AQUACULTURE AND THE PUBLIC TRUST DOCTRINE: ACCOMMODATING COMPETING USES OF COASTAL WATERS IN NEW ENGLAND

INTRODUCTION

As society becomes increasingly complicated, it will become more critical to balance the values and traditions of yesterday with the needs and technological capabilities of today. The public trust doctrine offers a necessary framework for striking a critical balance among competing demands for natural resources in the nation's coastal waters.

The public trust doctrine is a set of legal principles that gives states control of the navigable waters[1] within their boundaries and requires that they act as stewards of the resources in these waters.[2] The doctrine imposes an affirmative duty on states to manage their navigable waterways and to protect the public's "deeply inherent right" to use them for fishing, navigation, commerce, and recreation.[3] Although states have extensive leeway to administer the public trust[4] and can lease out portions of public waters for private activity, it is the state's responsibility to see that private uses do not unreasonably interfere with the public's right to occupy the area for recognized trust activities.[5] States must "safeguard and enhance public interests in those lands and . . . manage those lands for the benefit of the public" and, therefore, cannot allow private activities in navigable waterways that unduly infringe on other uses of the public resource.[6]

Salt water aquaculture, or mariculture, is the cultivation of aquatic animals and plants in the ocean.[7] It is an activity that has been recognized

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1. Navigable waters are those waters that are "influenced by the ebb and flow of the tide," and not merely waters that are navigable in fact. Phillips Petroleum v. Mississippi, 484 U.S. 469, 480-81 (1988). The public trust doctrine covers the entire body of water, even if only a portion is considered navigable. DAVID L. SLADE ET AL., PUTTING THE PUBLIC TRUST DOCTRINE TO WORK: THE APPLICATION OF THE PUBLIC TRUST DOCTRINE TO THE MANAGEMENT OF LANDS, WATERS AND LIVING RESOURCES OF THE COASTAL STATES 29 (1990). The definition of navigable waters continues to change over time. *Id.* at 15. Both freshwater and saltwater are protected under the public trust doctrine. *Id.* at 28.

2. *See* SLADE, *supra* note 1, at 3-4.

3. Borough of Neptune City v. Borough of Avon-By-The-Sea, 294 A.2d 47, 52-53 (N.J. 1972). Such uses are considered traditionally recognized uses. Marks v. Whitney, 491 P.2d 374, 380 (Cal. 1971).

4. SLADE, *supra* note 1, at 129.

5. Illinois Cent. R.R. v. Illinois, 146 U.S. 387, 453 (1892).

6. MARINE LAW INSTITUTE, IMPROVING THE LEGAL FRAMEWORK FOR MARINE AQUACULTURE: THE ROLE OF WATER QUALITY LAWS AND THE PUBLIC TRUST DOCTRINE 8 (1992) [hereinafter IMPROVING THE LEGAL FRAMEWORK].

7. ILLINOIS-INDIANA SEA GRANT PROGRAM, A BASIC OVERVIEW OF AQUACULTURE 2 (1990). Aquaculture is the general practice of cultivating plants or animals in water, which includes ponds, lakes, tidelands, oceans, as well as man-made, on-land facilities. MASSACHUSETTS COASTAL ZONE

and preserved under the public trust doctrine.[8] Open access to living resources within navigable waterways, such as wild fish and shellfish, has traditionally been protected by the public trust doctrine so that the public may harvest fish in these waters.[9] Thus, a more expansive application of the public trust doctrine would also protect the right to propagate fish because it is an activity that involves the harvesting of fish and can result in the production of more fish for the navigable waters.[10] Although the practice of growing fish in the sea has been utilized for hundreds of years in this country, the industry has only recently begun to expand.[11] The U.S. Department of Agriculture predicts that "the 1990s is expected to be a decade of tremendous growth for the domestic aquaculture industry."[12] Because consumption of seafood is increasing, world-wide population is growing, and commercial stocks are declining, aquaculture is now viewed as a potential way to meet the resulting needs.[13] Aquaculture has gained particular importance in New England where the continuing decline of wild fish populations has resulted in a sharp decrease in employment opportunities which damaged the region's economy.[14] The New England states are hopeful that aquaculture can help communities, as well as displaced fishermen, by providing new opportunities to continue working in the fishing industry.[15] There are definite expectations that aquaculture will grow quickly in this region.[16]

Although aquaculture has been recognized as a protected activity under the public trust doctrine, anticipated growth of the industry could create significant conflicts with other protected uses of the ocean and tidal waters, such as commercial fishing, navigation, and recreational boating

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MGMT., MASSACHUSETTS AQUACULTURE WHITE PAPER AND STRATEGIC PLAN 4 (1995) [hereinafter AQUACULTURE STRATEGIC PLAN]. Aquaculture that takes place in the ocean is termed mariculture, or marine aquaculture. *Id.* This Note will use aquaculture to refer to the specific activity of growing plants and animals in the ocean.

8. SLADE, *supra* note 1, at 252.

9. *See infra* note 86 and accompanying text.

10. *See infra* note 202.

11. JOINT SUBCOMMITTEE ON AQUACULTURE, AQUACULTURE IN THE UNITED STATES: STATUS, OPPORTUNITIES, AND RECOMMENDATIONS 1 (June 1993) [hereinafter JSA ON AQUACULTURE]; *see also infra* notes 140-41.

12. Tim Eichenberg & Barbara Vestal, *Improving the Legal Framework for Marine Aquaculture: The Role of Water Quality Laws and the Public Trust Doctrine*, 2 TERR. SEA J. 339, 339 (1992).

13. *See infra* notes 144-49 and accompanying text.

14. *See infra* note 150.

15. *See infra* notes 151-52.

16. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, AQUACULTURE IN THE NORTHEAST REGION OF THE NATIONAL MARINE FISHERIES SERVICE, U.S. DEPT. OF COMMERCE vii (1992) [hereinafter AQUACULTURE IN THE NORTHEAST REGION].

and swimming.[17] This is because many aquaculture activities require exclusive use of leased-out portions of the ocean and are best suited to areas relatively close to shore where aquaculturists have easy access to the operations.[18] The potential clash between these operations and traditional commercial fishing is but one example of the significant conflicts that could arise if industry growth is not planned carefully.[19] Other conflicts could also arise because the public enjoys recreational activities in these areas and appreciates the aesthetic beauty of uncluttered coastlines.[20]

The public trust doctrine requires states to protect the public's right to use the navigable waters and thus to balance interests to ensure that one activity does not severely infringe on other uses. This Note examines how the public trust doctrine would apply to the leasing of large areas of navigable waters for aquaculture. Part I describes the historical development of the public trust doctrine, the public uses and interests that are protected by the doctrine, and how the courts have applied the doctrine to protect navigable waters. Part II introduces the aquaculture industry and methods used to grow seafood, and explains why it is likely that the industry will continue to expand and thus occupy extensive portions of navigable waters. In Part III, this Note explains how the expansion of the aquaculture industry might create significant conflicts with other activities in the coastal waters due to the size of the operations and the nature of the methods used, which exclude traditionally protected uses of navigable waters. Part IV analyzes recent case law regarding the public trust doctrine and concludes that states have a duty under the doctrine to resolve these conflicts, preserve traditionally protected uses, and protect the natural resource. Part V proposes that there are two ways in which a state can expand aquaculture within its borders without abdicating its public trust responsibilities. First, states can codify the principles of the public trust doctrine by incorporating them into their coastal zone management plans, or by requiring an environmental impact assessment in order to ensure that decision-makers properly balance the conflicting interests and carefully examine the consequences of proposed uses on the public interest and resource. Second, states can establish compensation schemes that would require aquaculturists to pay a percentage of profits to the state in exchange for the exclusive right to occupy portions of public waters at the public's expense.

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17. *See infra* Part III.

18. *See infra* Part II.A and accompanying text.

19. *See infra* Part III.A and accompanying text.

20. *See infra* Parts III.B-C and accompanying text.

I. PUBLIC TRUST DOCTRINE

A. Origins and Early History of the Public Trust Doctrine

The public trust doctrine is a common law set of principles that recognizes the value of tidal and navigable waters as common resources to be used for the good of the public.[21] Although in this country the doctrine originated from widespread use of waterways as "public highways for navigation, commerce, and fisheries,"[22] its roots trace back to ancient Roman law.[23]

As early as the sixth century, water was recognized as a critical resource that should be accessible to everyone:

> Things common to mankind by the law of nature are the air, running water, the sea, and consequently the shores of the sea; no man therefore is prohibited from approaching any part of the seashore, while he abstains from damaging farms, monuments, edifices, etc., which are not in common as the sea is.[24]

The Romans considered the ocean, shores and rivers to be "common to all," and thus incapable of ownership.[25] This ancient concept continues to be the touchstone of the public trust doctrine, evolving and developing over time.[26]

Following the signing of the Magna Carta in 1215,[27] the English Parliament adopted this Roman concept and held that the beds of navigable waterways were to be protected by Parliament for the people.[28] Later, English common law divided this natural resource into two categories of ownership.[29] The first category was the *jus privatum*, or private interest,

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21. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 5.

22. Ralph W. Johnson et al., *The Public Trust Doctrine and Coastal Zone Management in Washington State*, 67 WASH. L. REV. 521, 529 (1992)[hereinafter *The Public Trust Doctrine and Coastal Zone Management in Washington State*].

23. SLADE, *supra* note 1, at 15.

24. J. INST. 2.1.1, *quoted in* Lynda L. Butler, *The Commons Concept: An Historical Concept with Modern Relevance*, 23 WM. & MARY L. REV. 835, 849-50 (1982).

25. SLADE, *supra* note 1, at 15.

26. *Id.* at 4.

27. R. Prescott Jaunich, *The Environment, The Free Market and Property Rights: Post-*Lucas *Privatization of the Public Trust*, 15 PUB. LAND L. REV. 167, 171 (1994).

28. *Id.* at 15.

29. Charles F. Wilkinson, *The Headwaters of the Public Trust: Some of the Traditional Doctrine*, 19 ENVTL. L. 425, 430-31 (1989); SLADE, *supra* note 1, at 15; *see also* Jaunich, *supra* note 27, at 176.

which was based upon the traditional property law concept that land is owned by an individual who has the right to develop upon the land or convey it to another.[30] Because the use of navigable waterways was primarily public, private ownership fell upon the King.[31] The second category was the *jus publicum*, or public interest, which was based upon the natural law concept that navigable waterways are a valuable resource that all people have an interest in using for commerce, fishing, and navigation.[32] Thus, from the *jus publicum* came the duty of the King to use the resource in the best interest of the public.[33] The navigable waterways were therefore held in trust under the King's name for public use because the King's ownership of these lands was subject to the *jus publicum*.[34]

Public trust principles continued to evolve based upon the belief that preserving "communal resources" eliminated the complicated and expensive need to disperse them among individuals.[35] In addition, private ownership of resources needed by everyone is difficult to justify: "private ownership of certain resources of a peculiarly public nature, valued for their importance to society, would be inappropriate."[36]

Many of the public trust principles recognized in English common law were then incorporated into American law where they continued to evolve.[37] American colonists, originally subject to English law, maintained open access of the waterways for fishing and sailing.[38] The availability of navigable waters was so fundamental to the successful growth of the new nation that "it is hard to overstate [its] importance . . . during the formative years of the United States."[39] It was vital that the navigable waterways be accessible to everyone because "[t]he sea and navigable rivers are natural highways, and any obstruction to the common right, or exclusive appropriation of their use, is injurious to commerce, and if permitted . . . would be very likely to end in materially crippling,

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30. SLADE, *supra* note 1, at 7.

