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D. Douglas Hopkins
Rebecaa J. Goldburg
Andrea Martson

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AN ENVIRONMENTAL CRITIQUE OF GOVERNMENT REGULATIONS AND POLICIES FOR OPEN OCEAN AQUACULTURE*

_D. Douglas Hopkins,** Rebecca J. Goldburg,*** and Andrea Marston****_

I. INTRODUCTION

Aquaculture, the practice of farming shellfish, finfish, and plants in water, has existed for thousands of years.¹ In the United States, however, aquaculture has a much shorter history and has only recently been recognized to have significant economic potential.² In light of recent dramatic management failures in capture fisheries, leading to collapses of some wild fish populations, many have begun to view aquaculture as an efficient, reliable alternative means to satisfy rising consumer demand for fish and to create new jobs.³ It is now the fastest growing agricultural

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** Senior Attorney, Environmental Defense Fund. J.D. 1981, University of Virginia School of Law.


2. _Id._ at 837-88.

Operators of aquaculture operations in the United States have to date limited their activities to freshwater and near-shore coastal water sites, almost exclusively within both state and federal jurisdictions. As the industry continues to grow, it will likely expand into the open ocean, defined for purposes of this paper as federal waters in the Exclusive Economic Zone (EEZ) lying beyond state waters. State waters are generally defined as extending three miles from shore. The principal reasons for the likely expansion of aquaculture into the open ocean are: (1) to avoid conflicts with other human uses of the sea surface, water column and seabed; (2) to avoid regulation under state laws; (3) to have access to more consistently high water quality; and (4) to minimize regulatory compliance burdens generally by siting facilities where the effluents are more readily dispersed.

The major factors currently limiting the expansion of aquaculture into the open ocean include the difficulty and high cost of engineering and building facilities able to withstand the more severe storm conditions encountered in the open ocean, the high cost of operating facilities far from shore, and the absence of a clear and environmentally protective federal regulatory framework. In addition, these factors have apparently...
made it difficult for developers to attract sufficient investment capital to construct and operate open ocean aquaculture facilities.\textsuperscript{9}

This Article reviews the most significant environmental concerns raised by open ocean aquaculture; describes the key elements of the current federal framework of environmental laws regulating aquaculture in federal waters; highlights the deficiencies of this framework, partly by discussing actual open ocean aquaculture proposals; and suggests ways to improve the framework by making it both more protective of the environment and, by reducing uncertainty, less burdensome to open ocean aquaculture developers.

II. ENVIRONMENTAL CONCERNS RAISED BY OPEN OCEAN AQUACULTURE

Aquaculture can cause significant environmental degradation, especially if aquaculture facilities are developed with little thought to environmental protection.\textsuperscript{10} Aquaculture operations may cause both chemical and biological pollution: waste from finfish operations typically has a low ratio of total nitrogen to total phosphorous, similar to other agricultural wastes and to human sewage.\textsuperscript{11} Even in developed countries, only a relatively small fraction of aquaculture operations treat their wastes.\textsuperscript{12}

In some receiving waters, nutrient loading from aquaculture can result in oxygen depletion and death of aquatic organisms.\textsuperscript{13} Applications of antibiotics, anti-fouling agents, and other chemicals in aquaculture may

\textsuperscript{9} Rychlak & Peel, \textit{supra} note 1, at 840-42.
\textsuperscript{11} See Landesman, \textit{supra} note 10, at 499-500.
\textsuperscript{12} Costa-Pierce, \textit{supra} note 10, at 2.
\textsuperscript{13} P.J. Johannessen et al., \textit{Macrobenthos: Before, During and After a Fish Farm}, 25 \textit{AQUACULTURE & FISHERIES MGMT.} 55, 57 tbl.2, 58 (1994).
encourage the evolution of antibiotic resistant bacteria and harm nontarget organisms.\textsuperscript{14} In addition, fish commonly escape from aquaculture facilities, potentially causing ecological problems.\textsuperscript{15} Escaped fish of nonnative species may establish wild populations, displacing native fish or otherwise altering natural ecosystems.\textsuperscript{16} Large numbers of escaped fish of native species may breed with wild fish stocks, possibly causing wild populations to lose genetic adaptations that facilitate their survival and reproduction.\textsuperscript{17} Movement of cultivated species among aquaculture operations can result in the introduction of fish parasites and pathogens, even in cases where the host is an indigenous species.\textsuperscript{18}

