by complex relationships among species both within a given trophic level, or step in the food chain, and across trophic levels. Therefore, when human activity disturbs a given environment, its immediate impact will usually lead to secondary effects as the disturbance spreads both geographically and through the system's food chain. The DDT example cited earlier [FN144] illustrates the complexity and unpredictability of attenuated effects. Application of the pesticide to the marshes and to other terrestrial environments led to toxic concentrations in marine fishes and \*420 ultimately in birds of prey, whose reproductive systems were seriously disrupted.

Further complexity arises from the likelihood that ecosystems will be subject to multiple disturbances. A variety of pollutants may enter a river or lake from a number of different sources; a wetland system may be degraded by disparate activities separated by space and time. With so many environmental participants acting in ignorance of one another, any reasonable certainty as to the effects of one individual's activity becomes lost in the general uncertainty of combined effects on the whole ecosystem. This is true not only because of diverse human manipulations but also because of unpredictable synergistic or

interactive effects. Local species populations and communities can react suddenly to particular events. An entire fish population or lake community can collapse because of pollution or habitat fragmentation. The degradation of the Chesapeake Bay precipitated such a calamitous crash of populations. [\[FN145\]](#)

Ecosystems also have considerable natural variability. Species populations and communities fluctuate over time according to natural life cycles or in response to periodic natural disturbances. Changes in physical or biological environments brought about by periods of drought, for example, interact with changes brought about by human causes. Again, these interactions are unpredictable. [\[FN146\]](#) In many instances we may lack both the experience with a particular kind of environmental disturbance and reliable models that might yield meaningful predictions. Thus, any development activity is an experiment whose results augment the usefulness of our models but cannot be said to correspond to any of them. We can continually refine our predictions but cannot hope to capture the complexity of an ecosystem's response to significant interference.

Our models have an especially difficult time reflecting the dynamic of human disturbances over time. A key characteristic of natural systems is their vulnerability to cumulative effects. The magnitude of these impacts can vary depending upon the extent <sup>\*421</sup> to which effects are dispersed or concentrated by either biological or physical processes, including animal migrations or feeding concentrations and wind or water currents. When new impacts occur before a system has recovered from a previous injury, or when impacts occur in adjacent areas, the combined effects can be worse than the results of the individual events. [\[FN147\]](#) The transformation of ecosystems processes is doubly mysterious because we know neither the configuration of varied human forces nor the impact of those forces on a natural system with its own flux. We do know that the time scales and extent of ecological processes are frequently mismatched with the jurisdictional boundaries and substantive expertise of management authorities. [\[FN148\]](#)

The characteristics of dynamic ecosystems complicate the task of safeguarding ecological viability. Decisionmaking authority must be vested in an entity with a frame of reference broader, both spatially and temporally, than may be common among private actors. Ecosystems require a decisionmaker who can reduce the risks inherent in uncertainty by attempting to keep the impacts below some designated level of disturbance. Because these optimal thresholds are unknown, a manager must make informed guesses about where they may lie. The characteristics of the ideal manager would include systematic knowledge, long-term and repeated involvement in a single ecosystem, and flexibility. Because environmental changes caused by human activity provide both information on the costs of the activity and future predictive ability, it would be helpful to confine decisionmaking to a single entity. This managing unit also needs an ability to adapt to unexpected effects, changes that spring from interaction with other natural or human-induced changes. This may mean abandoning the project if the initial phases prove to result in unacceptably high costs.

#### B. "Utility-Maximizing," Market Failure, and the Need for Public Management

Who, then, is most likely to have the necessary decisionmaking attributes to accommodate the flux and uncertainty of ecosystems <sup>\*422</sup> and to manage them accordingly? Of the three potential property rights institutions-- collective ownership, private ownership, or governmental ownership--economists have identified several reasons each may lead to the destruction of ecosystems. [\[FN149\]](#)

Collective ownership is subject to the familiar "tragedy of the commons," [\[FN150\]](#) where the lack of well-defined property rights in a commonly used resource leads to waste by overuse. Because the costs of overuse are borne collectively while the gains are enjoyed privately, individuals have incentives to exploit the commons until it is destroyed. Despite a growing body of research on real-world natural resource commons that have survived for generations, [\[FN151\]](#) the inevitable destruction of the commons remains a first principle--an article of faith--in resource economics. [\[FN152\]](#)

The fact that naturally functioning ecosystems produce a host of benefits outside their boundaries [\[FN153\]](#) gives them the character of "public goods." [\[FN154\]](#) They are nonexclusive and indivisible resources whose use or enjoyment by one consumer does not diminish the quality for a subsequent user. [\[FN155\]](#) Because the private owner cannot exclude others from the ecological benefits of his or her property, the market system cannot operate to supply the socially optimal amount of this resource. [\[FN156\]](#) Moreover, some ecosystems--like those including wilderness and endangered species--are irreproducible products of nature that must remain intact in order to provide benefits; their alteration or destruction is usually irreversible. [\[FN157\]](#) Ecologically significant public goods are often valued merely because they exist and are subject therefore to nonmarket **\*423** demands. [\[FN158\]](#) Thus, a private owner cannot capture these values through an entry fee nor can a market be organized. [\[FN159\]](#)

The private individual, or in economic parlance the "rational utility maximizer," does not have adequate incentives to invest in preservation of the system's ecological integrity. [\[FN160\]](#) A Prisoners' Dilemma arises, where conservation is the optimal strategy for the collective but not for each individual alone. [\[FN161\]](#) A naturally functioning salt marsh, for example, may provide fishing, scenic beauty, flood protection, and hunting opportunities for an entire community. The private marsh owner's property values, however, do not reflect these privately inappropriable "positive externalities." [\[FN162\]](#) In fact, the owner of a salt marsh will probably be legislatively restricted in the way he or she may use the property, thus sacrificing traditional private property rights for social benefit. [\[FN163\]](#) Similarly, the adverse consequences of destroying a functioning ecosystem may produce negative externalities that have little or no effect on the property's value to a private owner. [\[FN164\]](#)

A related problem (from the conservationist's perspective) is that the act of conserving natural resources is itself a collective or public good. [\[FN165\]](#) The problem is not only that what people want individually does not produce what they want either in the abstract **\*424** or collectively but also that they do not always act rationally. Their market behavior may be distorted by the "tyranny of small decisions," an illustration of the familiar Prisoners' Dilemma. [\[FN166\]](#) Kahn points out that the dominant feature of a decentralized, consumer-sovereign, market economy is that its major allocative decisions are made on the basis of numerous, small-scale purchase decisions taking place over a long period of time. [\[FN167\]](#) Individual decisions are "small" in three senses: in their size, in their time perspective, and in relation to their combined, ultimate effect. [\[FN168\]](#) When numerous individual consumers make minor decisions the aggregate consequences of which they would not have chosen had they been explicitly presented with the larger composite decision, they fall victim to the tyranny of small decisions. The consumer becomes a victim of the "narrowness of the contexts in which he or she exercises . . . sovereignty." [\[FN169\]](#)

Picking up on this idea, ecologist William Odum notes that many of our current environmental problems can be traced to the tyranny of small decisions. [\[FN170\]](#) The destruction of coastal wetlands on the U.S. eastern seaboard is a prime example. Between 1950 and 1970, almost fifty percent of the marshland in Connecticut and Massachusetts was lost. [\[FN171\]](#) Odum suggests that if the public had been asked whether the coastal marshes should be preserved or developed, people probably would have chosen preservation. [\[FN172\]](#) Instead, hundreds of individual decisions converted thousands of acres of salt marsh. The aggregate effect was the same as if one major decision had been made to destroy them. [\[FN173\]](#) The wetlands of San Francisco Bay, whose rescue in part inspired Professor Sax, are also evident victims of this phenomenon. [\[FN174\]](#)

**\*425** Another cause of irrational individual choice with respect to activity affecting ecosystems is the high degree of uncertainty surrounding the future consequences of present actions. When faced with these uncertainties, individuals vary in the degree to which they seek to avoid risks. [\[FN175\]](#) Moreover, individual risk perceptions are subject to systematic patterns of bias. [\[FN176\]](#) This bias comes from the manner in which individuals frame certain events and cannot be remedied by merely improving the information available in the market. [\[FN177\]](#) Therefore, we must supplement the rational actor model of economic theory with a catalog of decision characteristics including myopia, wishful thinking, self-delusion, fickleness,

and even stupidity. [FN178] Recognition of these attributes makes it easier to understand the continued destruction of ecosystems most claim to value.

If the tendencies of both collective ownership and private ownership tend toward the destruction of ecosystems, is the government the appropriate management entity? Perhaps, but some economists have also identified reasons governmental management can destroy ecosystems. [FN179] Because they are cut off from receiving price information and rarely confront the true ecological and economic opportunity costs of their decisions, [FN180] natural resource bureaucracies may respond to incentives that cause them to embrace inefficient resource allocations and which result in ecological damage. [FN181] In addition, government managers can be manipulated by politically powerful interest groups to produce transfers of wealth from the public to private entities.