31. Shively v. Bowlby, 152 U.S. 1, 11 (1894). A fictitious presumption assumed that lands not belonging to private parties belonged to the King. *See* Jaunich, *supra* note 27, at 176.

32. *Shively*, 152 U.S. at 11-12.

33. SLADE, *supra* note 1, at 7-8.

34. Brusco Towboat Co. v. State Land Bd., 567 P.2d 1037, 1044 (Or. Ct. App. 1977).

35. *See* Jaunich, *supra* note 27, at 172.

36. Mark Cheung, Comment, *Dockominiums: An Expansion of Riparian Rights That Violates the Public Trust Doctrine*, 16 B.C. ENVTL. AFF. L. REV. 821, 830 (1989) (citations omitted).

37. SLADE, *supra* note 1, at 16.

38. Jaunich, *supra* note 27, at 176-77.

39. Wilkinson, *supra* note 29, at 431.

if not destroying, [the sovereign]."[40] Before and after the Revolution, the public depended on unlimited access to the navigable waterways for transportation, trade, and fishing.[41] Waterways provided affordable, natural highways that connected various ports of the new land, thus facilitating communication between towns, immigration to new areas, and expansion of trade.[42] Shores provided easily accessible areas for settlement.[43] Fishing was also an essential activity in the country for both subsistence and commercial sale.[44] The common right to fish the ocean allowed "harvesting of the bounty of the sea by all."[45] The recognition that the waterways were valuable and needed to remain accessible led to the establishment of a public trust doctrine within each state.

The original thirteen colonies retained ownership of the tidal lands, as well as the lands under the navigable waters.[46] After the Revolution, each of the original colonies had independent authority to modify and expand upon the public trust principles as it saw fit because "the people of each state became themselves sovereign; and in that character hold the absolute right to all their navigable waters and the soils under them for their own common use, subject only to the rights since surrendered by the Constitution."[47] Each state interpreted the doctrine's principles differently, based upon its own needs and policies.[48] In *Shively v. Bowlby*, the Supreme Court recognized the lack of uniformity in the public trust doctrine laws of the original states and remarked that:

> [E]ach State has dealt with the lands under the tide waters within its borders according to its own views of justice and policy, reserving its own control over such lands, or granting rights therein to individuals or corporations, whether owners of the adjoining upland or not, as it considered for the best interests of the public.[49]

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40. People v. New York and Staten Island Ferry Co., 68 N.Y. (23 Sickels) 71, 76-77 (1876), *quoted in* Illinois Cent. R.R. v. Illinois, 146 U.S. 387, 458 (1892); *see also* Wilkinson, *supra* note 29, at 432.

41. Wilkinson, *supra* note 29, at 431-32.

42. *Id.* at 437.

43. *Id.* at 432

44. *Id.* at 432-33.

45. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 13.

46. Phillips Petroleum Co. v. Mississippi, 484 U.S. 469, 478 (1988).

47. Martin v. Waddell, 41 U.S. (16 Pet.) 367, 410 (1842).

48. SLADE, *supra* note 1, at 17.

49. *Shively*, 152 U.S. at 26.

Many principles have remained common to every state.[50] For example, today, every state is obligated to preserve and protect the public trust waters for recognized trust uses.[51] Each state also has the authority to determine the boundary lines for waters to be protected under the trust.[52] These general principles form the foundation of the doctrine today that protects resources for public use.[53]

There are now fifty public trust doctrines in this country, all in somewhat different forms, because the doctrine remains a creature of state law.[54] The Supreme Court allows states a great deal of discretion in interpreting the doctrine; thus, although the doctrines are all based upon the same premises, the specific details vary from state to state.[55] For example, one issue that differs from state to state is determining ownership of the intertidal zone, the land between the mean low tide and mean high tide marks, and the activities allowed within it. The ownership of the intertidal zone determines whether it is protected by the public trust doctrine.[56]

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50. SLADE, *supra* note 1, at 17.

51. *Id.*

52. *Id.*

53. *Id.*

54. It is generally accepted that there are fifty public trust doctrines. *See* Ralph W. Johnson, *Oil and the Public Trust Doctrine in Washington*, 14 U. PUGET SOUND L. REV. 671, 676 (1991). Others, however, include an additional federal doctrine which protects federal waters. *See* Wilkinson, *supra* note 29, at 425 n.1 (stating that according to the pivotal public trust doctrine case, *Illinois Central R.R.*, there is one federal public trust doctrine in addition to the fifty state public trust doctrines). Although states have complete sovereignty and ownership of tidelands and navigable waters, the exercise of their duties as trustees is subject to the paramount authority of Congress to regulate commerce and navigation. *See* 43 U.S.C. §1314(a) (1994); *see also Shively*, 152 U.S. at 57; *Illinois Cent. R.R.*, 146 U.S. at 435; Kaisner Aetna v. United States, 444 U.S. 164, 173-74 (1979). Thus, the argument is made that states have broad discretion to administer the trust, but that the doctrine is in fact "a matter of federal mandate." Wilkinson, *supra* note 29, at 464. However, it is still not clear that this authority creates a federal public trust doctrine.

Difficult questions also arise when the federal government owns land on the coast that would traditionally be protected by a state's public trust doctrine. State courts have differed on whether the federal government must act as a trustee under the doctrine in such instances. *Compare* United States v. 1.58 Acres, 523 F. Supp. 120, 124-25 (D. Mass. 1981) (recognizing the existence of federal trustee duties by declaring that the federal government could obtain ownership of waterfront property, but noting that federal government was "as restricted as the Commonwealth" by the duties articulated by the public trust doctrine) *with* United States v. 11.037 Acres, 685 F. Supp. 214, 216-17 (N.D. Cal. 1988) (deciding that submerged land was no longer impressed by a public trust and holding that federal power of eminent domain was paramount to state public trust powers).

55. *The Public Trust Doctrine and Coastal Zone Management in Washington State*, *supra* note 22, at 532; *see also Shively*, 152 U.S. at 26 (stating that "there is no universal and uniform law upon the subject").

56. In most states, private ownership ends at the high mean tide mark, which places the intertidal zone in the state's hands. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 7. However, in some states, such as Maine and Massachusetts, private ownership extends to the mean

Despite these variations in the public trust doctrines among states, there are still broad similarities regarding the boundaries that states have established for waters and submerged land. Generally, under the public trust doctrine, all states protect tidelands, submerged lands, and the aquatic organisms and resources within those lands under the doctrine.[57] Nearly all states own the territorial sea, comprising the waters above the submerged lands from the mean low tide mark to three nautical miles seaward from the coastline.[58] Bays, estuaries, lakes, rivers, the coastline areas, and the ocean for three miles from the shoreline are therefore all subject to the public trust doctrine.[59] If a state wants to lease a portion of navigable waters to a private individual for exclusive use, it is the water within these boundaries that is subject to state control and approval.[60]

At present, the public trust doctrine protects a wide range of resources and bodies of water, although the specific details differ in each state. The recognition that public resources must continue to be preserved also varies from state to state, but the trend indicates a greater effort to utilize the doctrine in a way that protects the navigable waters and resources within them to a greater extent than in the past.

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low tide mark. *See* Bell v. Town of Wells, 557 A.2d 168, 171 (Me. 1989); Pazolt v. Director of Div. of Marine Fisheries, 631 N.E.2d 547, 550 (Mass. 1994). Where the private ownership extends this far, the intertidal zone is usually under an easement to allow public use for fishing, hunting, and navigation. *See Bell*, 557 A.2d at 173; *Pazolt*, 631 N.E.2d at 551. Despite this easement, activities that are not closely related to fishing, hunting, or navigation, such as swimming, can be prohibited in this area due to its private ownership. *See Bell*, 557 A.2d at 173-74. In other words, in states where the land is privately owned to the mean low water mark, the public's trust rights are still protected, but only as to a limited number of activities.

57. SLADE, *supra* note 1, at 13.

58. Richard G. Hildreth, *The Public Trust Doctrine and Coastal and Ocean Resources Management*, 8 J. ENVTL. L. & LITIG. 221, 228-29 (1993).

59. *Id.*

60. Beyond the three mile boundary are federal waters. The area between three and 12 miles offshore is called the territorial sea of the United States and remains under federal control. Proclamation No. 5928, 3 C.F.R. 547 (1989), *reprinted in* 43 U.S.C. § 1331 (1994). Beyond the 12 mile mark are international waters; however, a Presidential Proclamation in 1983 declared a 200-mile exclusive economic zone (EEZ) for the United States, which thus extended the nation's waters an additional 188 miles. Proclamation No. 5030, 3 C.F.R. 22-3 (1984), *reprinted in* 16 U.S.C. § 1453 (1994). The EEZ creates a priority of access to living resources within the area and exclusive access to non-living resources. *Id.* The states are not involved in approval or regulation of aquaculture activities in the territorial sea and EEZ although such activities can occur there if approved by the appropriate federal agencies. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 8. It is unclear whether the federal government, in permitting aquaculture operations in federal waters, is under any public trust doctrine responsibilities. *See supra* note 54.

B. Public Interests Protected By the Public Trust Doctrine

Although the original purpose of the public trust doctrine was to preserve the public's rights in navigation, commerce, and fishing,[61] the doctrine has expanded over the years to protect additional interests.[62] Courts have recognized that the doctrine should be interpreted broadly and given the flexibility to protect activities that were not considered when the doctrine was originally conceived.[63] As the circuit court noted in *Borough of Neptune City v. Borough of Avon-By-The-Sea*, "[t]he public trust doctrine, like all common law principles, should not be considered fixed or static, but should be molded and extended to meet changing conditions and needs of the public it was created to benefit."[64]

States have flexibility in interpreting the public trust doctrine. However, the doctrine also imposes two obligations on states to ensure that the private use of the public resources does not unreasonably interfere with the public's use of the area for traditional purposes such as fishing, navigation and commerce.[65] Thus, states do not have unconditional discretion over how to use and dispose of their public lands. First, states hold title to these public lands in trust for their people and have a responsibility to protect and enhance the resource and to manage it for the benefit of the public.[66] A state's ability to convey leasehold interests in the public lands is limited because "[t]he control of the state for the purposes of the trust can never be lost, except as to such parcels as are used in promoting the interests of the public therein, or can be disposed of without any substantial impairment of the public interest in the lands and waters remaining."[67]

The doctrine places a second important limitation on states in that they cannot convey outright title to trust lands to any private individual or

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61. Borough of Neptune City v. Borough of Avon-By-The-Sea, 294 A.2d 47, 52 (N.J. 1972) (stating that "[t]he original purpose of the doctrine was to preserve the use of all the public natural water resources for navigation and commerce, waterways being the principle transportation arteries of early days, and for fishing, an important source of food").

62. SLADE, *supra* note 1, at 129.

63. National Audubon Soc'y v. Superior Court of Alpine County, 658 P.2d 709, 719 (Cal. 1983), *cert. denied*, 464 U.S. 977 (1983) (noting that the public trust doctrine has "evolved in tandem with the changing public perception of the values and uses of waterways").

64. *Borough of Avon-By-The-Sea*, 294 A.2d at 54.

65. *Id.*

66. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 8.