Aquaculture facilities may occupy and degrade natural habitat important for conservation, recreation, or commercial activities other than aquaculture.\textsuperscript{19} Proponents of offshore aquaculture commonly argue that offshore aquaculture facilities will result in less environmental degradation than nearshore aquaculture facilities.\textsuperscript{20} This assertion should generally hold true for chemical (including nutrient) pollution from aquaculture operations, in that the environmental effects of aquaculture wastes should be significantly diminished in offshore sites where wastes are quickly diluted by strong currents flowing in deep waters.

There may be important exceptions to this assertion, however. Wastes from offshore aquaculture facilities located in areas that are relatively shallow and have relatively weak currents, such as in the Gulf of Mexico, have the potential to cause environmental damage. Moreover, biological pollution caused by offshore aquaculture may not be any less significant for offshore operations than for nearshore ones. In fact,

\begin{footnotesize}
\begin{itemize}
\item 16. NATIONAL RESEARCH COUNCIL, \textit{supra} note 12, at 102-03.
\item 17. \textit{Id.}
\end{itemize}
\end{footnotesize}
because offshore facilities are extremely vulnerable to storm damage, they have higher rates of accidental releases of fish than nearshore facilities.

Consideration of the environmental effects of offshore aquaculture operations should include recognition that our society's view of the oceans has changed to put much greater emphasis on environmental protection. In particular, the oceans are no longer regarded as infinite, unperturbable, and therefore usable as a vast dumping ground, as they once were. While it was once acceptable to discharge vast quantities of raw, human sewage into the ocean, and while ocean disposal of dredged sediments and other materials was once routine, new laws greatly restrict such activities.

Arguments that people need not worry themselves about wastes from offshore aquaculture facilities—because they will be diluted in vast seas—sound strikingly like arguments that are employed by the proponents of ocean dumping. These arguments are no longer valid. Granted, the current small number of offshore aquaculture facilities may indicate that pollution from these facilities is minor compared to many other current sources. Nevertheless, as new sources of pollution from a potentially growing industry, careful environmental review of proposed offshore aquaculture facilities is entirely appropriate.

III. FEDERAL ENVIRONMENTAL REGULATORY FRAMEWORK

The current framework of federal laws that protect the environment from the potential impacts of open ocean aquaculture is best described as an unfinished patchwork quilt. All the squares exist but some remain incomplete and they have not been assembled into a pattern or sewn together. The resulting regulatory uncertainty has led to a largely ad hoc and unsatisfactory application of federal environmental laws to the few proposed open ocean aquaculture projects that have proceeded to the point at which developers have sought federal approvals.21

Several federal agencies have asserted authority over open ocean aquaculture under existing federal laws, including the Army Corps of

21. ALEX W. WYPYSZINSKI, NEW JERSEY SEA GRANT MARINE ADVISORY SERV., GOVERNMENTAL REGULATION OF GROWTH AND DEVELOPMENT: IMPROVING THE LEGAL FRAMEWORK FOR AQUACULTURE IN THE NORTHEASTERN UNITED STATES, NORTHEASTERN REGIONAL AQUACULTURE CENTER PROJECT NO. 90-1, I-ii (1994). Although there is a wide number of 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 this ad hoc decision making. Id. See also AQUACULTURE WHITE PAPER, supra note 5, at 107.
Engineers under the Rivers and Harbors Act of 1899\textsuperscript{22} and the Outer Continental Shelf Lands Act;\textsuperscript{23} the Environmental Protection Agency under the Clean Water Act,\textsuperscript{24} the Ocean Dumping Ban Act of 1988,\textsuperscript{25} and the Endangered Species Act;\textsuperscript{26} the National Marine Fisheries Service under the Magnuson Fishery Conservation and Management Act\textsuperscript{27} and the Marine Mammal Protection Act;\textsuperscript{28} the Department of Agriculture under the National Aquaculture Act;\textsuperscript{29} and the United States Fisheries and Wildlife Service under the Lacey Act Amendments of 1981.\textsuperscript{30} Other regulatory oversight may arise from duties of the federal government under the public trust doctrine, and from involvement of international organizations, such as the North American Commission of the North Atlantic Salmon Conservation Organization, under international protocols. None of these were written or established with aquaculture in mind, and considerable uncertainty exists as to whether the agencies’ assertions of jurisdiction over open ocean aquaculture under these statutes, principles and protocols will withstand legal challenge.