Rather than search for one ideal property institution, it may ultimately be necessary to rely on an array of property arrangements. \*426 In such a system, both private and government ownership may be subordinate to a property interest held by the "unorganized public" in the ecological integrity of natural resources. This interest might operate through the public trust doctrine.

#### C. Natural Resources Damages Assessment Provisions

United States environmental legislation has for some time sought to limit both the economically rational and rationally flawed behavior of individuals in order to protect undervalued natural resources. These laws attempt to substitute the government as a manager with a larger frame of reference, one with an ability to apply improvements in scientific knowledge in judging the risks of disturbing ecological systems. Much of this law operates to regulate private action, although laws also prescribe standards for federal land management practices and thereby qualify the state property rights as well. [FN182] To counteract some of the environmentally destructive tendencies of bureaucratic managers and their isolation from appropriate incentives, United States law relies on public disclosure, through information-based processes like the environmental impact statement. [FN183] Congress has also pursued resource protection by creating a liability rule and damages remedy to reflect the public value of natural resources, defining these public property rights as public trust rights. [FN184]

The most significant and under-evaluated--by public trust commentators, at least--recent recognition of the public trust concept in natural resources occurred in 1980. [FN185] In the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA") and amendments to the Clean Water Act, Congress ordered federal and state authorities to sue to recover damages to public trust resources caused by releases of oil or other hazardous \*427 substances. [FN186] Recent litigation over the Department of Interior's rules governing the trustees' damage assessment procedures and methodologies [FN187] has brought new attention to those provisions. [FN188] The provisions will continue to be of considerable interest as they undergo their most challenging application--damage assessment for the Exxon Valdez oil spill. Damage assessment procedures bear on our search for a theory for public rights in ecological preservation because they identify, as they attempt to quantify, the critical aspects of public values in natural resources.

The nature of the public property interests Congress sought to vindicate through the damage assessment program were clarified in litigation over the Interior Department's rules. A coalition of states and environmental organizations successfully argued that portions of the Department's guidelines had violated congressional intent. [FN189] Interior had systematically undervalued public trust resources by effectively limiting recovery to the open market value of the resource. [FN190] It had done so by authorizing recovery of "the lesser of": (1) the cost of restoring or replacing the equivalent of an injured resource; or (2) the lost use value of the resource. [FN191]

The D.C. Circuit held that this insistence on market value, excluding any valuation methods to account for the

non-commodity values of natural resources, violated the clear intent of Congress that damage assessment proceedings should "capture fully all aspects of the loss." [\[FN192\]](#) The legislative history of CERCLA \*428 indicated that Congress had intended restoration costs to be the presumptive measure of recovery. [\[FN193\]](#) Congress, the court concluded, would not have bothered to enact the damage provision had it been satisfied with the common law remedy of market value recovery. [\[FN194\]](#)

Interior had described its "lesser of" rule favoring lost use value as one that "promotes a rational allocation of society's assets." [\[FN195\]](#) In rejecting this characterization, the court read broadly the concept of efficiency, one that may incorporate non-commodity values in nature:

The fatal flaw of Interior's approach, however, is that it assumes that natural resources are fungible goods, just like any other, and that the value to society generated by a particular resource can be accurately measured in every case-- assumptions that Congress apparently rejected . . . . To say that Congress placed a thumb on the scales in favor of restoration is not to say that it forswore the goal of efficiency. "Efficiency," standing alone, simply means that the chosen policy will dictate the result that achieves the greatest value to society. Whether a particular choice is efficient depends on how the various alternatives are valued. Our reading of CERCLA does not attribute to Congress an irrational dislike of "efficiency"; rather, it suggests that Congress was skeptical of the ability of human beings to measure the true "value" of a natural resource . . . . Congress' refusal to view use value and restoration cost as having equal presumptive legitimacy merely recognizes that natural resources have value that is not readily measured by traditional means. Congress delegated to Interior the job of deciding at what point the presumption of restoration falls away, but its repeated emphasis on the primacy of restoration \*429 rejected the underlying premise of Interior's rule, which is that restoration is wasteful if its cost exceeds--by even the slightest amount--the diminution in use value of the injured resource. [\[FN196\]](#)

Fees paid by the public to gain access to a particular resource, such as a national park, do not represent the value to the public of recreational or other public uses of the resource. Instead, in the court's view, entrance fees that are priced below market reflect "Congress' strong conviction that parks are priceless national treasures and that access to them ought to be as wide as possible, and not as the DOI [Department of Interior] would have it, a sign that parks are really not so valuable after all." [\[FN197\]](#) In remanding the rules, the court instructed Interior to allow trustees to use nonconsumptive values such as "option" and "existence value" in calculating lost use values, to reflect fully the utility humans derive from a resource. [\[FN198\]](#)

Option value is actually one of three types of existence value, all of which are non-use values. [\[FN199\]](#) Existence values recognize that resources have value to humans beyond that which is reflected in their practical use or consumption. "Option value," the simplest of the three, is the value of a person's desire to retain the option to some day enjoy a particular, undisturbed natural resource. Other existence values are "vicarious value," the benefit one gains from \*430 knowing that other people will be able to enjoy a natural resource, and "bequest" or "intertemporal value," the monetary value of knowing that one's descendants will have such an opportunity. An important variant for ecological resources is "quasi-option value," which reflects the unknown future value of a resource, such as an endangered plant species that could one day supply an important pharmaceutical product. [\[FN200\]](#)

One commentator has pointed out several reasons these values are controversial. First, because attitudes rather than overt behavior gauge their magnitude, the values are difficult to measure. [\[FN201\]](#) Existence values do not motivate people's actions in the marketplace except through collective, public sector activities or through voluntary philanthropy. [\[FN202\]](#) Second, some disapprove of the very attempt to value resources in an anthropocentric manner, only in terms of their worth to human beings. [\[FN203\]](#) Finally, reliance on existence values may pose a danger that poor information will suppress the values people would otherwise attach to resources. There is always the possibility that the public will not be aware or may be kept ignorant of the complexity of a resource. The widespread use of existence value, especially in measuring damages, may create an incentive intentionally to keep a group ignorant of what resources are at stake or the extent to which they have been

restored. [\[FN204\]](#)

Despite these difficulties, the court directed Interior to allow public trustees to use these concepts in assessing damages. The court endorsed the contingent valuation method, which can determine a resource's option or existence value by simulating a market through interviews or questionnaires. To measure option value, for example, people are asked how much they would be willing to pay for the option of viewing a resource that they are not presently using, such as a sea otter colony. [\[FN205\]](#) To measure the colony's existence value, they would be asked how much they would be \*431 willing to pay for the knowledge that the colony exists and that other people in present and future generations would have the opportunity to see it. [\[FN206\]](#)

By invalidating the "lesser of" rule and rejecting the market value hierarchy, the court opened the door for revised trustee procedures which would allow the use of contingent valuation techniques as a principal damage assessment methodology. [\[FN207\]](#) Furthermore, the Ohio decision makes clear that these provisions apply to resources that case law defines as public trust resources, including those, like many tidelands and wetlands, that are privately owned but subject to public trust easements or restrictions. [\[FN208\]](#) Thus, how Congress defined the recoverable values of public trust properties and other natural resources gives new insight into using the public trust doctrine to protect a variety of natural resources. [\[FN209\]](#)

#### \*432 VI. CONCLUSIONS AND THOUGHTS FOR FUTURE THEORETICAL DEVELOPMENT

The legislative policies underlying CERCLA's damage recovery provisions further our quest for a theory supporting public property rights in ecological integrity. They may be seen as the latest affirmation of the ecological concepts of interdependency that first came to the fore in the 1960's. [\[FN210\]](#) In this most recent chapter of a story that began with the seeping virulence of DDT, federal statutes have codified the idea that the public has property rights in non-commodity values of natural resources.

The law's adoption of "existence values" and its application of ideas emerging from applied welfare economics recognizes that the collective public values tremendously the maintenance of a natural resource which individuals may scarcely value at all. [\[FN211\]](#) It is only when a community, a state, a region, or a nation of individuals collectively treasure a salt marsh in Connecticut for its natural functions that the ecosystem property will achieve its highest value.

The transformation from private to collective valuation of ecological systems mirrors earlier shifts in the relations communities bore to roadways and navigable waterways and contemporary communities bear to their beaches. [\[FN212\]](#) By using these properties for commerce and recreation and valuing the activities collectively, the communities increased the value of these properties. Allowing the public to hold a property right in these collectively valued resources ensures that economically rational or circumscribed behavior of individual actors will not destroy them.