67. *Illinois Cent. R.R.*, 146 U.S. at 453.

entity.[68] Thus, while title can be conveyed, such conveyance does not give the individual or entity the total bundle of rights that is commonly associated with the transfer of title because the state cannot ignore or abandon its duty to safeguard and maintain the resource. The resource continues to be subject to the trust, which gives the state the authority to intervene, if necessary, on behalf of the public interest.[69] As the trustee of navigable waters "in which the whole people are interested," the state cannot transfer that trust any more than it can "abdicate its police powers in the administration of government and the preservation of the peace."[70] The *jus publicum* and *jus privatum* concepts from English law persist in that states have an inalienable interest in the navigable waterways that must be exercised to maintain and protect these valuable resources.

These restrictions on states' powers over trust resources still allow for extensive use and development of navigable waters. For example, courts have approved the construction of wharves, piers, harbors and docks as uses consistent with the public trust doctrine because these structures benefited the public or enhanced accessibility and use of the area.[71] In such instances, courts concluded that the public benefited from this development, recognizing that "in this latter half of the twentieth century, the public rights in tidal lands are not limited to the ancient prerogatives of navigation and fishing, but extend as well to recreational uses, including bathing, swimming, and other shore activities."[72] As interests and activities in these trust areas expand, so do the number of activities that

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68. Brusco Towboat Co. v. State Land Bd., 567 P.2d 1037, 1044 (Or. Ct. App. 1977); *see also* People *ex rel.* Attorney General v. Kirk, 45 N.E. 830, 833 (Ill. 1896) (holding that "the state . . . does not hold such title subject to barter and sale, as does the United States its public lands; but the state holds the title in trust, in its sovereign capacity for the people of the entire state, for the purposes of navigation and fishing. The governmental powers of the state over these lands cannot be relinquished or given away. The trust imposed upon the state must be kept and faithfully observed.").

69. *Brusco Towboat Co.*, 567 P.2d at 1044 (noting that if the state's title is conveyed to another party, "such title, even in the hands of a private party, remains subject to the paramount power of the state to intervene on behalf of the public interest"). The public trust doctrine provides states with a powerful tool, apart from its police powers, to manage these coastal resources. *Illinois Cent. R.R.*, 146 U.S. at 455 (stating that "[a]ny grant of the kind is necessarily revocable, and the exercise of the trust by which the property was held by the state can be resumed at any time"). Under the doctrine, states have the authority to render a conveyance or place heavy restrictions on activities in the area, with no need to compensate the landowner. Courts have recognized that such actions do not constitute takings because the restrictions place no greater burden on the public land than that which is already imposed on the land by the public trust doctrine. *See, e.g., National Audubon Soc'y*, 658 P.2d at 727-28 (state water board's vested rights to reallocate water did not bar the court from forcing the state to consider alternatives based upon the public trust doctrine).

70. *Illinois Cent. R.R.*, 146 U.S. at 453.

71. *Id.* at 452; *see also Borough of Avon-By-The-Sea*, 294 A.2d at 53.

72. *Borough of Avon-By-The-Sea*, 294 A.2d at 54.

courts are willing to recognize and protect by application of the public trust doctrine.[73]

In addition to preserving fishing, swimming, and other recreational uses of the resource, states apply the doctrine to protect the ecology and aesthetic enjoyment of resources.[74] Courts recognize that the value of these natural resources comes not merely from maintaining access to them, but from 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."[75]

The expansion of public interests that states currently protect under the public trust doctrine demonstrates the power states have to preserve public use of the navigable waters. In addition, the doctrine has been utilized to prevent destruction of state resources. This doctrine, therefore, provides states with a flexible tool that has endured and should continue to be applied to determine whether new uses of navigable waters should be approved.

C. Judicial Application of the Public Trust Doctrine

The case law reveals that courts have played a significant role in determining the rights and responsibilities of states as trustees under the public trust doctrine. Although states have the flexibility to expand the number of uses preserved by the doctrine, some states have hesitated to expand the doctrine for fear that expansion could interfere with traditional uses of navigable waters.[76] Opinions that have addressed conflicts involving competing uses for trust resources also indicate that although states have broad discretion in applying the doctrine, courts will intervene when states severely impair the public's rights.

As trustees of the public waters, states must maintain and protect these waters.[77] In addition, the public is unequivocally the beneficiary of the trusteeship.[78] Courts are reluctant to interfere with the state's authority

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73. Jaunich, *supra* note 27, at 167.

74. Steven W. Turnbull, Note, *The Public Trust Doctrine: Accommodating the Public Need Within Constitutional Bounds*, 63 WASH. L. REV. 1087 (1988); *see also* SLADE, *supra* note 1, at 133-34.

75. Marks v. Whitney, 491 P.2d 374, 380 (Cal. 1971).

76. SLADE, *supra* note 1, at 132.

77. *See supra* notes 66-67 and accompanying text.

78. *See supra* note 68 and accompanying text.

as trustee by ordering states to take certain actions.[79] However, while states are given great leeway with which to govern, manage, and protect navigable waters, courts will intervene if a state ignores its basic responsibilities.[80] The cases outlined below clarify the critical duties of a state as trustee and discuss additional limitations that courts have established on states under the public trust doctrine.

1. Early Recognition of the Public Trust Doctrine

The duties of a state under the doctrine were articulated as early as the 1821 decision of *Arnold v. Mundy*, in which Mundy challenged the conveyance of an oyster bed from the King of England to an individual; the conveyance took place before New Jersey became a state.[81] A number of subsequent conveyances eventually led to Arnold's ownership and use of the oyster bed, which had historically been used by the public.[82] The New Jersey Superior Court held that the natural oyster beds were part of the navigable waters, and that under natural law and common law, they belonged to the people.[83] Thus, the state could not grant a private party the absolute right to a portion of the resource.[84] The Supreme Court reaffirmed the validity of the doctrine in 1842 in a closely related case, *Martin v. Waddell*.[85] The Court held that the navigable waters and resources within them were common to all and therefore could not be alienated to an individual for private use.[86] The Court recognized that the New Jersey oyster beds in question had been available for common use, based upon the well-accepted notion that each state became sovereign after the Revolution, and that the people now "hold the absolute right to all their navigable waters, and the soils under them."[87]

States' duties were articulated in greater detail in *Illinois Central Railroad v. Illinois*. The Illinois legislature deeded the bed of Lake Michigan along the entire Chicago waterfront to a railroad company. The legislature then repealed the grant and sued the company to establish the

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79. Turnbull, *supra* note 74, at 1091 (noting that "[t]he Supreme Court continues to recognize the public trust doctrine as a prerogative of state government, declining an active role in vindicating public trust rights") (citations omitted).

80. SLADE, *supra* note 1, at 216.

81. Arnold v. Mundy, 6 N.J.L. 1, 1-2 (N.J. Super. Ct. 1821).

82. *Id.* at 2.

83. *Id.* at 78.

84. *Id.*

85. *Martin*, 41 U.S. (16 Pet.) at 410.

86. *Id.* at 414.

87. *Id.* at 410.

invalidity of the company's continued assertion of ownership over the submerged lands.[88] The Supreme Court held that because the public trust doctrine was founded upon the need to preserve the use of navigable waters for the public,[89] the state had a duty to maintain the resources for public benefit and could not abdicate its trust over the public lands unless the land was used to promote the interests of the public.[90] The holding established that states are held to a "high standard, a trust-like standard, with regard to public trust resources."[91]

These holdings defined and established the original public trust doctrine: states must ensure open access of the navigable waters for the general public. A state can convey a portion of the navigable waters only if the conveyance furthers a public trust purpose, or if the conveyance does not substantially impair the public's interest in the waterway.[92] States must carefully examine the public benefit of any proposed use and balance that benefit against the public benefit of other uses that will be impaired.[93] Where states do not take on this responsibility voluntarily, courts are likely to intervene on behalf of the public interest.

2. Court Intervention: Articulation of a State Duty to Balance Interests

Courts require states to adhere to the public trust doctrine. Professor Joseph L. Sax, renowned for his work in this area, concluded that:

> When a state holds a resource which is available for the free use of the general public, a court will look with considerable skepticism upon *any* governmental conduct which is calculated *either* to reallocate that resource to more restrictive uses *or* to subject public uses to the self-interest of private parties.[94]

A review of recent case law indicates that where a proposed use of navigable waters will result in substantial conflicts with other uses, states must take public interests into careful consideration and balance the benefit

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88. *Illinois Cent. R.R.*, 146 U.S. at 433-34.

89. *Id.* at 436 (stating that the public trust doctrine is "founded upon the necessity of preserving to the public the use of navigable waters from private interruption and encroachment").

90. *Id.* at 452-53.

91. *The Public Trust Doctrine and Coastal Zone Management in Washington State*, *supra* note 22, at 530.

92. *Illinois Cent. R.R.*, 146 U.S. at 435, 453.

93. *See infra* notes 101-06 and accompanying text.

94. Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471, 490 (1970).

of the proposed use against the public benefit of other uses that will no longer occur. Where the state does not take that duty seriously, courts are willing to intervene.

The seminal decision interpreting the public trust doctrine is *National Audubon Society v. Superior Court* because it illustrates how far courts are willing to go to protect a trust resource.[95] In *National Audubon Society*, the California Water Resources Board deeded grants in 1940 to the Department of Water and Power of Los Angeles (DWP) that permitted the city to divert water from non-navigable tributaries of Mono Lake, a scenic and navigable body of water.[96] The city's diversion of the water from those tributaries over time reduced the water level in Mono Lake, and the National Audubon Society claimed this reduction imperiled the lake's scenic beauty and ecological value.[97] The National Audubon Society asserted that the public trust doctrine prohibited the appropriation of water by DWP.[98] The court held that the state had a duty to protect the scenic and the ecological value of Mono Lake, and to supervise use of the trust resources continuously.[99] In addition, the court ordered DWP to reconsider the water allocation and undertake a study to determine the effects of the allocation on trust resources.[100]

Under this decision, the doctrine requires the protection of trust uses[101] and a balance of those uses "according to both yesterday's traditions and today's values. . . . [T]he state must consider and accommodate both."[102] In balancing competing uses, a state must determine whether resources traditionally subject to the trust would be significantly affected. Upon this determination, states must avoid harm to those interests where feasible and thus satisfy trust uses without "destabilizing existing users."[103]

The court in *National Audubon Society* expanded the duties of states under the doctrine by requiring not only that interests be balanced, but that California develop an in-depth water reallocation plan to determine the potential effects of Los Angeles's use of water from the Mono Lake

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95. Michael C. Blumm & Thea Schwartz, *Mono Lake and the Evolving Public Trust in Western Water*, 37 ARIZ. L. REV. 701, 703 (1995).

96. *National Audubon Soc'y*, 658 P.2d at 711.

97. *Id.* at 711-12.

98. *Id.* at 712.

99. *Id.*

100. *Id.*

101. *Id.* at 726-29.

102. Blumm & Schwartz, *supra* note 95, at 703.

103. *Id.* at 712.

watershed.[104] The holding suggests that where effects of a proposed use are unknown and potentially threatening, states have a duty to understand the long-term impacts of the use on the public resource before allowing the proposed use to take place. In *United Plainsmen Ass'n v. North Dakota Water Conservation Commission*, the Supreme Court of North Dakota made a similar finding when it held that North Dakota could not issue additional water permits until it created conservation and development plans for its natural resources.[105] The court noted that the public trust doctrine limited the state's discretionary authority and required "at a minimum, . . . [t]he development and implementation of some short- and long-term planning capability."[106] Thus, states are responsible for ensuring that use of navigable waters is in the public's best interest. The holdings in *National Audubon Society* and *United Plainsmen Ass'n* clarify these basic trustee duties. Courts have defined additional guidelines that states must follow as well.