\textit{A. Rivers and Harbors Act of 1899 and Outer Continental Shelf Lands Act—Army Corps of Engineers}

The United States Army Corps of Engineers (Corps) has asserted authority to require developers to obtain a permit from the Corps for any open ocean aquaculture facility under the Rivers and Harbors Act of 1899 (RHA), Section 10,\textsuperscript{31} as extended by the Outer Continental Shelf Lands Act (OCSLA). Under OCSLA, the Corps’ authority to issue Section 10 permits was extended beyond the territorial waters to include the outer continental shelf.\textsuperscript{32}

\begin{itemize}
  \item \textsuperscript{22} 33 U.S.C. § 403 (1994).
  \item \textsuperscript{23} 43 U.S.C. §§ 1331-1356 (1994).
  \item \textsuperscript{24} 33 U.S.C. § 1342 (1994).
  \item \textsuperscript{25} 33 U.S.C. §§ 1401-1445 (1994).
  \item \textsuperscript{26} 16 U.S.C. §§ 1531-1544 (1994).
  \item \textsuperscript{28} 16 U.S.C. §§ 1361-1421h (1994).
  \item \textsuperscript{29} 16 U.S.C. §§ 2801-2810 (1994).
  \item \textsuperscript{30} 16 U.S.C. §§ 3371-3378 (1994).
  \item \textsuperscript{31} 33 U.S.C. § 403 (1994).
  \item \textsuperscript{32} 43 U.S.C. § 1333(e) (1994).
\end{itemize}
Historically, the Corps has required Section 10 permits for creation of "any obstruction" in federal waters, unless authorized by Congress, in order to preserve unhindered navigational access of the nation's waters.33 Interpreting this statutory authority broadly, the Corps has required permits under the RHA for the building or placement of any structure in U.S. territorial waters that could affect or obstruct navigation, including wharves, piers, booms, and jetties.34 The Outer Continental Shelf Lands Act Amendments of 1978 (OCSLA) extended the Corps' Section 10 authority into the EEZ beyond U.S. territorial waters, allowing the agency to regulate installations and other devices permanently or temporarily attached to the seabed, which may be erected thereon for the purpose of exploring for, developing, or producing resources from the outer continental shelf.35

Most open ocean aquaculture operations would fall under the Corps' Section 10 jurisdiction within this description because the structures would likely be attached to the seabed floor. Ambiguity remains in the meaning of the OCSLA, however. Statutory authority for the Corps to regulate may depend not only on whether an aquaculture facility is attached to the seabed, but also on whether it is erected thereon. This question has not yet been resolved in court; nevertheless, federal courts have historically accorded considerable deference to federal agencies' interpretation of statutory ambiguities in asserting jurisdiction. Thus, the Corps' assertion of such regulatory authority is likely to withstand judicial attack.

The Corps asserts under its Section 10 authority that any open ocean aquaculture facility must obtain a Corps permit.36 Section 10 gives the Corps enormous discretion to decide when to issue and when to deny such a permit. The Corps has interpreted this authority to allow it to consider navigational impacts as well as essentially any other factors affecting the public interest.37 The U.S. Supreme Court has recently upheld the Corps'
expansive interpretation of this authority.\textsuperscript{38} As a result, the Corps now considers a broad range of potential environmental and other impacts before issuing or denying a Section 10 permit for an open ocean aquaculture facility.\textsuperscript{39} These considerations include: effects and cumulative impacts upon the water quality, effects of the facility or structure on recreation, fish and other wildlife, pollution, economic factors, safety, aesthetics, and navigation.\textsuperscript{40}

It would be extremely difficult, however, for a member of the public to successfully challenge on substantive environmental grounds a Corps permitting decision. Because the RHA, as extended by OCSLA, only grants regulatory authority to the Corps – without imposing on the Corps a definitive obligation to assert this authority – courts would likely give the Corps broad leeway to weigh environmental and other factors in deciding whether or not an aquaculture project is in the public interest. Compounding this uncertainty as to how well Section 10 protects the environment, the Corps has discretion at any time to rewrite its Section 10 regulations to substantially diminish the importance of environmental considerations in permitting decisions affecting open ocean aquaculture facilities. Challenging such regulatory changes would be very difficult for the same reasons.