The CERCLA provisions reflect a recognition of the inadequacy of relying solely upon regulatory programs to control the exercise of private property rights. Congress apparently determined that the only way to vindicate the public's full interest in naturally functioning systems was to empower public trustees to sue to recover for their injury, expansively defined to include all lost values. The inherently public nature of roadways and waterways, recognized in historical doctrines, is now an acknowledged attribute of many naturally functioning ecosystems. This new, \*433 broadly defined "inherently public property" is protected by the modern public trust doctrine.

If this idea is to be taken seriously, considerable attention must be given to its operational effect. Can private property rights be enjoyed in the face of such a pervasive public right? However, such an analysis is beyond the scope of this Article. Other writers have described the operational effect of the modern public trust doctrine, and these ideas provide an excellent basis for further work on these questions. [\[FN213\]](#)

In concluding, one final caveat seems in order. As work on this and other ideas about the public trust doctrine continues, commentators and the courts will eventually need to reconcile the various purposes the doctrine has come to serve. If the doctrine is broadened to include all naturally functioning ecosystems, it may not be possible for it to serve as a vehicle for public access to all resources within its scope. Mono Lake may need to have fewer human visitors and users if wildlife species dependent on its ecological integrity are to benefit from doctrinal advances intended primarily for humans. This and other challenges await the many who will find themselves drawn to the puzzling but compelling public trust doctrine.

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[FN1]. See [Marks v. Whitney](#), 6 Cal. 3d 251, 491 P.2d 374, 98 Cal. Rptr. 790 (1971); [National Audubon Soc'y v. Superior Court of Alpine County](#), 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346, cert. denied, 464 U.S. 977 (1983). See also Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970) [hereinafter Sax, *Effective Judicial Intervention*]; Hunter, *An Ecological Perspective on Property: A Call for Judicial Protection of the Public's Interest in Environmentally Critical Resources*, 12 HARV. ENVTL. L. REV. 311, 313 (1988).

[FN2]. See, e.g., [National Audubon Soc'y v. Superior Court of Alpine County](#), 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346, cert. denied, 464 U.S. 977 (1983); [Cinque Bambini Partnership v. State](#), 491 So.2d 508 (Miss. 1986), aff'd sub nom., [Phillips Petroleum Co. v. Mississippi](#), 484 U.S. 469 (1988); [Orion Corp. v. State](#), 109 Wash. 2d 621, 747 P.2d 1062, cert. denied, 486 U.S. 1022 (1988); [Just v. Marinette County](#), 56 Wis. 2d 7, 201 N.W.2d 761 (1972).

Protection of ecologically unique or significant resources is also provided by legislative initiatives, such as the federal Wilderness Act of 1964, [16 U.S.C. §§ 1131-1136 \(1988\)](#) (preventing federal land managers from authorizing public lands development) and the Clean Water Act, [33 U.S.C. §§ 1251-1387 \(1988\)](#) (prohibiting alterations of privately owned wetland ecosystems).

[FN3]. Courts are also interpreting other common law doctrines--including the federal reserved water rights doctrine--to recognize public property rights in environmental resources. See Butler, [Environmental Water Rights: An Evolving Concept of Public Property](#), 9 VA. ENVTL. L.J. 323, 341 (1990). Moreover, some state constitutional provisions have been interpreted as imposing a governmental duty to protect natural resources on behalf of the state's citizenry. [Id.](#) at 342-43; see, e.g., [CWC Fisheries, Inc. v. Bunker](#), 755 P.2d 1115 (Alaska 1988) (Alaska constitutional provision reserving fish, wildlife and waters for the people for common use where occurring in their natural state precludes state conveyance of tidelands free of the public trust); [Cal. Const. art. XV, §§ 2-3](#); [Wis. Const. art. IX, § 1](#).

[FN4]. See generally W. RODGERS, *HANDBOOK ON ENVIRONMENTAL LAW* § 2.16 (Supp. 1984); Stevens, *The Public Trust: A Sovereign's Ancient Prerogative Becomes the People's Environmental Right*, 14 U.C. DAVIS L. REV. 195 (1980).

[FN5]. See, e.g., COASTAL STATES ORG., *PUTTING THE PUBLIC TRUST TO WORK: PROCEEDINGS OF THE NATIONAL PUBLIC TRUST STUDY SYMPOSIUM* (1990) (describing the results of a 29-state study of resource management applications of the public trust doctrine).

[FN6]. Sax, *Liberating the Public Trust Doctrine from Its Historic Shackles*, 14 U.C. DAVIS L. REV. 185 (1980) [hereinafter Sax, *Liberating the Public Trust Doctrine*]; Myers, [Variations on a Theme: Expanding the Public Trust Doctrine to Include Protection of Wildlife](#), 19 ENVTL. L. 723 (1989). Judging from the frequency with which the courts have cited his 1970 article, Professor Sax's predictions may be entitled to more than a little respect. See Blumm, [Public Property and the](#)

[Democratization of Western Water Law: A Modern View of the Public Trust Doctrine, 19 ENVTL. L. 573, 574 n.1 \(1989\)](#) (noting at least 33 judicial opinions and 26 law review articles citing Sax, Effective Judicial Intervention, supra note 1).

[FN7]. See, e.g., Myers, supra note 6, at 728-35; Hunter, supra note 1, at 374.

[FN8]. See, e.g., Comment, The Fifth Amendment as a Limitation on the Public Trust Doctrine in Water Law, 15 PAC. L.J. 1291, 1307-13 (1984); Huffman, Avoiding the Takings Clause Through the Myth of Public Rights: The Public Trust and the Reserved Rights Doctrine at Work, 3 J. LAND USE & ENVTL. L. 171, 192 (1987) [hereinafter Huffman, Myth of Public Rights]; Huffman, Phillips Petroleum Co. v. Mississippi: A Hidden Victory for Private Property?, 19 Envtl. L. Rep. (Envtl. L. Inst.) 10,051, 10,052-53 (February 1989).

[FN9]. See, e.g., Huffman, [A Fish Out of Water: The Public Trust Doctrine in a Constitutional Democracy, 19 ENVTL. L. 527 \(1989\)](#) [hereinafter Huffman, Fish Out of Water]; Blumm, supra note 6.

[FN10]. See, e.g., Lazarus, [Changing Conceptions of Property and Sovereignty in Natural Resources: Questioning the Public Trust Doctrine, 71 IOWA L. REV. 631 \(1986\)](#).

[FN11]. Public trust "rights" are distinguishable from public trust "resources." The natural resources that are subject to the doctrine, such as navigable waters or submerged and intertidal lands, are public trust resources. The uses of those resources by the public, which the government has a duty to protect, are public trust rights. See W. RODGERS, supra note 4, at 61-65. This Article argues that these public use rights are in the nature of public property rights. See infra notes 24-55 and accompanying text.

[FN12]. Furthermore, the absence of a coherent, overriding theory limits the impact of individual instances of judicial expansion of the public trust doctrine on the evolution of public property rights in ecological resources and precludes resolution of the inevitable conflicts with private property rights. See Butler, supra note 3, at 343, 355.

[FN13]. [42 U.S.C. §§ 9601-9675 \(1988\)](#).

[FN14]. [33 U.S.C. §§ 1251-1387 \(1988\)](#).

[FN15]. See infra notes 34-49 and accompanying text.

[FN16]. [National Audubon Soc'y v. Superior Court of Alpine County, 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346](#), cert. denied, [464 U.S. 977 \(1983\)](#).

[FN17]. [6 Cal. 3d 251, 491 P.2d 374, 98 Cal. Rptr. 790 \(1971\)](#).

[FN18]. Legal and political developments likewise affected the science of ecology, transforming at least three of its early hypotheses into basic, utilitarian assumptions of environmental legislation. Sagoff, Fact and Value in Ecological Science, 7 ENVTL. ETHICS 99, 104-12 (1985).

[FN19]. See infra notes 72-85 and accompanying text.

[FN20]. See infra notes 108-110 and accompanying text.

[FN21]. See infra notes 103-118 and accompanying text.

[FN22]. See generally McCurdy, [Application of the Public Trust: Public Trust Protection for Wetlands](#), 19 ENVTL. L. 683 (1989); Hunter, *supra* note 1, at 338-42; [United States v. Riverside Bayview Homes](#), 474 U.S. 121 (1985).

[FN23]. See *infra* notes 186-198 and accompanying text.

[FN24]. See, e.g., [Shively v. Bowlby](#), 152 U.S. 1, 11-14 (1894); [Martin v. Waddell](#), 41 U.S. (16 Pet.) 367, 410 (1842); Lazarus, *supra* note 10, at 633-35.