3. Court Intervention: Additional Duties of the States as Trustees

Although courts are generally reluctant to interfere with a state's decision as trustee, there have been several instances in which courts have imposed additional duties under the doctrine to maintain and protect trust resources.

First, where a state has attempted to grant exclusive use of a portion of navigable waters to benefit a private individual or entity only, courts have intervened and declared that the conveyance has violated the public trust doctrine. This is because the navigable waters are deemed public resources to be enjoyed by the general citizenry. In *Owsichek v. State, Guide Licensing and Control Board*, the Supreme Court of Alaska declared unconstitutional a law giving hunting guides exclusive use of areas from which all other hunting guides were excluded.[107] The court found that the law created a monopoly for the guides such that fish, wildlife, and water resources were inaccessible to the public at large, and that the doctrine only allows Alaska to authorize activities that further traditional uses of the waters and do not substantially impair the public's access to them.[108] State

104. *National Audubon Soc'y*, 658 P.2d at 728-29.

105. United Plainsmen Ass'n v. State Water Conservation Comm'n, 247 N.W.2d 457, 463 (N.D. 1976).

106. *Id.* at 462.

107. Owsichek v. State, Guide Licensing & Control Bd., 763 P.2d 488, 496 (Alaska 1988). The Alaska Constitution contains a common use clause which incorporated the common law principles imposed upon the state by the public trust doctrine. *Id.* at 493.

108. *Id.* at 496.

grants that exclude the general public and only benefit an individual or private entity violate the trust and courts will generally void them.[109] Thus, states must ensure the public broad access to state waters.

Second, a state may convey trust lands to a private person or entity only if the conveyance furthers the public interest. In *People ex rel. Scott v. Chicago Park District*, the Supreme Court of Illinois held that a conveyance of submerged land for the construction of a steel plant, which the state asserted would create jobs and economic development, did not serve a sufficient public purpose because the economic benefits were "too indirect, intangible, and elusive."[110] The court focused on the purpose of the conveyance and noted that it had never upheld a grant of public land where the primary purpose was to benefit a private entity.[111] This holding is in line with the fundamental philosophy of the doctrine, which holds states responsible for preserving the resource for the benefit of the public, not a private individual or entity.

Third, courts have concluded that preservation of the environment in its natural state is an important part of the public trust doctrine.[112] The holding in *National Audubon Society* prevented the reallocation of water based upon the potential threat to the ecology and scenic beauty of Mono Lake.[113] This is particularly important because the proposed use was significant. As values change and the public becomes more aware of threats to the nation's waterways, "there has developed a strong . . . interest in conserving natural resources and in protecting and improving our physical environment. The public has become increasingly concerned with dangers to health and life from environmental sources and more sensitive to the value and, frequently, the irreplaceability of natural resources."[114] Indeed, as society becomes increasingly aware of

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109. *See, e.g., id.*; *see also* Cape Cod Steamship Co. v. Selectmen of Provincetown, 3 N.E.2d 244, 245 (Mass. 1936) (holding that a wharf which was the only place for docking ships in town could not be leased for exclusive commercial use to one private company at the exclusion of others).

110. People *ex rel.* Scott v. Chicago Park Dist., 360 N.E.2d 773, 781 (Ill. 1976); *see also* Lake Michigan Fed'n v. United States Army Corps of Eng'rs, 742 F. Supp. 441, 445 (N.D. Ill. 1990) (finding public's gain to be illusory where university sought to develop a lakefront to extend its campus to which the public would have unrestricted access). *But see Brusco Towboat Co.*, 567 P.2d at 1044 (upholding bidding system for leases to exclusively occupy navigable waters and noting that the state's ability to receive compensation for a private use of public waters served the public interest by increasing the common wealth).

111. *Chicago Park Dist.*, 360 N.E.2d at 779-80.

112. *See supra* notes 74-75 and accompanying text.

113. *See supra* notes 95-104 and accompanying text.

114. *Chicago Park Dist.*, 360 N.E.2d at 780.

environmental concerns, the public trust doctrine has become an important tool for preserving resources.[115]

Courts have not yet clearly articulated the boundaries of states' responsibilities. Given the doctrine's continuing development, this may never happen. However, the case law establishes some basic guidelines which states must follow. Most importantly, states cannot abdicate their public trust responsibilities. Before approving the proposed use, a state must carefully examine whether the use will seriously conflict with other uses and identify available alternatives. States have the discretion to permit uses that will conflict with traditional uses, but only if they have carefully considered the short- and long-term effects and balanced the needs involved. Exclusive use of the navigable waterways is not permitted unless the public directly benefits, and a state cannot allow uses that could significantly damage the natural beauty or ecological value of waterways.

Given the flexible nature of the public trust doctrine, it is possible that a state could decide that it had the authority to promote expansion of aquaculture within its waters even though most aquaculture operations require exclusive use of the waters. However, exclusive use could result in substantial conflicts if states do not create management plans to balance the competing uses. Although an expanded aquaculture industry could provide extensive benefit to states, these benefits do not necessarily justify the substantial cost to the public if it is unable to use and benefit from the navigable waters. The public trust doctrine should be used in a constructive manner to ensure that aquaculture practices expand without substantially burdening the public.

II. THE AQUACULTURE INDUSTRY

The practice of farming shellfish, finfish, and plants in the ocean has existed for thousands of years although it has a short history in the United States.[116] There are several different methods used to grow animals and plants in the ocean, some of which necessarily exclude other activities from the same waters due to the type of structures used to grow the organisms. The method chosen by the aquaculturist depends upon what kind of organism is being grown, the location of the operation, and the

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115. Turnbull, *supra* note 74, at 1087 (stating that "[t]he doctrine's recent popularity represents an overdue recognition of the public's right to protect and enjoy natural resources that by their character should be accessible and open to the public").

116. Ronald J. Rychlak & Ellen M. Peel, *Swimming Past the Hook: Navigating Legal Obstacles in the Aquaculture Industry*, 23 ENVTL. L. 837, 837-38 (1993).

amount of money available for investment.[117] As New England's needs change, the aquaculture industry there will continue to grow. It will be crucial that states in this region have appropriate management systems in place to balance competing uses and consider the long-term effects of the industry on navigable waters and other activities.

A. Aquaculture Methods

The cultivation of shellfish employs either bottom or off-bottom methods.[118] Bottom culture of shellfish involves planting shellfish seed, or juvenile shellfish, in net-covered nursery trays on the bottom of the ocean.[119] Once the seed has grown to a particular size, it is transferred to net-covered pens or runways which are also placed on the bottom.[120] When the shellfish are large enough to harvest, they are typically gathered by hand.[121] Bottom culture operations are generally located in the intertidal zone, where the aquaculturist can reach the trays easily at low tide.[122] This form of aquaculture is not particularly invasive because there are no structures in the water column[123] that would prevent the overlying water from being used for other activities.[124] Although this method therefore avoids many conflicts with other uses of the surface, bottom-culture methods do compete for valuable portions of the ocean bottom and intertidal zone and thus result in conflicts with traditional shellfishermen who use the same areas to collect wild shellfish.[125]

Off-bottom culture of shellfish uses the entire water column to grow shellfish in suspended cages, lantern-shaped nets, or lines attached to rafts that float on the surface.[126] The shellfish are enclosed or attached to

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117. *See generally* THE CAPE COD RESOURCE, AQUACULTURE IN MASSACHUSETTS (Apr. 1995) (describing key factors in setting up an aquaculture operation and problems with the permitting process); AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 146-47.

118. ILLINOIS-INDIANA SEA GRANT PROGRAM, *supra* note 7, at 8-10.

119. Pazolt v. Director of the Div. of Marine Fisheries, 631 N.E.2d 547, 549 (Mass. 1994).

120. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 154.

121. *Pazolt*, 631 N.E.2d at 549.

122. *See, e.g.*, AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 157 (stating that the reservation of tidelands for aquaculture can cause problems).

123. The water column is the column of the water extending from the surface to the ocean bottom.

124. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 53.

125. *Id.* at 157 (noting that the "fear of competition has a long history in the Northeast. Within the last century, violence has erupted over the existence and placement of shellfish licensed-areas. Maine, Massachusetts, New York and Connecticut have all experienced their own versions of the 'Quahog Wars,' violent clashes between culturists and commercial fishermen . . . .").

126. *Id.* at 159-65.

suspended substructures which are also anchored to the ocean bottom.[127] This culture method is easy to maintain, protects the shellfish from predators, and enables the aquaculturist to contain mobile species, such as scallops, until they are ready to be harvested.[128] Although these operations must be located farther out to sea than bottom culture operations, aquaculturists tend to place them close to shore because access is easier,[129] and the operation is in more protected waters.[130] Off-bottom culture tends to create more conflicts with other uses because the structures physically exclude most other types of activities from the same area.[131]

Cultivating finfish such as salmon involves the placement of juvenile fish into large cylindrical cages or net-pen systems that are primarily submerged and joined together to form a single unit with walkways or handling areas on the surface between each cage or net-pen.[132] These walkways allow the aquaculturist easy access to feed, medicate, and harvest the fish. This method is not referred to as bottom or off-bottom culture, but is similar to off-bottom culture in that placement of large cages or net-pens in the water requires exclusive use and prevents other activities from taking place in that area.[133] Cylindrical cages can measure up to thirty meters in diameter and thirty meters in depth, while net-pens average ten meters per side and four meters in depth.[134] In addition, the cages and net-pens extend above the surface to prevent fish from jumping over the top, which can make the structures unsightly. Finfish operations, like off-bottom culture of shellfish, also occurs beyond the intertidal zone because the enclosures must be submerged. Once again, aquaculturists are often encouraged to locate their operations relatively close to shore so that they are easily accessible and do not require long boat trips out to unprotected waters.[135] In addition, operations in more shallow, protected waters require less expensive equipment because they do not need heavier and longer mooring lines to hold them in place.[136]

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127. *Id.* at 159.

128. *Id.*

129. *See id.* at 161 (stating that off-bottom culture operations are often located near the shoreline).

130. *See infra* notes 135-36 and accompanying text.

131. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 165.

132. *Id.* at 167.

133. *Id.* at 173.

134. *Id.* at 167.

135. MAINE AQUACULTURE INNOVATION CENTER, AQUACULTURE IN MAINE 16 (1992).

136. AQUACULTURE DIV'N, DEPT. OF FISHERIES AND AQUACULTURE, GUIDELINES FOR DETERMINING THE SIZE AND PRODUCTION LEVELS FOR MARINE AQUACULTURE SITES IN THE BAY OF FUNDY 4 (May 1993). Aquaculture operations located in deeper waters can be more expensive

Aquaculture operations require different amounts of space, depending on both the amount of organisms under cultivation and the method used. For example, a five-acre bottom culture operation exclusively occupies five acres of the ocean bottom. However, an off-bottom culture project or net-pen operation would not only occupy five square acres of the bottom, but also the surface above it and the intervening volume. Although the size of sites can vary tremendously, operations can be quite large. One off-bottom project off of the coast of Massachusetts, for instance, will occupy forty-seven square miles of navigable waters if it is approved in its final form.[137] Given the potential size of these operations, regardless of the method used, anticipated growth in aquaculture makes it clear that additional planning is needed for avoiding potential conflicts which will arise as more facilities occupy more space exclusively.