Thus, although the Corps currently has a functioning permitting process which ostensibly regulates the environmental impacts of open ocean aquaculture projects, environmentalists put little long term faith in this process. The Corps' lack of expertise to evaluate potential ecological impacts of these facilities adds to the worry that reliance on the Corps' Section 10 authority leaves the environment inadequately protected.

\textsuperscript{38} United States v. Alaska, 503 U.S. 569, 579-80 (1992). \textit{See also} 33 C.F.R. § 320.4(a)(1) (1995), which provides that the "public interest review" conducted by the Corps under Section 10 is essentially a "general balancing process" that considers all potential advantages and disadvantages.

\textsuperscript{39} \textit{See} Zabel v. Tabb, 430 F.2d 199 (5th Cir. 1970) (court upheld the Corps' ability to make a permit decision based upon environmental factors, even though the project would not interfere with navigation). \textit{See also} 33 C.F.R. § 320.4 (1995) (general policies for evaluating permit applications).

\textsuperscript{40} United States v. Alaska, 503 U.S. at 582-83 (citing 33 C.F.R. § 320.4(a)(1) (1990)).
B. Clean Water Act—Environmental Protection Agency

The Environmental Protection Agency (EPA) has asserted jurisdiction under the Clean Water Act (CWA) to require point source pollution discharge permits for aquaculture projects in the open ocean. This regulatory requirement can afford important protection for the marine environment. The EPA's assertion of such jurisdiction under existing EPA regulations is vulnerable to legal challenge, however. This vulnerability could be significantly reduced if the EPA were to issue explicit new regulations under the CWA defining open ocean aquaculture projects as point sources requiring discharge permits under the National Pollutant Discharge Elimination System (NPDES).

Under the CWA, EPA must authorize any discharge of point source pollution in navigable waters (within twelve miles seaward of the coastline), or any point source pollution from a source other than a vessel or floating craft. Under the EPA's existing CWA regulations, a court might be able to hold that an open ocean aquaculture operation requires a permit under the definition of point source pollution, which includes "concentrated animal feeding operations . . . from which pollutants are or may be discharged." However, EPA regulations that define concentrated animal feeding operations refer only to terrestrial animals. Another EPA regulation that defines a concentrated aquatic animal facility imposes two relevant additional alternative criteria that may exclude many open ocean aquaculture facilities from the definition of concentrated aquatic animal facility. Either the facility must be a signifi-

41. See Memorandum from Joseph Freedman, Senior Attorney, United States Environmental Protection Agency, Office of General Counsel, to Addressees (Feb. 22, 1993) (on file with the Ocean and Coastal Law Journal) (concerning applicability of Clean Water Act to proposed open ocean aquaculture facility); Memorandum from Mike Reed, United States Department of Justice, Environment and Natural Resources Division, to Joseph Freedman, Senior Attorney, United States Environmental Protection Agency, Office of General Counsel (Feb. 18, 1993) (on file with the Ocean and Coastal Law Journal) (supporting regulatory authority of EPA to apply Clean Water Act to proposed open ocean aquaculture facility). Although the EPA has not definitively required by rulemaking that open ocean aquaculture projects obtain point source pollution discharge permits under the CWA, the State of Washington has recently adopted regulations that impose this permit requirement on a state level. See WAC § 173-221A-110 (1995) (effective Dec. 1, 1995).


cant contributor of pollution to the waters of the United States, or the aquatic animals must be held in ponds, raceways, or other similar structures.