[FN25]. These resources were either owned by no one (*res nullius*) or by everyone in common (*res communis*). See W.W. BUCKLAND, *TEXTBOOK OF ROMAN LAW FROM AUGUSTUS TO JUSTINIAN* 182-83 (1966).

[FN26]. Stevens, *supra* note 4, at 197-98.

[FN27]. English common law adopted the distinction between the *jus privatum*, or private property interest in submerged or tidal lands, which the Crown could convey, and the *jus publicum*, or general public interest, which was inalienable. Lazarus, *supra* note 10, at 636. This distinction was accepted by American courts in the 19th century. See, e.g., [Shively v. Bowlby](#), 152 U.S. 1 (1894); [Martin v. Waddell](#), 41 U.S. (16 Pet.) 367 (1842).

[FN28]. See [Martin](#), 41 U.S. (16 Pet.) at 410 (finding that states succeeded to the Crown's ownership of navigable waters, holding them and their submerged lands for common use). The classic American case reflecting the principle of inalienability of public trust resources is [Illinois Central Railroad Co. v. Illinois](#), 146 U.S. 387 (1892), which asserted for the first time after [Arnold v. Mundy](#), 6 N.J.L. 1 (1821), that the legislature had limited discretion to dispose of trust lands.

[FN29]. [Shively](#), 152 U.S. at 57. See also [Phillips Petroleum Co. v. Mississippi](#), 484 U.S. 469 (1988). Scholars differ over whether tidelands in England were in fact inalienable; at any rate, *Shively* reflects the American judiciary's version of the common law governing tidelands. See Stevens, *supra* note 4, at 189 n.14.

[FN30]. Professor Huffman, an articulate proponent of private property rights, may be an exception. See, e.g., Huffman, *Myth of Public Rights*, *supra* note 8; Huffman, *Fish Out of Water*, *supra* note 9. Huffman views the doctrine's modern use as a vehicle for avoiding takings and just compensation limitations that would otherwise be imposed on government action.

[FN31]. Nor is it really common ownership because, despite generally open access to resources held in trust, the government has an obligation to ensure that overuse does not destroy the resources' value to the public. See [National Audubon Soc'y v. Superior Court of Alpine County](#), 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346, cert. denied, 464 U.S. 977 (1983).

[FN32]. The more skeptical commentators cite the doctrine's emergence in Tudor England, as evidence of the Crown's desire to nullify prior royal grants of valuable shorelands. See, e.g., Lazarus, *supra* note 10, at 635; Rose, [The Comedy of the Commons: Custom, Commerce, and Inherently Public Property](#), 53 U. CHI. L. REV. 711, 728-29 (1986).

[FN33]. See, e.g., Sax, *Effective Judicial Intervention*, *supra* note 1, at 475-76; Note, *The Public Trust in Tidal Areas: A Sometime Submerged Traditional Doctrine*, 79 YALE L.J. 762, 763-68 (1970); cf. Deveney, *Title, Jus Publicum, and the Public Trust: An Historical Analysis*, 1 SEA GRANT L.J. 13, 79 (1976) ("point[ing] out the fallacy of bootstrapping with dubious historical precedent and . . . expos[ing] the all too readily accepted [sic] mythological elements" underlying the public trust doctrine); MacGrady, *The Navigability Concept in the Civil and Common Law: Historical Development, Current Importance, and Some Doctrines That Don't Hold Water*, 3 FLA. ST. U.L. REV. 511, 590-91 (1975).

[FN34]. Rose, *supra* note 32.

[FN35]. *Id.* at 713, 716-17 (examining prescription and custom doctrines as well as the public trust).

[FN36]. The justifications for private property rights are familiar: without them, no one would have an incentive to invest labor and capital into production because one could not exclude others from enjoying the fruits of one's labor. See *id.* at 711 n.2 (quoting 2 W. BLACKSTONE, COMMENTARIES \* 4, \*7). Similarly, the arguments for governmental ownership of certain resources are becoming equally familiar: market failures due to natural monopolies or the presence of too many small stakeholders require governmental management. *Id.* at 719; cf. Baden and Lueck, A Property Rights Approach to Wilderness Management, in PUBLIC LANDS AND THE U.S. ECONOMY: BALANCING CONSERVATION AND DEVELOPMENT 37 (G. Johnston & P. Emerson eds. 1984) (government ownership may lead to bureaucratic mismanagement and destruction of environmental quality because prices and profit motives are absent).

[FN37]. Rose, *supra* note 32, at 717.

[FN38]. *Id.* at 718. Roadways and open squares were also subject to sole ownership. *Id.*

[FN39]. *Id.* at 719.

[FN40]. *Id.*

[FN41]. *Id.* at 720-21.

[FN42]. *Id.* at 721.

[FN43]. *Id.* at 768.

[FN44]. *Id.* at 766-69 (explaining that the higher the number of participants, the greater the value to and enjoyment by all).

[FN45]. *Id.* at 723.

[FN46]. *Id.* at 744-45.

[FN47]. *Id.*

[FN48]. *Id.* at 743-45, 770-71 ("The publicly-created rent established a public entitlement to access.").

[FN49]. *Id.* at 722-23, 779-81. This idea is partially echoed in Dunning, [The Public Trust Doctrine: A Fundamental Doctrine of American Property Law](#), 19 ENVTL. L. 515 (1989) (noting that the physical character of certain resources make them suitable for broad public use and thus inclusion in the public trust).

Rose's nearly exclusive reliance upon economic justifications for her theory of inherently public property has been criticized for failing to consider nonutilitarian justifications. See Butler, *supra* note 3, at 362-63. Butler points out that democratic values also can justify legal recognition of important but intangible public interests, such as ecological appreciation. *Id.* at 364. The law has the power to correct political and market failures by recognizing these interests. Moreover, such recognition may serve to legitimize governmental action constraining private ownership interests without compensation. *Id.*

[FN50]. See, e.g., Butler, *supra* note 3, at 370 (arguing that ecological uses of waterways, recognized in public instream water rights, has a socializing element because environmental protection involves collective action that, if successful, increases the resource's overall value).

[FN51]. Private owners may also try to capture publicly created rent by demanding compensation in exchange for accepting regulatory restrictions on use of their own natural areas. See, e.g., [Orion Corp. v. State](#), 109 Wash. 2d 621, 747 P.2d 1062, cert. denied, 486 U.S. 1022 (1988) (private owner of bay tidelands sought compensation for development restrictions associated with bay's designation as an estuarine sanctuary).

When implementing a mandate to protect the public, courts may respond to a moral justification for public property rights, recognizing that the public created the resource's high value and is therefore entitled to enjoy it. Butler, *supra* note 3, at 375; Rose, *supra* note 32, at 770.

[FN52]. Rose, *supra* note 32, at 775.

[FN53]. *Id.* at 776-77. Rose suggests that the recent beach public trust cases may reflect recognition of the civilizing and educative functions of recreation. *Id.* at 780-81.

[FN54]. See, e.g., Huffman, *Myth of Public Rights*, *supra* note 8.

[FN55]. Decisions in other state courts are also reflecting this trend. For example, in the course of allowing the destruction of public trust resources, the Oregon Supreme Court has written:

The severe restriction upon the power of the state as trustee to modify water resources is predicated not only upon the importance of the public use of such waters and lands, but upon the exhaustible and irreplaceable nature of the resources and its fundamental importance to our society and to our environment. These resources, after all, can only be spent once. Therefore, the law has historically and consistently recognized that rivers and estuaries once destroyed or diminished may never be restored to the public and, accordingly, has required the highest degree of protection from the public trustee.

[Morse v. Oregon Div. of State Lands](#), 34 Or. App. 853, 860, 581 P.2d 520, 524 (1978), *aff'd*, 285 Or. 197, 590 P.2d 709 (1979). See also [Orion](#), 109 Wash. 2d at 641 n.10, 747 P.2d at 1073 n.10.

[FN56]. [National Audubon Soc'y v. Superior Court of Alpine County](#), 33 Cal. 3d 419, 658 P.2d 709, 189 Cal. Rptr. 346, cert. denied, 464 U.S. 977 (1983).

[FN57]. *Id.* at 452, 658 P.2d at 732, 189 Cal. Rptr. at 369.

[FN58]. *Id.* at 426, 658 P.2d at 712-13, 189 Cal. Rptr. at 349-50 ("An objective study and reconsideration of the water rights in the Mono Basin is long overdue. The water law of California--which we conceive to be an integration including both the public trust doctrine and the board-administered appropriative rights system--permits such a reconsideration; the values underlying that integration require it." (emphasis added)).