B. Growth of the Aquaculture Industry

While aquaculture operations can be complicated, risky, and costly, there are great expectations about the role the industry could play since it is "being increasingly held up as the future of sustainable management."[138] Approximately twenty percent of the world's seafood harvest currently comes from aquaculture, and by the year 2000, it is expected to account for twenty-five percent.[139]

Aquaculture is a fairly new practice in the United States, but it is already the fastest growing segment of agricultural production.[140] Although aquaculture currently accounts for only ten to fifteen percent of seafood harvests in this country, production has already more than quadrupled since the 1980s.[141] Studies indicate that growth of the industry is anticipated to continue with the development of new information and

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because the structures require heavier and longer mooring lines to hold them in place. *Id.*

137. *See infra* note 180.

138. Mike Hagler, *Deforestation of the Deep: Fishing and the State of the Oceans*, THE ECOLOGIST, Mar./Apr., May/June 1995, at 74, 78. While many projections for the future of the aquaculture industry refer to growing seafood in all bodies of water, not just the ocean, Hagler refers specifically to the cultivation of seafood in the sea.

139. Michael Crowley, *Trends and Technology*, NAT'L FISHERMAN, July 1995, at 18.

140. Robin Estrin, *Aquaculture Touted as Industry Future*, THE PATRIOT LEDGER (Quincy, MA), Oct. 9, 1995, at 5.

141. JSA ON AQUACULTURE, *supra* note 11, at 21. Farm gate value (the price the grower received for his product) for aquaculture production was over $760 million in 1990, as compared to $192 million in 1980. *Id.* at 3. Fish grown include baitfish, catfish, clams, crawfish, freshwater prawns, mussels, oysters, Pacific salmon, shrimp, and trout. *Id.* at 21. These statistics include all aquaculture activities, not just mariculture.

technologies.[142] Congress has provided extensive support for the growth of the industry. For example, in 1980, the National Aquaculture Act[143] established a national policy of encouraging development of aquaculture in the United States, and recognized the industry as a source for "augmenting existing commercial and recreational fisheries . . . [and] producing other renewable resources, thereby assisting the United States in meeting its future food needs and contributing to the solution of world resource problems."[144] Proponents of the industry promote it as an efficient means of growing food that could become a way of life,[145] and as a way to "maintain[ ] or increas[e] food supplies while relieving pressure on the overfished oceans."[146] Many view aquaculture as a reliable and predictable method for producing a high-quality product.[147] The services needed to grow and harvest the fish could create many jobs, and the industry could also produce large quantities of fish for recreational fishing.[148] If seafood demands continue to rise, and the world population continues to grow, aquaculture could be one of the most efficient ways to meet the demand.[149]

Aquaculture has gained particular attention in New England states, where the decline of wild fish populations has caused a sharp decline in jobs and has weakened the economic base of the region.[150] The industry has been "touted as kind of the savior for the fishing community" because it could employ displaced fishermen and boost local economies.[151] The

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142. Crowley, *supra* note 139, at 18 (noting that "[i]n the United States, aquaculture production is growing at about 5% annually. . . . As impressive as the current overall growth rate is, it is expected to increase as new technology provides more efficient ways of growing fish."); *see also* Albert Sasson, *Aquaculture: Realities, Difficulties and Outlook*, in MANAGING THE OCEAN 61 (Jacques G. Richardson ed. 1985) (stating that "[i]t has been practiced for centuries but is evolving as the result of modern research and methods").

143. 16 U.S.C. §§ 2801-2810 (1988 & Supp. III 1991).

144. *Id.* § 2801(c).

145. Sasson, *supra* note 142, at 68.

146. Alex Wilks, *Prawns, Profit and Protein: Aquaculture and Food Production*, THE ECOLOGIST, Mar./Apr., May/June 1995, at 120.

147. Barbara Carton, *From the Farm to the Table: An Alternative Way to Harvest Fish Captures the Market*, THE BOSTON GLOBE, Apr. 27, 1994, at 54.

148. JSA ON AQUACULTURE, *supra* note 11, at 3.

149. *Id.* at 2.

150. *See, e.g.*, Peter B. Doeringer & David G. Terkla, *Trouble in Fishing Waters*, BOSTONIA, Spring 1995, at 15 (stating that "[s]ome 20,000 jobs in the [Northeast] region, including such ancillary industries as boatyards and services, marine insurance, delivery, fish processing, and ice, depend on fishing. The Northeast . . . is faced with the loss not just of a trademark industry, but a way of life.").

151. Estrin, *supra* note 140, at 5 (quoting Sebastian Belle, researcher at the New England Aquarium); *see also Aquaculture in Maine*, BANGOR DAILY NEWS, Feb. 15, 1994, at 6.

seafood industry also believes that aquaculture can provide a way for the region to produce a steady supply of fish while the region's wild stocks recover.[152] New England states such as Maine, Massachusetts, and Connecticut are striving to strengthen and expand the industry,[153] indicating the likely continued expansion of the industry in the Northeast.

Aquaculture activities in New England consist primarily of shellfish farming.[154] However, there are currently twenty-three finfish operations in Maine, and proposals in Massachusetts are under consideration.[155] The twenty-three current finfish leases cover approximately two square miles,[156] and range in size from three to ninety-five acres per operation.[157] A state's decision to lease a portion of navigable waters to a private individual involves many agencies, decision-makers, and factors.[158] This process can be difficult, prolonged, and unorganized, which could create problems as the industry expands and battles over conflicting uses increase.

C. State Permitting of Aquaculture

Most states use leases as the vehicle to grant exclusive rights to aquaculturists for occupation of a portion of the states' waters.[159] Leases are granted only after local, state, and federal permits have been obtained.[160] States usually grant renewable leases for long-term use of the area, and require payment of rent to the state based on the acres of water.[161] However, rents are minimal, calculated so as to cover the cost

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152. Jules Crittenden, *Nets Cast to Save N.E. Fish Through Farming*, BOSTON HERALD, Oct. 8, 1995, at 16.

153. Carton, *supra* note 147, at 54; *see also* AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 4 (noting that the "economic realities of the fisheries decline coupled with the economic opportunities associated with increased demand for fish and fish products means that the interest in aquaculture is growing rapidly. . . . Now is the time, therefore, to break down these barriers and ensure that aquaculture can be effectively pursued.").

154. Telephone Interview with Susan Snow-Cotter, Ocean Policy Manager, Executive Office of Environmental Affairs, Massachusetts Coastal Zone Management (Oct. 9, 1996).

155. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 166.

156. *Id.*

157. SOFIA U. BETTENCOURT & JAMES L. ANDERSON, PEN-REARED SALMONID INDUSTRY IN THE NORTHEASTERN UNITED STATES, NORTHEASTERN REGIONAL AQUACULTURE CENTER 44 (1990).

158. *See generally* ALEX W. WYPYSZINSKI, NORTHEASTERN REGIONAL AQUACULTURE CENTER PROJECT NO. 90-1, GOVERNMENTAL REGULATION OF GROWTH AND DEVELOPMENT: IMPROVING THE LEGAL FRAMEWORK FOR AQUACULTURE IN THE NORTHEASTERN UNITED STATES i-xvi (1994).

159. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 12.

160. WYPYSZINSKI, *supra* note 158, at III-3.

161. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at app. B. Lease terms in New England range from one to ten years. *Id.* at 72, 74-77.

of processing applications.[162] Considerations that agencies make prior to approving proposed projects vary, depending on the state. Generally, these considerations include potential interference with navigation and commerce; whether the operation will discharge excessive materials into the water and thus violate state water standards; and whether the project may disrupt the migration of marine mammals.[163] The state may also choose to consider the proposed size of the operations, support or opposition of landowners in the area, and other potential conflicts.[164] While conflicts with competing uses of the water may be a consideration in the decision-making process, states have not established in-depth, long-term planning systems for dealing with these conflicts, but generally tend to make ad hoc decisions instead.[165]

Exclusive use of an area is generally required for aquaculture due to the nets, rafts, or cages involved, which often occupy the entire water column.[166] In addition, aquaculturists need a legally insured right to occupy public waters exclusively for two reasons. First, aquaculture operations occupy public waters.[167] Second, aquaculturists need to protect their investment from theft, trespass, and competing uses.[168]

Potential conflicts between competing uses of coastal waters has emerged as a major legal and policy issue in the midst of the phenomenal growth of the industry.[169] Because current aquaculture activities occupy small portions of the navigable waters, disputes have not been extensive. However, as the number of operations grows, the area precluded from other activities will also increase dramatically. As a result, a large number of other activities traditionally protected by the public trust doctrine may

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162. *Id.* For example, in Connecticut, where the application fee for a lease is $65, approximately $63 covers advertisement of legal notice to the public that a competitive bid for the lease area will take place, and $2 covers processing costs. *Id.* at 72.

163. *See* Rychlak & Peel, *supra* note 116, at 838-39 (remarking that the state and federal regulatory framework for permitting aquaculture operations requires approval from a large number of agencies on these matters).

164. *See supra* notes 158, 165 and accompanying text.

165. WYPYSZINSKI, *supra* note 158, at I-ii. Although there are a wide number of state and federal agencies that must approve an aquaculture project before it is operational, there is a significant lack of uniformity in standards, and poor communication between the agencies, which results in ad hoc decision-making. *See* AQUACULTURE IN MASSACHUSETTS, *supra* note 117 at 16, 19; AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 107 (noting that programs often reflect local attitudes regarding the aquaculture industry, how local decision-makers choose to resolve multi-use conflicts, and the value of historic and cultural resources within the state). In Massachusetts, the permitting system is complicated and inefficient, resulting in "case by case" decisions. *Id.* at 107-08.

166. *See supra* Part II.A and accompanying text.

167. IMPROVING THE LEGAL FRAMEWORK, *supra* note 6, at 12.

168. *Id.*

169. WYPYSZINSKI, *supra* note 158, at I-2.

be curtailed. Because states lack coordinated, long-term plans for determining how to expand and regulate the aquaculture industry, there is no procedure for resolving conflicts or balancing competing interests.[170] This problem will worsen as increasing areas of navigable waters are dedicated to exclusive use and private profit.

III. CONFLICTS IN USE

If aquaculture continues to expand rapidly, it could significantly impair many traditional uses of the navigable waterways. There are three primary areas where a growing aquaculture industry could create substantial battles among competing uses. First, aquaculture could conflict with traditional fishing practices. Second, recreational and aesthetic enjoyment of the coastline could be impaired by a rapidly growing aquaculture industry. Third, the ecological value of navigable waters could be threatened by aquaculture practices.

A. Traditional Fishing

Conflicts between aquaculture and traditional commercial fishing are likely as exclusive leases restrict fishermen from traditional fishing grounds. Fishing, whether for commercial or recreational reasons, has historically been recognized as an acceptable use of navigable waters under the public trust doctrine.[171] Despite the economic and cultural significance of the traditional fishing industry, it is struggling to survive in New England as stocks continue to decline due to overfishing.[172] Although some fishermen are willing to give up their traditional jobs for aquaculture,[173] expanded aquaculture in New England could create conflicts with these fishermen for two reasons. First, because of aquaculturists' need for exclusive use of an area, fishermen are often excluded from waters that were formerly available.[174] As the number of aquaculture structures multiplies, the industry will inevitably encroach upon traditional

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170. *See supra* notes 158, 165 and accompanying text.

171. CWC Fisheries v. Bunker, 755 P.2d 1115, 1121 n.14 (Alaska 1988).

172. Doeringer & Terkla, *supra* note 150, at 15 (stating that "[i]ndeed, New England's ancient groundfishing industry is threatened with extinction. . . . As all evidence demonstrates, this decline is heavily attributable to overfishing.").