An aquaculture facility contributing pollution to waters of the United States, that is, to waters within twelve miles of shore, may nevertheless fail to meet the definition of concentrated aquatic animal facility if not deemed a significant contributor. Moreover, facilities sited further offshore would be less likely to contribute pollution to waters of the United States even if they contribute very significant pollution in their offshore localities. Finally, the alternative criteria regarding ponds, raceways, or similar structures, would appear on its face to include only contained terrestrial aquaculture facilities; which would likely have an obvious, distinct pipe or other distinct point source from which polluted effluent enters navigable waters. Thus, despite the fact that the EPA has asserted under the CWA and existing CWA regulations that open ocean aquaculture facilities are point sources requiring NPDES permits, ambiguities in both the statute and the regulations leave this question unresolved and EPA's assertion of authority remains vulnerable to legal challenge. Whether the CWA mandates NPDES permits for marine netpen operations, even within territorial seas, is unsettled.

The EPA could go a long way toward eliminating this uncertainty by promulgating a new regulation that explicitly defines open ocean aquaculture facilities as point sources requiring NPDES permits. As recited above, the CWA imposes a NPDES permit requirement on any point source of pollution in the U.S. EEZ beyond the navigable waters, except for point source pollution from vessels or other floating crafts. Despite the fact that on their face aquaculture facilities are generally floating crafts and thus would appear to fit within the vessel exemption, the EPA and

46. 40 C.F.R. § 122.24(c) (1995).
48. Under 33 U.S.C. § 1362(8), EPA authority reaches the territorial seas, not just the navigable waters. Under 43 U.S.C. § 1331, the territorial sea was extended from three to twelve miles. See 40 C.F.R. § 122.2 (1995) (stating under definition for “waters of the United States” that EPA's regulations expand upon the statutory definition of “navigable waters” to include the territorial seas).
U.S. Department of Justice (DOJ) have asserted that long-standing EPA practices under the CWA demonstrate that the vessel exemption only applies to vessels used for transportation. Thus, because open ocean aquaculture facilities are essentially stationary and are not used for transportation, they cannot rely on the vessel exemption to avoid CWA regulation. Under this interpretation, the EPA therefore has the authority to require NPDES permits for aquaculture activities in the U.S. EEZ beyond the navigable waters (in the open ocean), as long as they are point sources of pollution.

Although the EPA has not yet issued any regulation explicitly stating that open ocean aquaculture facilities are point sources, there exists an adequate statutory and factual basis for the agency to issue such a regulation. Large amounts of fish food, fish feces, and drugs and other chemicals may be deposited into the ocean in or adjacent to open ocean aquaculture facilities. Finally, courts will generally accord considerable deference to an agency's interpretation of a statute it is responsible for implementing.

C. Ocean Dumping Act—EPA

The Ocean Dumping Act, also called the Marine Protection, Research and Sanctuaries Act of 1972, provides EPA authority to regulate the dumping of material into the ocean in the outer continental shelf area beyond the territorial sea. Despite the fact that the Department of Justice has supported EPA authority to regulate open ocean aquaculture facilities under the Ocean Dumping Act, such an assertion of authority could be vulnerable to legal challenge.

The definition of “dumping” exempts the deposit of oyster shells, or other materials, “when such deposit is made for the purpose of developing, maintaining or harvesting fisheries resources and is otherwise

51. Memorandum from Joseph Freedman to Addressees, supra note 41.
52. See infra Part II. See also 40 C.F.R. § 122.2 (1995) (defining “discharge of a pollutant”).
53. See Russell L. Weaver, Deference to Regulatory Interpretations: Inter-Agency Conflicts, 43 ALA. L. REV. 35, 35-36 (1991) (discussing “deference rule” as applied by federal courts to an agency’s interpretation of its own governing statute or regulations).
56. See Memorandum from Mike Reed to Joseph Freedman, supra note 41.
regulated by Federal or State law or occurs pursuant to an authorized Federal or State program." Thus, for example, salmon in an open ocean netpen could easily be deemed a fisheries resource and the deposit of food, antibiotics, and antifoulants into such a facility could be deemed to be made for the purpose of developing, maintaining or harvesting this resource. Under this interpretation, the EPA could only regulate the aquaculture facility if the discharges were exempt from regulation under the RHA, the CWA, and all other federal and state laws. Accordingly, the Ocean Dumping Act should be viewed only as a federal law of last resort for protecting the environment from discharges associated with open ocean aquaculture facilities.