The court made frequent reference to value issues underlying the controversy's legal questions, finding a dramatic clash of values in the contrast of Mono Lake as a "scenic and ecological treasure of national significance," and the burgeoning growth of Los Angeles. Such growth symbolized the entire state, whose prosperity and habitability depended upon continued water diversions. *Id.*

In the terminology of one public trust commentator, the court imposed a "hard-look process remedy," equivalent to the inquiry required under the state's environmental review statute, the California Environmental Quality Act, Cal. Pub. Res. Code §§ 21,000-21,165 (West 1986). To satisfy its duty to exercise continued supervision of public trust property, the state was required to consider adverse effects and protect public trust uses from those effects "wherever feasible." Blumm, *supra* note 6, at 591-92. Professor Blumm notes that this hard-look remedy will become increasingly important as the scope of the public trust expands beyond tidelands to resources where the notion of inalienability is inappropriate. *Id.* at 592, see also W. Rodgers, *supra* note 4, at 66.

For a description and diagram of the creeks and water-diversion works in the Mono Basin, see [California Trout v. Water](#)

[Resources Control Bd., 207 Cal. App. 3d 585, 593, 634, 255 Cal. Rptr. 184, 187, 214 \(1989\).](#)

[FN59]. [National Audubon Soc'y, 33 Cal. 3d at 434, 658 P.2d at 719, 189 Cal. Rptr. at 356.](#)

[FN60]. [6 Cal. 3d 251, 491 P.2d 374, 98 Cal. Rptr. 790 \(1971\).](#)

[FN61]. [National Audubon Soc'y, 33 Cal. 3d at 434, 658 P.2d at 719, 189 Cal. Rptr. at 356](#) (quoting [Marks, 6 Cal. 3d at 259-60, 491 P.2d at 380, 98 Cal. Rptr. at 796](#) (emphasis added) (citation omitted)).

Hunter suggests that this language reflects the land ethic called for in Aldo Leopold's A Sand County Almanac. Hunter, *supra* note 1, at 317-20 & nn.21-29, 372-73 (citing A. LEOPOLD, A SAND COUNTY ALMANAC (3d ed. 1966)). See generally Tideman, [Takings, Moral Evolution, and Justice, 88 COLUM. L. REV. 1714 \(1988\)](#) (stating that the evolution of ethical awareness has led to changes in definitions of property rights, such as the abolition of slavery).

[FN62]. [National Audubon Soc'y, 33 Cal. 3d at 435, 658 P.2d at 719, 189 Cal. Rptr. at 356.](#) The Los Angeles Department of Power and Water contested whether ecological values were threatened by continued diversions. [Id. at 429, 658 P.2d at 715, 189 Cal. Rptr. at 352.](#) Nevertheless, the court accepted findings of risk memorialized in a 1979 report prepared by representatives of the California Department of Water Resources and the U.S. Department of the Interior. [Id. at 425 n.2 & 429 n.9, 658 P.2d at 711 n.2 & 714--15 n.9, 189 Cal. Rptr. at 342 n.2 & 351 n.9.](#)

[FN63]. [National Audubon Soc'y, 33 Cal. 3d at 435, 658 P.2d at 719, 189 Cal. Rptr. at 356.](#)

[FN64]. [Id. at 435--37, 658 P.2d at 719--21, 189 Cal. Rptr. at 356--57.](#)

[FN65]. [146 U.S. 387 \(1892\).](#)

[FN66]. [National Audubon Soc'y, 33 Cal. 3d at 441, 658 P.2d at 724, 189 Cal. Rptr. at 360](#) (emphasis added).

[FN67]. See Sax, Effective Judicial Intervention, *supra* note 1, at 484. See also *infra* notes 90--120 and accompanying text.

[FN68]. The California court had already demonstrated a concern for finite and diminishing natural resources independent of a concern for public navigation. In a decision preceding the Mono Lake decision, the California Supreme Court applied the doctrine to protect an expanded range of trust values in non-tidal, navigable lakes and the privately owned marshland bordering them between the high and low water lines. [State v. Superior Court \(Lyon\), 29 Cal. 3d 210, 625 P.2d 239, 172 Cal. Rptr. 696](#), cert. denied, [454 U.S. 865 \(1981\)](#). Recognizing that the decision would affect substantial areas of land (4000 miles of shoreline along 34 navigable lakes and 31 navigable rivers), the court nonetheless found its action justifiable, in part, on ecological grounds. It characterized California's freshwater marshes as a resource which is "fast disappearing in California; they are of great importance for the ecology, and for recreational needs of the residents of the state." [Id. at 216, 625 P.2d at 242, 172 Cal. Rptr. at 699.](#) The Lyon court reaffirmed the unanimous opinion in Marks, which had concerned privately owned tidelands, that the public's rights are not confined to commerce, navigation, and fishing, but include recreational uses and the right to preserve tidelands and shorelands in their natural state. The court saw no reason why the public's rights in freshwater tidelands should not be as broad as those in saltwater tidelands. [Id. at 230--31, 625 P.2d at 251, 172 Cal. Rptr. at 708.](#)

[FN69]. See, e.g., [Just v. Marinette County, 56 Wis. 2d 7, 201 N.W.2d 761 \(1972\); Orion Corp. v. State, 109 Wash. 2d 621, 641 n.10, 747 P.2d 1062, 1073 n.10 \(1987\).](#)

[FN70]. [484 U.S. 469 \(1988\).](#)

[FN71]. [Id. at 476 n.5](#) (rejecting the dissent's argument that the fundamental purpose of the public trust is to protect commerce).

[FN72]. [Marks v. Whitney, 6 Cal. 3d 251, 257, 491 P.2d 374, 378, 98 Cal. Rptr. 790, 794 \(1971\)](#). The lower court had dismissed Whitney's public trust claim, accepting the plaintiff's argument that a citizen lacks standing to assert the public trust. [Marks v. Whitney, 11 Cal. App. 3d 1089, 90 Cal. Rptr. 220 \(1970\)](#).

[FN73]. [Marks, 6 Cal. 3d at 257, 491 P.2d at 378, 98 Cal. Rptr. at 794](#).

[FN74]. See supra note 61 and accompanying text. Marks was also cited with approval in [City of Berkeley v. County of Alameda, 26 Cal. 3d 515, 521, 606 P.2d 362, 365, 162 Cal. Rptr. 327, 330 \(1980\)](#), see also infra note 89 and accompanying text, and [Just v. Marinette County, 56 Wis. 2d 7, 201 N.W.2d 761 \(1972\)](#), another influential state court decision concerning shorelands.

[FN75]. [Marks, 6 Cal. 3d at 259, 491 P.2d at 380, 98 Cal. Rptr. at 796](#).

[FN76]. [Id. at 257 n.4, 491 P.2d at 378 n.4, 98 Cal. Rptr. at 794 n.4](#), (citing Sax, Effective Judicial Intervention, supra note 1, at 530--31). The Marks opinion certainly seems to reflect the tenor of Sax's article and to embody the notion of "effective judicial intervention" on behalf of natural resources.

[FN77]. [Marks, 6 Cal. 3d at 257 nn.1 & 3, 491 P.2d at 378 nn.1 & 3, 98 Cal. Rptr. at 794 nn.1 & 3](#) (referring to involvement of the California Attorney General and several other amici in litigation concerning Bay area tideland patents). See, e.g., [City of Berkeley, 26 Cal. 3d 515, 606 P.2d 362, 162 Cal. Rptr. 37](#).

[FN78]. [Marks, 6 Cal. 3d at 257, 491 P.2d at 378, 98 Cal. Rptr. at 794](#).

[FN79]. Cal. Gov't Code §§ 66,600--66,661 (West 1983). This law was the forerunner of many state wetlands protection and coastal zone management laws. See infra notes 81-- 84 and accompanying text.

[FN80]. Cal. Gov't Code § 66,603 (West 1983).

[FN81]. The struggle to impose a public decisionmaking process with respect to uses of San Francisco Bay's municipally and privately owned tidelands may be considered an early victory of the American environmental movement, facilitated by the notion of "ecology" then recently introduced to popular thinking. See R. CARSON, SILENT SPRING (1962); E. ODUM, FUNDAMENTALS OF ECOLOGY (1959). While not the first textbook on ecology, Odum's book was the first to link theoretical principles with information from field observations.

The first natural resource to benefit from the lessons of these and other works was the salt marsh. See J. TEAL & M. TEAL, LIFE AND DEATH OF THE SALT MARSH (1969). DDT spraying on the salt marshes of Long Island and elsewhere along the eastern seaboard to control mosquitoes had caused the pesticide to enter the food web. It spread to wildlife, particularly birds such as the bald eagle and the osprey, bringing some species to the brink of extinction. Wildlife were vulnerable because of their ecological interrelationships with the salt marsh. The interdependence of these relationships was one of the principal new ideas brought to public attention by the ecology movement. See S. UDALL, THE QUIET CRISIS AND THE NEXT GENERATION 200, 203 (1989) ("Making Silent Spring a book about the spacious concepts of ecology was a masterstroke . . . shift[ing] the debate over pesticides into a context where ecological, not economic, values would predominate.").