173. David Polochanin, *N.E. Fishing Industry Gets US Aid $800,000 Targeted for Programs From Cape Cod to Maine*, THE BOSTON GLOBE, Aug. 21, 1994, at 36.

174. Robert L. Stephenson, *Multiuse Conflicts: Aquaculture Collides With Traditional Fisheries in Canada's Bay of Fundy*, WORLD AQUACULTURE, June 1990, at 34, 36, 40-41. Exclusion of other uses is often inevitable, due to the nature of the operations. *See supra* Part II.A.

fishing sites. Second, in addition to the loss of areas for fishing, fishermen assert that aquaculture sites may adversely affect the behavior and movement of nearby wild fish, which could reduce the fishermen's catch.[175]

The collision between traditional fishing and a rapidly growing aquaculture industry in the Bay of Fundy in New Brunswick, Canada, demonstrates the conflict that may emerge in New England. In New Brunswick, cages for farmed salmon encroach on sites that were traditionally used to catch herring, lobster, scallops, clams, and other native fish, resulting in an intense conflict.[176] Although the conflict's intensity is due in part to the narrow coastal zone available for use in the Bay of Fundy,[177] the New Brunswick fishermen's concerns regarding loss of area and reduction of catch are shared elsewhere.

Although conflicts are not yet as severe in New England, similar concerns have been raised due to the continuing growth of the aquaculture industry.[178] For example, a company obtained a lease to farm salmon off the coast of Swans Island, Maine with no objections, but faced serious protest by local fishermen when it sought another lease nearby, showing that concerns increase as the aquaculturists attempt to increase the amount of water they occupy.[179] Fishermen explained that their opposition to aquaculture results from a deep "fear of losing [their] livelihood."[180] The clash between traditional fishing and aquaculture in New England is

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175. Stephenson, *supra* note 174, at 42. Fishermen contend that waste from the aquaculture operation may change water quality, which could cause wild fish to alter their normal routes. *Id.* The sites could also physically obstruct normal routes of wild fish. *Id.* Lastly, noise, lighting, and excessive human movement in the area, due to aquaculture facilities, may also frighten fish away from their normal paths. *Id.*

176. *Id.* at 45. The conflict in New Brunswick has slowed the growth of the aquaculture industry there. *Id.* at 34.

177. *Id.* at 36.

178. AQUACULTURE IN THE NORTHEAST REGION, *supra* note 16, at 27; *see also* AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 174 (noting that while the aquaculture industry "represent[s] a potential for tremendous productivity and economy of scale, traditional fishermen are very suspicious of them and many objections have been raised about encouraging their development in New England").

179. *The Goo Factor: Salmon Farming*, THE ECONOMIST, Aug. 19, 1991, at 29.

180. *Id.* Concerns were also set forth in a suit by the Conservation Law Foundation (CLF) against the American Norweigan Fish Farm (ANFF). *See* Plaintiff's Complaint, Conservation Law Found. of New England, Inc. v. United States Army Corps of Eng'rs No. 91-10488WD (D. Mass. filed Feb. 6, 1991). When ANFF sought to build a 47-square nautical mile facility to harvest salmon off the coast of Cape Ann, Massachusetts, in a "very productive fishing area," CLF sued, claiming that it would "interfere with the traditional public rights of navigation and fishing . . . by effectively granting to a single private party . . . the right to the exclusive use of a large expanse of . . . public navigable waters, an action that will have the practical effect of drastically inhibiting navigation and commercial fishing in that area." *Id.* at 12-13.

therefore a realistic and foreseeable conflict which could worsen without adequate planning.

B. Recreational and Aesthetic Enjoyment

Unless expansion of the aquaculture industry is planned carefully, other uses of the ocean, such as recreational boating, swimming, aesthetic appreciation, and the function of the ecosystem itself could be severely impaired. Although New England is well known for its traditional fisheries, the region's valuable coastlines are also enjoyed by residents and tourists every year. The public enjoys recreational boating, swimming, and fishing, and appreciates the natural beauty of the rugged New England coastline. All of these uses of navigable waters have been recognized and protected under the public trust doctrine.[181] The right to enjoy New England waters for these purposes could be severely limited by an expanded aquaculture industry as the operations occupy more and more of the ocean's surface, thereby prohibiting other activities.

Landowners, and even entire communities, have opposed aquaculture ventures for purely aesthetic reasons.[182] Others have opposed projects on their coastline due to the exclusionary nature of the operations, and a concern that eventually, "much of [the state's] coastal waters will be privately controlled by large corporations, thereby limiting the public's commercial and recreational uses."[183] Residents complain that "their views of the ocean are 'spoiled' by people working on the flats."[184] In areas that welcome tourists, motel and hotel owners have fought aquaculture projects near their beaches based upon a fear that their businesses will suffer if the tourists cannot swim, fish, or boat in those waters.[185]

While recreational and natural enjoyment of the navigable waters may not be paramount to allowing the aquaculture industry to expand, such uses are nevertheless important and substantial. For this reason, they must be recognized and preserved. The public should not lose its right to enjoy navigable waters in order for the industry to expand. Rather, states must find a way for recognized public uses and the aquaculture industry to co-exist.

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181. *See supra* note 72, 75.

182. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 173.

183. Phyllis Austin, *Enter, Aquaculture*, MAINE TIMES, Aug. 28, 1992, at 2, 4; *see, e.g.*, Bell v. Town of Wells, 557 A.2d 168 (Me. 1989).

184. John Fiske, *Growing Net Profits: State Wading in to Help Lift Stalled Aquaculture Industry*, BOSTON GLOBE, Oct. 18, 1995, at 33, 36.

185. *See generally* Pazolt v. Director of Div. of Marine Fisheries, 631 N.E.2d 547 (Mass. 1994).

C. Environmental Concerns

Expansion of aquaculture also raises concerns about potential effects to the waters. Courts have found that states have an obligation under the public trust doctrine to protect and maintain the ecological value of navigable waters.[186]

Currently, there is little information regarding environmental effects of aquaculture to surrounding waters.[187] Several specific issues have been raised by environmentalists, fishermen, and scientists. First, studies indicate that aquaculture operations may adversely affect the quality of the water surrounding them through releases of excess feed, fish feces, and antibiotics.[188] Excessive introduction of these nutrients can damage the resources on the ocean bottom, or the benthic ecosystem, "producing detrimental impacts."[189]

Second, there is concern about the potential risks of genetic effects, caused by the mixing of genes between wild and cultured fish.[190] The genetic makeup of fish raised in aquaculture operations is usually different from wild populations as a result of selective breeding and domestication.[191] For example, populations of Atlantic salmon in different bodies of water are genetically different.[192] Studies indicate that these differences may improve their homing instinct, growth rate, and ability to

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186. *See supra* notes 75, 99-100 and accompanying text.

187. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 169-72.

188. Stephenson, *supra* note 174, at 40-42; *see also* Carton, *supra* note 147, at 53; AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 169-70. For more detailed information about these environmental effects, see generally P.J. Johannessen et al., *Macrobenthos: Before, During and After a Fish Farm*, 25 AQUACULTURE & FISHERIES MGMT. 55 (1994); Peter L. DeFur & Douglas N. Rader, *Aquaculture in Estuaries: Feast or Famine?*, ESTUARIES, Mar. 1995, at 2, 5-6; A. ERUIK, ED., ET AL., HAVFORSKININGS INSTITUTTET OF MARINE RESEARCH, PROCEEDINGS OF THE CANADA-NORWAY WORKSHOP ON ENVIRONMENTAL IMPACTS OF AQUACULTURE (1994) (discussing environmental concerns regarding aquaculture operations); Barry A. Costa-Pierce, *Environmental Impacts of Nutrients Discharged From Aquaculture: Towards the Evolution of Sustainable, Ecological Aquaculture Systems*, Plenary Talk at Conference on Aquaculture and Water Resource Management, Instit. of Aquaculture, Univ. of Stirling, Scotland U.K., June 21-25, 1994 (reviewing the effects of aquaculture operations on the environment, and promoting the development of a sustainable, ecologically sound method for cultivating fish).

189. Costa-Pierce, *supra* note 188, at 12.

190. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 171-72.

191. *Id.* at 136.

192. *See generally* P.S. MAITLAND, NATURE CONSERVANCY COUNCIL, THE GENETIC IMPACT OF FARMED ATLANTIC SALMON ON WILD POPULATIONS, CANADA (1989) (describing research indicating that different rivers contain genetically distinct varieties of salmon, which increases chances of survival within each particular river, and that the mixing of these varieties with salmon from aquaculture operations increases threats to the genetic integrity of the wild stocks).

fight off diseases in a particular environment.[193] Cultivated salmon that escape may pose a risk to wild salmon because the exchange of genetic material may reduce wild salmon's ability to survive.[194] Farmed fish can also pose a threat to nearby wild populations by introducing new diseases.[195] Regulations are critical to safeguard wild populations from these risks.[196]

The risks and impacts of an expanded aquaculture industry in New England are still unknown, and the environmental impacts are not well understood. However, if states wait until the aquaculture industry has expanded, it may be too late to prevent damage to trust resources. In-depth planning and management of the resource demands that states collect reliable information on these issues in order to prevent irreparable conflicts and harm to trust resources.[197] Decision-makers should take these potential environmental effects into serious consideration before allowing the industry to grow too quickly. This is particularly true, given that other countries now regret not addressing similar adverse effects from aquaculture until it was too late.[198]

IV. APPLICATION OF PUBLIC TRUST DUTIES TO AQUACULTURE

As New England states begin to expand aquaculture, it is vital that they take their public trust duties seriously and effectively manage and protect their navigable waters. This may mean slowing the industry's growth in order to preserve other valuable uses of the navigable waterways. The public trust doctrine has been recognized, reinforced, and expanded upon so that this nation's navigable waters remain accessible to the general public to enjoy. It is critical that states remember that the beneficiaries of these trust resources are the entire public, and should not exclude them in order to benefit the aquaculture industry.

The public trust doctrine is an important legal tool that states should use to regulate aquaculture activities within state waters. Any conveyance of navigable waters within state boundaries must be considered under the

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193. *Id.* at 6.

194. *Id.*

195. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 136.

196. *Id.*

197. *Id.*

198. *See* ALISON ROSS, MARINE CONSERVATION SOCIETY, CONTROLLING NATURE'S PREDATORS ON FISH FARMS 79 (1988) (noting that in Scotland, "[t]he industry has followed the all too familiar pattern where government backing has led to full scale development, with no one taking heed of possible negative impacts on the environment. By the time problems are perceived . . . it is typically too late as the developments are established and the problems with them.").

framework of the public trust doctrine to ensure that the public's rights are not substantially impaired. States must take a careful look at the practice of cultivating fish under *Illinois Central R.R.*, which requires the state to determine whether one of two conditions has been satisfied.[199] Either the activity must further a traditionally recognized use of the navigable waterways, or the activity must not substantially impair the public's right to use the waters for traditional purposes.[200]

A. Aquaculture—A Traditional Public Use?

States must first determine whether aquaculture is an activity that directly furthers a traditional use of the navigable waterways. Open access to living resources within navigable waterways is protected by the public trust doctrine.[201] Some would argue that the public trust doctrine also protects the right to propagate fish as it is an activity that involves the harvesting of cultivated fish and results in the production of more fish from the navigable waters.[202] However, recreational and commercial fishing were protected under the doctrine on the premise that these waters and fish were common to all.[203] The exclusive use of an area to raise fish for private profit goes against the very notion of protecting traditional fishing practices and resources. In *Town of Wellfleet v. Glaze*, Justice O'Connor of the Supreme Judicial Court of Massachusetts concluded that aquaculture, unlike traditional fishing, is not a traditional public right.[204] Although the public clearly has a right to fish in the intertidal zone,[205] the court noted that shellfish propagation and aquaculture are not "incidental" to, reasonably related to, or a "natural derivative" of, the public's right to fish.[206]

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199. *See supra* notes 88-93 and accompanying text.