[FN82]. One account of the Bay story credits Catherine Kerr, a Berkeley resident and the wife of the president of the University of California. Kerr organized the citizens' group whose efforts led to passage of the McAteer-Petris Act. She was moved to act after reading about the Army Corps of Engineers 1959 report to the Commerce Department on San Francisco Bay. The report found over 325 square miles of "reclaimable" tidelands around the Bay and stated that by 1990 most of the remaining marshland would be reclaimed. Extrapolations from the Corps report suggested that at then-present filling rates, in 100 years the Bay's waters would be reduced to a channel. Kerr was also disturbed by the city of Berkeley's 1960 waterfront master plan that would double the city's size by filling in its tidelands. R. ODELL, *THE SAVING OF SAN FRANCISCO BAY* 10--12 (1972).

[FN83]. Cal. Gov't Code § 66,600 (West 1983) (emphasis added).

[FN84]. Further language in the Act reveals the influence of additional ecological principles:

The Legislature further finds and declares that uncoordinated, haphazard filling in San Francisco Bay threatens the bay itself and is therefore inimical to the welfare of both present and future residents of the area surrounding the bay . . . further piecemeal filling of the bay may . . . destroy the irreplaceable feeding and breeding grounds of fish and wildlife in the bay, may adversely affect the quality of bay waters and even the quality of air in the bay area, and would therefore be harmful to the needs of the present and future population of the bay region.

Cal. Gov't Code § 66,601 (West 1983).

[FN85]. Marks filed his quiet title action in mid-1967. The McAteer-Petris Act had been enacted a year and a half earlier, after a special Joint Committee of Tidelands submitted a comprehensive, four-volume report entitled "California's Tidelands Trust." For a description of these early efforts, see Comment, *San Francisco Bay: Regional Regulation for Its Protection and Development*, 55 CAL. L. REV. 728 (1967).

[FN86]. See, e.g., [State v. Superior Court \(Lyon\)](#), 29 Cal. 3d 210, 625 P.2d 239, 172 Cal. Rptr. 696, cert. denied, 454 U.S. 865 (1981); [State v. Superior Court \(Fogarty\)](#), 29 Cal. 3d 240, 625 P.2d 256, 172 Cal. Rptr. 713, cert. denied, 454 U.S. 1094 (1981). For an analysis of the Lyon and Fogarty cases, see Comment, *The Public Trust Doctrine Expansion and Integration: A Proposed Balancing Test*, 23 SANTA CLARA L. REV. 211 (1983).

[FN87]. [Fogarty](#), 29 Cal. 3d at 245, 625 P.2d at 259, 172 Cal. Rptr. at 716 (stating that public trust properties are "ideally suited for scientific study, since they provide a gene pool for the preservation of biological diversity"). Id.

[FN88]. Id. (quoting Nash, *Who Loves a Swamp?*, in *STRATEGIES FOR PROTECTION AND MANAGEMENT OF FLOODPLAIN WETLANDS: A SYMPOSIUM* (U.S. Dep't of Agriculture Forest Service, GTR-WO-12, Dec. 11--13, 1978)).

[FN89]. [26 Cal. 3d 515, 606 P.2d 362, 162 Cal. Rptr. 327 \(1980\)](#).

[FN90]. Sax, *Effective Judicial Intervention*, *supra* note 1.

[FN91]. See Blumm, *supra* note 6, at 574 n.1.

[FN92]. Sax, *Effective Judicial Intervention*, *supra* note 1, at 490 (stating that "the Court articulated a principle that has become the central substantive thought in public trust litigation"); see [Illinois Cent. R.R. Co. v. Illinois](#), 146 U.S. 387 (1892).

[FN93]. [Illinois Central](#), 146 U.S. at 457--60.

[FN94]. See W. RODGERS, *supra* note 4, at 64 (noting that public trust doctrine has been used to "both defy and combat the tragedy of the commons," supporting both widespread access to trust assets and an obligation to maintain them).

[FN95]. Sax, *Effective Judicial Intervention*, *supra* note 1, at 474.

[FN96]. *Id.*

[FN97]. *Id.* at 495.

[FN98]. *Id.* at 498.

[FN99]. *Id.* at 531.

[FN100]. *Id.* at 484. Sax offers the great ponds of New England as an example.

[FN101]. *Id.* at 485.

[FN102]. Moreover, Sax suggests several specific applications illustrating the kind of diffuse public interests that warrant public trust protection: air pollution, pesticide spraying, utility rights-of-way, strip mining, and wetlands filling, as well as issues affecting the poor and consumer groups. *Id.* at 556--57.

[FN103]. *Id.* at 524.

[FN104]. *Id.* at 575.

[FN105]. *Id.*

[FN106]. *Id.* at 560--61.

[FN107]. Membership of the BCDC includes commercial and industrial shoreside property owners, local governments, and citizen representatives. See Cal. Gov't Code § 66,201 (West 1983).

[FN108]. Sax, *Effective Judicial Intervention*, *supra* note 1, at 564.

[FN109]. Sax, *Liberating the Public Trust Doctrine*, *supra* note 6.

[FN110]. *Id.* at 188.

[FN111]. *Id.* at 192--93.

[FN112]. *Id.* at 188. Sax cites the medieval customary law of common use of uncultivated areas--derived from the 11th-century regional French law--and responses to lords who curtailed common rights, usually agrarian revolt. *Id.* at 189--91.

[FN113]. *Id.* at 188.

[FN114]. *Id.* at 192.

[FN115]. Sax believes destabilizing acts of Los Angeles were critical issues in the Mono Lake litigation. *Id.* at 192 n.22.

[FN116]. Sax is not particularly explicit about cases in which people hold particular resource expectations that it would be destabilizing to alter.

[FN117]. See Dunning, *supra* note 49, at 522 (arguing that a key attribute of public trust resources, in addition to their scarcity, is a "natural suitability for common use" by the general population).

[FN118]. Sax, *Effective Judicial Intervention*, *supra* note 1, at 565 (citing [State v. Public Serv. Comm'n, 275 Wis. 112, 81 N.W.2d 71 \(1957\)](#), where the court identified several factors indicating whether the decision to alter Lake Madison to create parkland would promote a larger public purpose than would the decision to retain the lake's natural condition).

[FN119]. See Huffman, *Trusting the Public Interest to Judges: A Comment on the Public Trust Writings of Professors Sax, Wilkinson, Dunning and Johnson*, 63 DENVER U. L. REV. 565, 569 (1986) [hereinafter Huffman, *Trusting the Public Interest*]; Huffman, *Myth of Public Rights*, *supra* note 8, at 189--96, 211--12; Huffman, *Fish Out of Water*, *supra* note 9, at 571.

[FN120]. In some of Sax's other work, he admits to favoring the idea of a "secular prophet" who can call to others to eschew passive, high-technology forms of recreation and to go into the wilderness to gain the benefits of contemplation and self-actualization. Sax, *Freedom: Voices from the Wilderness*, 7 ENVTL. L. 565 (1977) (an invited response to an article by Professor Huffman). See also J. SAX, *MOUNTAINS WITHOUT HANDRAILS* (1980).

[FN121]. Huffman, *Trusting the Public Interest*, *supra* note 119, at 575.

[FN122]. *Id.* at 570--71.

[FN123]. *Id.* at 571.

[FN124]. *Id.* at 572.

[FN125]. *Id.* at 574. He finds nothing in common between the decisions to which Sax refers and those forming the basis for a representation-reinforcing theory of judicial review developed in J. ELY, *DEMOCRACY AND DISTRUST* (1980). *Id.* at 572. Ely's theory seeks protection of the "discrete and insular minority" and is therefore consistent with democratic principles; in Sax's theory, the so-called democratic failure is merely a failure of the silent majority to become involved. *Id.* at 572 n.56.

[FN126]. *Id.* at 573.

[FN127]. *Id.* at 575.

[FN128]. See, e.g., Posner, *The Ethical and Political Basis of the Efficiency Norm in Common Law Adjudication*, 8 HOFSTRA L. REV. 487 (1980).

[FN129]. Huffman, *Trusting the Public Interest*, *supra* note 119, at 575.

[FN130]. Huffman develops this theme in *Public Trusts: Gaining Access to the Courts*, 8 ENVTL. L. 217, 230--31 (1977) (reviewing R. APPELATE, *PUBLIC TRUSTS: A NEW APPROACH TO ENVIRONMENTAL PROTECTION* (1976)).

[FN131]. Huffman, *Trusting the Public Interest*, *supra* note 119, at 575.

[\[FN132\]](#). Id. at 576.

[\[FN133\]](#). Id.

[\[FN134\]](#). Id.

[\[FN135\]](#). Id. at 570.

[\[FN136\]](#). Id. at 575.

[\[FN137\]](#). Id.

[\[FN138\]](#). Id. at 578.

[\[FN139\]](#). Ecology is the study of relationships of living organisms to their physical and biological environment. J. CLARK, COASTAL ECOSYSTEMS: ECOLOGICAL CONSIDERATIONS FOR MANAGEMENT OF THE COASTAL ZONE 1 (1974).

[\[FN140\]](#). The fact that ecology focuses on the interactions of numerous physical and biological factors complicates its application in environmental impact assessments. Carpenter, *The Scientific Basis of NEPA--Is It Adequate?*, 6 *Envtl. L. Rep. (Envtl. L. Inst.)* 50,014, 50,017 (March 1976), quoted in F. ANDERSON, D. MANDELKER & A. TARLOCK, ENVIRONMENTAL PROTECTION: LAW AND POLICY 785 (2d ed. 1990).

[\[FN141\]](#). The ideas in this section are drawn primarily from NATIONAL RESEARCH COUNCIL, COMMITTEE ON THE APPLICATIONS OF ECOLOGICAL THEORY TO ENVIRONMENTAL PROBLEMS, ECOLOGICAL KNOWLEDGE AND ENVIRONMENTAL PROBLEM-SOLVING: CONCEPTS AND CASE STUDIESSSSS (1986) [hereinafter NRC, KNOWLEDGE].

[\[FN142\]](#). McCurdy, *supra* note 22, at 697. These values have only recently been appreciated. Wetlands used to be called swamps and were considered suitable only as refuse heaps or development sites.

[\[FN143\]](#). Id. These benefits are among those commonly cited for wetlands, but they are not uncontested. See, e.g., Sagoff, *supra* note 18; Shabman & Batie, *Estimating the Economic Value of Coastal Wetlands: Conceptual Issues and Research Needs*, in ESTUARINE PERSPECTIVES 9-11 (V.S. Kennedy ed. 1980).

[\[FN144\]](#). See J. TEAL & M. TEAL, *supra* note 81.

[\[FN145\]](#). See CHESAPEAKE BAY PROGRAM, U.S. ENVIRONMENTAL PROTECTION AGENCY, CHESAPEAKE BAY: A PROFILE OF ENVIRONMENTAL CHANGE (1983), cited in NRC, KNOWLEDGE, *supra* note 141.

[\[FN146\]](#). A related difficulty centers around measurement errors, often significant ones, encountered in making and recording observations. In combination with natural variability, estimation difficulties make the detection of ecological effects expensive and very difficult. See NRC, KNOWLEDGE, *supra* note 141, at 90.

[\[FN147\]](#). NRC, KNOWLEDGE, *supra* note 141, at 94; see also Rieser, [Managing the Cumulative Effects of Coastal Land Development: Can Maine Law Meet the Challenge?](#), 39 *ME. L. REV.* 321 (1987).

[\[FN148\]](#). See, e.g., B. ACKERMAN, S. ROSE-ACKERMAN, J. SAWYER & D. HENDERSON, THE UNCERTAIN

SEARCH FOR ENVIRONMENTAL QUALITY (1974) (describing the complex scientific and legal tasks of the Delaware River Basin Commission).

[FN149]. See Hanemann, Economics and the Preservation of Biodiversity, in BIODIVERSITY 193 (E.O. Wilson ed. 1988); Krutilla, Conservation Reconsidered, 57 AM. ECON. REV. 777 (1967).

[FN150]. Hardin, The Tragedy of the Commons, 162 SCIENCE 1243 (1968), reprinted in ECONOMIC FOUNDATIONS OF PROPERTY LAW 2 (B. Ackerman ed. 1975). Contra Cox, No Tragedy on the Commons, 7 ENVTL. ETHICS 49 (1985) (customary practices prevented overuse and waste of manorial commons).

[FN151]. See Field, The Economics of Common Property: A Review of Two Recent Books, 30 NAT. RESOURCES J. 239 (1990).

[FN152]. Runge, An Economist's Critique of Privatization, in PUBLIC LANDS AND THE U.S. ECONOMY: BALANCING CONSERVATION AND DEVELOPMENT (G. Johnston & P. Emerson eds. 1984).

[FN153]. See supra notes 111-112 and accompanying text.

[FN154]. Butler, supra note 3, at 358-59; S. EDWARDS, AN INTRODUCTION TO COASTAL ZONE ECONOMICS 30 (1987).

[FN155]. Baden & Lueck, supra note 36, at 53. National defense and scenic vistas are common examples of public goods.

[FN156]. Butler, supra note 3, at 358.

[FN157]. Krutilla, supra note 149, at 784; cf. Baden & Lueck, supra note 36, at 53-54.

[FN158]. Krutilla, supra note 149, at 780-81. See infra notes 161-170 and accompanying text.

[FN159]. Krutilla, supra note 149, at 782.

[FN160]. Hanemann, supra note 149, at 194. Krutilla, supra note 149, at 779- 80, notes that a private owner of an ecosystem, facing a choice between the use alternatives that would conserve a natural condition, such as recreation or scientific research, and extractive activities such as logging and mining, would choose the activity that promises to return the highest discounted net income stream. However, this allocation may not be most efficient. The owner would not be able to appropriate in gate receipts the entire social value of the non-consumptive activity. Among other things, the owner can appropriate neither the option-value, that is, people's willingness to pay for retaining the option to use or enjoy the area, nor the existence-value, what people are willing to pay just to know that the resource exists. See infra notes 201-204 and accompanying text.

[FN161]. Hanemann, supra note 149, at 194.

[FN162]. Kahn, The Tyranny of Small Decisions: Market Failures, Imperfections, and the Limits of Economics, 19 KYKLOS 23, 28 (1966).

[FN163]. This raises the familiar takings issue, one of the major objections levied against the public trust doctrine and related principles. See Huffman, Myth of Public Rights, supra note 8. But see Hunter, supra note 1, at 338 (citing B. ACKERMAN, PROPERTY AND THE CONSTITUTION (1977), who states that wetlands are the best example of the general problem in

takings law). The most rational choice for the owner of a marsh presumably is to alter its natural character by draining or filling, thereby putting the land to uses that will be reflected in its market value.

[FN164]. S. EDWARDS, *supra* note 154, at 30-31.

[FN165]. Hanemann, *supra* note 149, at 194 ("The preferences people exhibit when acting publicly or collectively may differ from those reflected in their private market decisions.").

[FN166]. Kahn, *supra* note 162.

[FN167]. *Id.* at 24.

[FN168]. *Id.*

[FN169]. *Id.*

[FN170]. Odum, Environmental Degradation and the Tyranny of Small Decisions, 32 BIOSCIENCE 728 (1982).

[FN171]. *Id.* at 728.

[FN172]. *Id.*

[FN173]. Odum suggests that regional resources, like the Florida Everglades, are particularly vulnerable to destruction through piecemeal activities. In Florida the construction of numerous roadways, drainage canals, housing developments, and municipal water supplies, combined to destroy the Everglades. Almost all endangered species, because they are necessarily regional or transregional, owe their precarious condition to the tyranny of small decisions, as do the polluted watersheds and airsheds across the country. *Id.*

[FN174]. Because specialization tends to promote efficiency, when regions or countries participate in a non-local market, they may sacrifice an ecosystem in order to produce one product with market value outside of their boundaries. Norgaard, The Rise of the Global Exchange Economy and the Loss of Biological Diversity, in BIODIVERSITY 206 (E.O. Wilson ed. 1988). This raises the question of how "large" a decision framework is required to prevent the loss of unique and globally interrelated ecosystems.

[FN175]. See generally M. DOUGLAS & A. WILDAVSKY, RISK AND CULTURE (1982).

[FN176]. JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES (D. Kahneman, P. Slovic & A. Tversky, eds. 1982).

[FN177]. See Tversky & Kahneman, Rational Choices and the Framing of Decisions, 59 J. BUS. STRATEGY 251 (1986); Ellickson, Bringing Culture and Human Frailty to Rational Actors: A Critique of Classical Law-and-Economics, 65 CHI.-KENT L. REV. 23 (1989).

[FN178]. Hanemann, *supra* note 149, at 195.

[FN179]. Baden & Lueck, *supra* note 36, at 37.

[FN180]. *Id.* at 42.

[FN181]. These incentives, replacing profit, include workplace amenities, discretionary power, minimal tension, and budgetary increases. *Id.* at 37. Bureaucracies may also respond to political hysteria, such as the recent energy crises. *Id.*

[FN182]. See generally Wilkinson, *The Public Trust Doctrine in Public Land Law*, 14 U.C. DAVIS L. REV. 269 (1980) (arguing that the public trust doctrine applies to federal land management practices).

[FN183]. See National Environmental Policy Act of 1969, [42 U.S.C. §§ 4321-4335 \(1988\)](#).