200. *See supra* notes 92-93 and accompanying text.

201. *See supra* notes 25-26, 82-83 and accompanying text; *see also infra* notes 204-05 and accompanying text.

202. SLADE, *supra* note 1, at 252.

203. *See supra* note 25-26.

204. Town of Wellfleet v. Glaze, 525 N.E.2d 1298, 1304 (Mass. 1988) (O'Connor, J., concurring).

205. In Massachusetts, the intertidal zone is privately owned, although the state holds an easement on such lands to preserve traditional rights to fish, hunt and navigate in such waters. *See supra* note 56. The holding in *Town of Wellfleet* is useful to distinguish between traditional fishing and aquaculture; however, it does not apply to other states because, in most states, the intertidal zone is owned by the state rather than the riparian landowner. *See supra* note 56.

206. *Town of Wellfleet*, 525 N.E.2d at 1304 (O'Connor, J., concurring). Justice O'Connor noted:

> Aquaculture is not fishing, nor can it legitimately be considered a "natural derivative"

The private cultivation of fish in public waters directly contradicts the purpose of the doctrine and its fundamental premise of public ownership because the cultivated fish are the property of the aquaculturist, and cannot be harvested by anyone else. In addition, aquaculturists, unlike traditional fishermen, are profiting from the cultivation of private property, the fish, within a public resource that should be available to everyone. Thus, it may be difficult to argue that aquaculture is a traditional use which should be protected by states.

An argument could be made that aquaculture furthers a traditional public use of fishing if the aquaculture facilities were publicly owned, or were operated solely to grow fish for public benefit (either fishing or consumption).[207] However, this would require investment of state capital which may not be available. In addition, the current growth of the industry is primarily due to private operations.

B. Impairing Public Enjoyment or a Direct Public Benefit?

If aquaculture is considered to be a use of navigable waters which does not further a traditionally recognized use, states must determine whether the expansion of aquaculture would substantially impair the public's ability to enjoy the navigable waters for traditionally protected uses. Many aquaculture activities require exclusive use of the ocean over large areas, thus there is little doubt that an expanded industry would result in a larger number of aquaculture operations that would substantially impair the public's right to enjoy the waters. In that case, aquaculture should only be allowed to occur at a significant rate if the industry directly benefits the public.

Some courts have held that although aquaculture is not a traditional use, it may directly benefit the public.[208] As early as 1908, a Florida court considered whether exclusive use of an oyster bed for aquaculture was a

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> of the right to fish, any more than breeding game animals on someone else's land could properly be considered a "natural derivative" of the right to hunt there. Thus, whatever right the public has to interfere with the private property rights of coastal owners for purposes "reasonably related" to the promotion of fishing as well as navigation . . . turning the tidal flats . . . into a shellfish farm is too great an extension of the public's right of "free fishing" to be "reasonably related" to that right.

Id. at 1304.

207. *See, e.g.*, State *ex rel.* Medlock v. South Carolina Coastal Council, 346 S.E.2d 716, 718-19 (S.C. 1986).

208. SLADE, *supra* note 1, at 252-53. This is particularly surprising, given that aquaculture does not satisfy the requirements established in *Illinois Central R.R.* *See supra* notes 88-93 and accompanying text.

legitimate use of such lands under the public trust doctrine.[209] In *State ex rel. Ellis v. Gerbing*, Gerbing had planted oysters in nearby salt marshes, staked off the submerged lands, and claimed ownership to them.[210] The court held that because the land was protected by the public trust doctrine, Florida could not convey it to a private individual for personal profit at the public's expense.[211] However, the court remarked that this activity might benefit the public, if it had been directed towards the public good rather than an individual, as a way to "develop resources and encourage industries" to expand in the region.[212]

More recently, the South Carolina Supreme Court recognized the potential public benefits to be gained from cultivating fish, yet clarified that such benefits must demonstrate "an *overriding* public interest."[213] In *State ex rel. Medlock v. South Carolina Coastal Council*, the Council approved the impoundment of public trust land by a private landowner in exchange for permission to conduct state aquaculture and mariculture experiments.[214] The court held that the impoundment, which obstructed navigation, did not justify the loss of the area for public use because it appeared that the primary purpose of the impoundment was a private business venture rather than to provide a location for aquaculture research.[215] The court indicated, however, that if the primary purpose of the impoundment had been aquaculture research, the exclusive use may have been permitted under the doctrine as it might benefit the public.[216]

Because of the flexibility in the public trust doctrine, aquaculture may be allowed in state waters, despite the validity of environmental and conflicting use concerns that have been illustrated, because the doctrine allows for expansion of uses protected where the public continues to benefit. Although there are benefits to be gained by increasing the number of aquaculture operations, it is questionable whether there are direct benefits to the public large enough to justify the substantial interference with the public's use of those waters. Certainly, there are some advantages to expanding the industry,[217] but most of the direct benefits go to the private entities, and only tangentially to the general public.

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209. State *ex rel.* Ellis v. Gerbing, 47 So. 353, 354 (Fla. 1908).

210. *Id.*

211. *Id.*

212. *Id.* at 356.

213. *South Carolina Coastal Council*, 346 S.E.2d at 719.

214. *Id.* at 717-18.

215. *Id.* at 719-20.

216. *See id.* at 720. However, the court was vague about why it may have been willing to recognize aquaculture as a source of public benefit.

217. *See infra* notes 218-27 and accompanying text.

Courts might view aquaculture as a public benefit because it could reduce the pressure to overfish natural stocks. This could be based upon the argument that traditional commercial fishing is depleting the natural resources.[218] Some fishermen may lack concern or understanding of their impact on the ocean and wild fish populations.[219] Most, however, continue to overfish the ocean, despite an awareness of the long-term impacts on fish population, because they need to earn a living.[220] The fishery crisis is a result of this constant and desperate race.[221] Aquaculture could arguably protect and preserve the remaining wild stocks, allow for their recovery, and simultaneously provide a continuous source of seafood for the public.[222] In fact, if the wild fish stocks disappear, the cultivation of fish may provide the only way to produce seafood. This could become increasingly important because governmental efforts to manage the fishery crisis have not been entirely successful.[223]

Another public benefit of expanded aquaculture could be a reliable and predictable supply of food. This may be increasingly important as the world population grows, and the consumption of seafood increases.[224] More aquaculture could translate into more jobs for fishermen who are displaced due to the worsening fisheries crisis.[225] In addition, local

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218. *See* Doeringer & Terkla, *supra* note 150.

219. NORTH PACIFIC FISHERY MGMT. COUNCIL, TRUE NORTH 3 (1992), *quoted in* Seth Macinko, *Public or Private?: United States Commercial Fisheries Management and the Public Trust Doctrine, Reciprocal Challenges*, 33 NAT. RESOURCES J. 919, 928 (1993):

> The race for fish leaves no time to think about responsible use of the resources, about decreasing by catch . . . . As the dance floor's gotten more crowded, the music's picked up the pace. Open access [to the ocean] gives the fleet flexibility, but it doesn't promote personal stewardship of the resource. If one fisherman backs off for conservation reasons, there are two more pushing to take his place. Faced with intensifying pressure, fishermen have no incentive to conserve and every reason to fish as hard and fast and frantically as they can before the curtain falls.

220. *See* Alfredo Corchado, *Seaborne Smugglers Often Outfox Feds—But Not For Drugs: The Cargo is Smal Scallops; Agents Must Face Insults, Threats and Rough Water*, WALL ST. J., May 21, 1987, at 1, 20 (stating that "the National Marine Fisheries Service tightened harvesting regulations to protect young scallops. If fishermen kept taking too many of them . . . the breeding population would be threatened. But most fishermen hate the new law. Many have turned to smuggling.").

221. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 107.

222. *See supra* notes 144-49; *see also* AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 7 (stating that "in the face of declining wild fish stocks . . . [a]quaculture can be used to augment the wild harvest, which will undoubtedly be fished at lower intensities than in the past").

223. Peter Weber, *Net Loss: Fish, Jobs, and the Marine Environment*, WORLDWATCH PAPER 120, July 1994, at 8, 35 (noting that governmental policies worldwide have contributed to "overexpansion of the fishing industry" and stating that while integrated transferable quotas (ITQs) are a widely discussed "management solution," ITQs have had unexpected adverse effects).

224. *See supra* note 149 and accompanying text.

225. AQUACULTURE STRATEGIC PLAN, *supra* note 7, at 29-30.

industries that process, package, and ship seafood could remain in business.[226] State agencies could also continue to research and improve the methods and technology used to grow fish, in order to produce more reliable methods for growing and harvesting fish.[227]

These potential benefits of an expanded aquaculture industry are valid and should be recognized. However, one must question how direct, if at all, these benefits are to the public, which is losing use of valuable space in order for the industry to expand. In addition, there are many disadvantages to aquaculture which must be considered.

Although proponents of the aquaculture industry point to the damage fishermen have done to our natural resources, it is doubtful that aquaculturists would do a better job.

> In general . . . aquaculture serves as a distraction from facing the limits of marine fisheries. Policy makers may be tempted to assume that we can make up for mistreating the oceans and small-scale fishers by farming fish. . . . But their contribution to the welfare and nutrition of coastal people who have traditionally relied on marine fisheries has been minimal.[228]

In addition, the environmental concerns that have been raised, as well as the alarm voiced regarding the genetic mixing of wild and farmed fish, are not adequately understood for state policy makers to be confident that these effects might not result in problems.[229] Although the economic benefits of aquaculture may be vast, they are not direct benefits to the general public. An expanded industry may provide some employment, and local economies may improve, however these benefits appear vague, indirect, and unproven at this time, and are more hopeful predictions of what the industry anticipates could be brought to the region. Even if some jobs are created and economies improve slightly, these indirect benefits may not outweigh the direct and substantial loss to the public of waters that were previously used for fishing, recreation, and navigation. The primary and direct benefits of expanded aquaculture belong to the private entities that cultivate fish harvests and therefore earn profits. Benefits to the public appear to be incidental and indirect.

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226. *Id.* If the industry does expand as anticipated, jobs that might benefit include those in the aquaculture industry itself (e.g., cultivation of the fish); creation, production, and distribution of products (e.g. nets, cages, and fish feed) required by the industry; and processing and distribution of seafood. *Id.*

227. *See, e.g.*, *supra* note 142.

228. Weber, *supra* note 223, at 42.

229. *See supra* notes 190-95.

Aquaculture operations provide a private individual or entity the opportunity to earn a profit through the use of public resources. Exclusive use of the resource directly benefits the private interest, not the public, because it excludes the public from using that area to fish, swim, and boat. It could also reduce tourism, and prevent landowners from making investments in particular pieces of coastline.

Although traditional fishing also does not provide direct benefits to the public, it is distinguishable from aquaculture because it does not significantly impair other uses. A state may only permit private use of navigable waters that impairs other uses if the use provides substantial and direct benefit to the public. Under the public trust doctrine, one use cannot be deemed more important than other uses, and therefore states cannot impair those uses, particularly when it is unclear how much benefit the public will gain from the favored use. Since the time the nation was founded, trust resources have been protected by states so that they remain available for public use and benefit. States must be cautious in permitting any new use of the resource that will remove waters from public access if the new use does not directly benefit the public.