[FN184]. Anderson, *Natural Resource Damages, Superfund, and the Courts*, 16 B.C. ENVTL. AFF. L. REV. 405, 405-06 (1989) (stating that CERCLA's trustee provisions put public natural resources on a par with private property by creating liability for their injury).

[FN185]. *Id.*; see Yang, *Valuing Natural Resource Damages: Economics for CERCLA Lawyers*, 14 Envtl. L. Rep. (Envtl. L. Inst.) 10,311 (August 1984).

[FN186]. CERCLA § 107(a)(4)(C), (f)(1), [42 U.S.C. § 9607\(a\)\(4\)\(C\), \(f\)\(1\) \(1988\)](#); Clean Water Act § 311(f)(4), (5), [33 U.S.C. § 1321\(f\)\(4\), \(5\) \(1988\)](#) (federal and state officials "shall act on behalf of the public as trustees . . . to recover" natural resource damages). The provisions are mandated by statutory citizen suit provisions, as well as under administrative and mandamus law principles. See Olson, *Natural Resource Damages in the Wake of the Ohio and Colorado Decisions: Where Do We Go from Here?*, 19 Envtl. L. Rep. (Envtl. L. Inst.) 10,551, 10,552-53 (December 1989).

[FN187]. CERCLA § 301(c)(1), [42 U.S.C. § 9651\(c\)\(1\) \(1988\)](#); Clean Water Act § 311, [33 U.S.C. § 1321 \(1988\)](#). If the trustees follow procedures in the guidelines, CERCLA creates a rebuttable presumption that the assessment is valid. CERCLA § 107(f)(2)(C), [42 U.S.C. § 9607\(f\)\(2\)\(C\) \(1988\)](#).

[FN188]. [Ohio v. United States Dep't of Interior](#), 880 F.2d 432 (D.C. Cir. 1989); [Colorado v. United States Dep't of Interior](#), 880 F.2d 481 (D.C. Cir. 1989).

[FN189]. [Ohio v. United States Dep't of Interior](#), 880 F.2d 432 (D.C. Cir. 1989); [Colorado v. United States Dep't of Interior](#), 880 F.2d 481 (D.C. Cir. 1989).

[FN190]. If a competitive market did not exist for a particular damaged resource, the regulations allowed the substitution of an appraisal value. [Ohio v. United States Dep't of Interior](#), 880 F.2d at 462.

[FN191]. *Id.* at 441.

[FN192]. *Id.* at 463. The court noted unanimous agreement among commentators in predicting that the "lesser of" rule will always favor the use value standard. *Id.* at 446 n.13 (citing, inter alia, Cross, [Natural Resource Damage Valuation](#), 42 VAND. L. REV. 269, 307 (1989) ("Only about five percent of some resources, such as plants and animals, possess an established economic value.")). The use value standard would value a fur seal whose habitat had been destroyed by a hazardous substance spill at approximately \$15, the market value of the animal's pelt. [Ohio v. United States Dep't of Interior](#), 880 F.2d at 442 n.4 (citing [52 Fed. Reg. 9092 \(1987\)](#) (Dep't of Interior regulations)).

[FN193]. Congress had also expressly rejected Interior's underlying premises that: (1) the common-law measure of damages is appropriate for natural resource injuries; and (2) it is economically inefficient to restore a resource whose use value is less than the cost of restoration. [Ohio v. United States Dep't of Interior](#), 880 F.2d at 455.

[FN194]. *Id.* The court pointed out that even the common law recognizes that in some circumstances restoration is the proper remedy for property damage where other measures will fail to compensate fully for the injury, such as where the property is used for residence or recreation. [Id. at 455 n.37.](#)

[FN195]. See [51 Fed. Reg. 27,674, 27,704 \(1986\)](#) (Interior's final natural resources damage assessment regulations).

[FN196]. [Ohio v. United States Dep't of Interior, 880 F.2d at 456-57](#) (emphasis in the original). The court noted that this skepticism is shared by many scholars, citing Anderson, *supra* note 184, at 443, 451, Cross, *supra* note 192, at 307-25, and Breen, CERCLA's Natural Resource Damage Assessment Provisions: What Do We Know So Far?, 14 Envtl. L. Rep. (Envtl. L. Inst.) 10,304, 10,307 (August 1984). It quoted at length an explanation, Cross, *supra* note 192, at 331-32, of how the use of restoration costs as a presumptive measure of damages does not repudiate the goal of economic efficiency. Restoration cost is a cost-based, supply-side measure rather than a demand-side, value-based measure of natural resource value. Recognizing that natural resource economics has not yet developed an adequate demand-side measure, economists use restoration costs to acknowledge this deficiency and as a cautious, preservationist approach. [Ohio v. United States Dep't of Interior, 880 F.2d at 457 n.40.](#)

Interior's proposed rules had included a class of "special resources" to which the "lesser of" rule would not apply, allowing recovery of restoration costs as long as they were not "grossly disproportionate to the benefits gained." Special resources were those committed to specific uses by law, such as parks, wilderness areas, and wildlife refuges. The final rules, however, eliminated this exception and made all natural resources subject to the "lesser of" rule. [Id. at 457 n.42.](#)

[FN197]. [Ohio v. United States Dep't of Interior, 880 F.2d at 463.](#)

[FN198]. [Id. at 464.](#) The court remanded the rule for Interior to prepare a rule allowing trustees to sum up "all reliably calculated use values, however measured, so long as the trustee does not double count." *Id.*

[FN199]. *Id.* (citing Cross, *supra* note 192, at 285-89).

[FN200]. Cross, *supra* note 192, at 285-92.

[FN201]. *Id.*

[FN202]. *Id.* at 289 n.93.

[FN203]. *Id.* at 290 (citing Callicott, Non Anthropocentric Value Theory and Environmental Ethics, 21 AM. PHIL. Q. 299, 299 (1984)); see also Cross, *supra* note 192, at 292-96 (discussing intrinsic value).

[FN204]. Cross, *supra* note 192, at 291.

[FN205]. See Olson, *supra* note 186, at 10,555.

[FN206]. *Id.* A consortium of industries had challenged this methodology. [Ohio v. United States Dep't of Interior, 880 F.2d at 475-76.](#) The companies claimed that the contingent valuation method was inconsistent with common law principles for damage assessment and was not the "best available procedure." They argued that the method tended to overestimate the value of a natural resource, citing a study estimating the option and existence values to Texans of the whooping crane population, which spends the winter in the Arkansas National Wildlife Refuge. The study multiplied Texas's population (13.9 million) by the amount that survey respondents reported they would be willing to pay to visit the refuge (\$7.13). This led to a total value of \$109 million, or \$1.58 billion, had the total U.S. population been used. [Id. at 477 n.86](#) (citing Industry Petitioners' Brief at

14 n.24 which referred to J. STOLL & L. JOHNSON, CONCEPTS OF VALUE, NONMARKET VALUATION, AND THE CASE OF THE WHOOPING CRANE 23-24 (Natural Resources Working Paper Series, National Resource Workgroup, Dep't of Agric. Economics, Texas A & M Univ. (1984)). The court rejected these claims, accepting Interior's determination that the method was valid. [Ohio v. United States Dep't of Interior, 880 F.2d at 478.](#)

[\[FN207\]](#). See Cross, supra note 192, at 315-20.

[\[FN208\]](#). The plaintiffs had challenged Interior's comments accompanying the final regulations which suggested that recovery for injury to publicly managed private property would be prohibited. See [51 Fed. Reg. 27,674, 27,696 \(1986\)](#). In rejecting this suggestion, the court chose a particularly interesting illustration, referring to instances cited in [Phillips Petroleum Co. v. Mississippi, 484 U.S. 469, 483 n.12 \(1988\)](#), where a state law required owners of tideland property to permit public access. [880 F.2d at 461.](#)

[\[FN209\]](#). In rejecting Interior's rigid hierarchy of methods for determining "use values" the court found Interior's emphasis on market value unreasonable:

While it is not irrational to look at market price as one factor in determining the use value of a resource, it is unreasonable to view market price as the exclusive factor, or even the predominant one. From the bald eagle to the blue whale and snail darter, natural resources have values that are not fully captured by the market system.

[880 F.2d at 462-63](#) (citation omitted).

[\[FN210\]](#). See supra notes 81-86 and accompanying text.

[\[FN211\]](#). See supra notes 198-209 and accompanying text.

[\[FN212\]](#). See supra notes 34-55 and accompanying text.

[\[FN213\]](#). See, e.g., Blumm, supra note 6, at 589-94 (describing the public trust doctrine's function as a common law equivalent of administrative law's "hard look" doctrine); Hunter, supra note 1, at 376-82 (describing changes in takings jurisprudence that would consider the ecological role of land).

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