The advantages and disadvantages of expanded aquaculture present a difficult debate for state decision-makers. Regardless of how direct the benefits of a growing industry may or may not be, the reality is that states may have enough flexibility under the public trust doctrine to allow for rapid growth of aquaculture activities in public waters if they choose to do so. However, their duty is instead to balance the various interests, rather than decide that one use of navigable waters may have a priority over all other uses. Courts must enforce this trustee duty where states fail to do so.

C. States' Duty to Balance Interests and Protect Navigable Waters

Regardless of whether New England states recognize aquaculture as a public use of navigable waters and thus allow the industry to expand, states have a duty as trustees to balance this expansion with traditional public uses of the navigable waterways. Courts should enforce this obligation in order to preserve public access to navigable waterways and to protect traditional uses.

Decisions such as *National Audubon Society* require that a state carefully examine the effects of the proposed use on resources and traditional uses, and develop short- and long-term management plans to

ensure that the resources remain protected.[230] Aquaculture may truly offer states vast opportunities for the future; however, those benefits cannot come at the expense of a substantial loss of water for public use. In addition, there must be a better understanding of the potential environmental impacts of aquaculture. Accordingly, states have an obligation under the public trust doctrine to determine the long-term effects of large aquaculture operations on the public waters before allowing them to expand.

V. SUGGESTED APPROACHES FOR RESOLVING FUTURE CONFLICTS

There are two different ways in which states could fulfill their roles as trustees of the navigable waterways. First, public trust doctrine principles could be codified by states in order to satisfy the requirements articulated in *National Audubon Society*. Alternatively, states could develop more significant compensation schemes in exchange for leases to exclusively occupy navigable waterways.

A. Codification of Public Trust Doctrine Principles

As responsible trustees, states must fulfill the obligations set out in *National Audubon Society*. This requires a study of the potential conflicts among uses, and an understanding of the effects widespread aquaculture may have on the public waters.[231] States should determine the appropriate areas, locations which would minimize adverse effects on the environment and reduce conflicts with traditional fishing, recreation, and environmental and aesthetic values. Where states do not fulfill this obligation, courts should intervene, as the California Supreme Court did in *National Audubon Society*.

The public trust doctrine provides a state with the principles it needs to protect the navigable waters and limit the activities within them, but the doctrine is not self-executing.[232] One way a state could ensure that the public trust principles are considered is to codify them.[233] For example, states could incorporate the public trust principles into their coastal zone

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230. *See supra* notes 100-04 and accompanying text.

231. *See supra* notes 100-04 and accompanying text.

232. SLADE, *supra* note 1, at 345.

233. *See, e.g.*, Owsichek v. State, Guide Licensing & Control Bd., 763 P.2d 488, 496 (Alaska 1988) (noting that the state legislature incorporated the "common to all" principle into the state constitution); Brusco Towboat v. State Land Bd., 567 P.2d 1037, 1044 (Or. Ct. App. 1977) (state constitution required that leases for submerged lands be granted only after a determination of the greatest benefit for the people of the state).

management programs.[234] This would provide states with guidelines that would promote sound management in coastal waters in a manner consistent with the trust doctrine. States could also codify the public trust doctrine principles by implementing a procedure whereby agencies are required to conduct an environmental assessment, similar to that required under the National Environmental Protection Act.[235] Under this type of analysis, state decision-makers would assess the environmental impacts of the proposed aquaculture facility, and consider alternative sites for the facility that could avoid or minimize adverse effects.

A codification of public trust principles would require that decision-makers obtain sound data about the effects of aquaculture on the public resource. This information is critical to developing a management system that mitigates short- and long-term effects of aquaculture on these resources as well as minimizing conflicts among uses. Such a plan could also create a mechanism for continued cooperation between local and state agencies to avoid unnecessary conflicts among activities in state waters. In addition, this process could identify and significantly limit private activities, such as aquaculture, in areas identified as critical habitats. Lastly, the plan could recognize and protect uses in specific locations. For example, near beaches, where recreation is concentrated, states could limit private activities. Similarly, in an area where there would be minimal interference with other uses, states could allow private activities such as aquaculture. While codification of the public trust doctrine principles will not solve all the problems, it could put the principles into statutory language, and provide a way to ensure that coastal waters are protected.

B. Compensation Schemes

Careful planning is essential, and can help states avoid conflicts. However, states could also justify this expansion by requiring the aquaculture industry to compensate the public for the resources it uses. Significant payment to states for the right to exclusively occupy a portion of public waters would produce direct and substantial public benefits

234. SLADE, *supra* note 1, at 232-44.

235. 42 U.S.C. § 4331 (1994). The National Environmental Protection Act requires federal agencies to consider environmental impacts of major federal actions, as well as the feasibility of alternatives to the proposed action, in order to "foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future Americans." *Id.*

because the funds would be available for general expenditures.[236] Courts recognize that compensation in exchange for a lease to occupy an area exclusively provides a direct benefit to the public.[237] Where the common wealth was increased, the public benefitted from the exclusive leases that prohibited their use of the area.[238] A more significant compensation scheme can provide direct and substantial benefits to the public and thus outweigh aquaculture's burdens on the public.

Although most states currently require some sort of payment from the aquaculturist to obtain a lease, these fees are minimal.[239] Nevertheless, once the aquaculturist gets started, he can earn large profits, just like any other business venture. States could charge aquaculturists a higher fee to obtain leases. However, this cost might limit investments in aquaculture. A better solution might be to establish royalty payments, similar to the federal government's oil and gas leasing system, which would require ongoing payments to the state once the aquaculturist begins to earn a profit.

The federal offshore oil and gas leasing system may be an appropriate model for an aquaculture compensation system for several reasons. First, oil and gas exploration activities are undertaken by the private sector in public waters, exploit public resources, and require supervision by the government.[240] Second, exploratory and production wells require exclusive use of the public land or water, and can result in conflicts with competing uses.[241] Lastly, the private company that explores the public waters and discovers oil or gas also earns a private profit through the use of public resource.

The current leasing system for offshore oil and gas production was established through the Outer Continental Shelf Lands Act Amendments of 1978,[242] under which the Secretary of the Interior is authorized to

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236. A compensation scheme could benefit the public directly if some of the money earned by aquaculture was devoted to protecting and preserving other public waters. For example, funds could be used to identify and preserve certain submerged lands or beach areas that would be available for public enjoyment. In this instance, the public would obtain a benefit that offsets the costs imposed by the aquaculture operation.

237. *Brusco Towboat Co.*, 567 P.2d at 1044.

238. *Id.*; *see also Borough of Avon-By-The-Sea*, 294 A.2d 47, 50 (recognizing that the state had the authority to charge and collect reasonable fees from individuals using beach and bathing facilities for the purpose of improving and maintaining the public resource).

239. *See supra* note 162.

240. *See* G. Kevin Jones, *Harvesting the Ocean's Resources: Oil or Fish?*, 60 S. CAL. L. REV. 585, 596 (1987).

241. *Id.* at 613-14.

242. 43 U.S.C. §§ 1331-1356 (1994).

choose tracts of the outer continental shelf for competitive lease sales.[243] Most leases are purchased by private companies through a bonus bid, fixed royalty system, under which all bidders submit non-refundable sums for the right to explore a particular tract for oil or gas.[244] The private interest that bids the highest wins the rights to explore and must then pay the federal government a fixed percentage, or royalty, of the value of any oil or gas that is produced from that tract.[245] The money earned by the federal government is then deposited directly into the Treasury.[246]

The notion behind this compensation scheme is that the private individual or entity can make a large profit from a privilege granted by the federal government to temporarily use and develop a public resource.[247] The nature of the arrangement justifies this type of payment.[248] The public, through the federal government, owns the public resources, and the private company invests the money and expertise needed to develop them.[249] It therefore seems reasonable that the economic benefits gained from this joint venture belong to both parties.

Aquaculture operations require a similar exchange between the government (albeit state rather than federal) and the private individual. A similar compensation scheme could be structured for aquaculture operations so that the state receives payment from the aquaculturist, based upon a percentage of its profit. If the state captures a percentage of the profit from each successful aquaculture venture, the public could benefit greatly. The revenue raised through this method would offset the public's direct loss of use of the area devoted to aquaculture.

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243. H.R. REP. NO. 590, 95th Cong., 2nd Sess. 47 (1978), *reprinted in* 1978 U.S.C.C.A.N. 1450, 1453-54.

244. *Id.*

245. Jones, *supra* note 240, at 597. The royalty interest can be based upon proceeds, market price or market value. *See* Wendy Schornstein Good, Note, *Oil & Gas—Obligations—The Meaning of "Market Value" in a Gas Lease Royalty Clause*, 57 TUL. L. REV. 1049, 1050 (1983). The percentage of interest paid the federal government varies, depending upon the particular agreement, although it usually averages 16.33% of value of the resource at the time it is discovered. Jones, *supra* note 240, at 597.

246. Jones, *supra* note 240, at 595.

247. H.R. REP. NO. 590, 95th Cong., 2nd Sess. 47 (1978), *reprinted in* 1978 U.S.C.C.A.N. 1450, 1461 (stating that the bidding system allowed the Secretary of the Interior to "strike a proper balance between securing a fair return to the Federal Government for the lease of its lands, increasing competition in exploitation of resources, and providing the incentive of a fair profit to the oil companies, which must risk their investment capital"); *see also* Hannifin v. Morton, 444 F.2d 200, 202 (10th Cir. 1971) (noting that this policy ensures that "the public interest is served by exacting a fair return on behalf of the government from the persons engaged in exploiting its resources").

248. Good, *supra* note 245, at 1055.

249. *Id.*

Thus, while an expanded aquaculture industry will inevitably result in some conflicts in state-owned navigable waters, states can comply with their trust obligations, ameliorate a substantial number of conflicts, and avoid court intervention, in one of two ways. First, states can codify the public trust doctrine principles by incorporating them into coastal zone management programs, or by requiring an environmental impact review prior to permitting aquaculture facilities. This would ensure that decision-makers address these issues in the balancing process before it is too late. Second, states can increase the common wealth, and thus increase the benefit of aquaculture to the public, by establishing a compensation scheme that reimburses for loss of the direct use of the area.

CONCLUSION

Although the aquaculture industry is only in its infancy in New England, it appears to have an extremely promising future in the region. It could provide sorely needed employment for traditional fishermen, as well as those who work in the seafood manufacturing and processing industries. In addition, New England already has a strong reputation for quality seafood and is strategically located to service large seafood markets around the world.

It is critical that states recognize the values of preserving these waterways for the general public to enjoy, and thus create a policy to ensure a proper balance. The public trust doctrine offers the guiding principles with which states can sort out conflicting uses of this public resource. States should be using the doctrine to ensure a fair balance of competing uses, and to plan for the future of the resource by determining short- and long-term effects. If states are unwilling to adhere to these principles, courts must be willing to intervene before unbridled state discretion allows rampant destruction of the resource. The Oregon Court of Appeals recognized the importance of the public trust doctrine in decision-making:

> 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.[250]

250. Morse v. Oregon Div., 581 P.2d 520, 524 (Or. Ct. App. 1978).

The nation's waterways are finite, and New England states that want to expand aquaculture leasing must make an effort to preserve them. The principles expounded in the public trust doctrine have been with the public since before this nation was founded. In order to ensure the continued viability of our nation's ocean resources, it is critical that the states continue to respect them.

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