D. Magnuson Fishery Conservation and Management Act—National Marine Fisheries Service

The Magnuson Fishery Conservation and Management Act (Magnuson Act) grants authority to National Marine Fisheries Service (NMFS) through the Secretary of Commerce to regulate fisheries in federal waters (within the 200 mile EEZ), for the purposes of conserving, restoring and protecting the nation’s fisheries. The statute provides a legal basis for NMFS to assert authority to regulate the construction and operation of aquaculture facilities in federal waters. This authority is based on the Act’s broad definition of “fishing,” which covers the harvesting of fish or activities likely to result in harvesting of fish.

The New England Fishery Management Council (Council) and NMFS have already asserted this authority by writing into the Atlantic salmon fishery management plan (FMP) an aquaculture exemption from the general prohibition against using any vessel of the United States for taking, catching, harvesting, or fishing for any Atlantic Salmon within the EEZ or landing any taken there. The Council and NMFS could amend the Atlantic salmon FMP to require that they specifically review and approve any proposed open ocean salmon aquaculture operation before it may rely on the aquaculture exemption in the salmon FMP. Regional Fishery Management Councils and NMFS could include similar provi-

60. 50 C.F.R. § 657.20(b).
sions in fishery management plans for other fish species proposed to be
grown in offshore aquaculture facilities.

E. Marine Mammal Protection Act (MMPA)—
NMFS and the Department of Commerce

NMFS, through the Department of Commerce, also has authority to
regulate open ocean aquaculture projects under the Marine Mammal
Protection Act (MMPA).\footnote{61} Any facility whose operation may endanger
critical habitat of marine mammals, or migratory paths for whales, or
otherwise may result in the taking (defined very broadly to include even
the disturbance or temporary restraint) of protected marine mammals,
would be subject to NMFS review and approval under the MMPA.\footnote{62}

Generally, the Act provides that any taking\footnote{63} of a protected marine
mammal, including whales, porpoises, seals, and sea lions, is illegal
unless it results from an activity approved by NMFS under the Act.\footnote{64}
Special provisions apply to taking of animals during commercial fishing
activities.\footnote{65}

Operations of many marine aquaculture facilities are highly likely to
result in takings as the result of marine mammals being attracted by the
concentrated and reliable presence of prey species.\footnote{66} These encounters
may result in mammals being inadvertently trapped or killed in nets or
other parts of a facility, or being shot and killed intentionally as costly
predators. Accordingly, many, if not most open ocean aquaculture
facilities will require NMFS approval under the MMPA.

F. National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) applies to any federal
action that might "significantly affect the quality of the human environ-

\footnote{61. 16 U.S.C. §§ 1361-1421h (1994).}
\footnote{62. 50 C.F.R. pt. 216 (1995).}
\footnote{63. "Taking" is defined under the MMPA as meaning "to harass, hunt, capture, or
\footnote{64. 16 U.S.C. § 1371 (1994).}
\footnote{65. 16 U.S.C. § 1383(a)(1) (1994).}
\footnote{66. See, e.g., David D. Platt, Task Force Sees to Resolve Seal-Salmon Conflict, THE
WORKING WATERFRONT, June 1994, at 5.}
ment. NEPA requires that where significant environmental impacts are expected, the lead permitting agency must identify the impacts, attempt to minimize or avoid those impacts, and explore alternatives that may be less harmful to the environment. The lead federal agency must prepare an environmental impact statement (EIS) for an action, such as a decision to approve an aquaculture project, that is significant and controversial. For smaller projects the permitting agency may only need to prepare an environmental assessment (EA) which involves a lesser degree of analysis. Where more than one federal agency proposes taking an action, such as issuing a permit or granting an approval necessary for the construction of a facility that might significantly affect the environment, NEPA regulations require that the agencies reach agreement as to which is the lead agency responsible for preparing the EIS.

Federal agencies have expressed conflicting views as to whether NEPA applies to aquaculture facilities in the open ocean. This conflict appears to have been resolved, however, in favor of the application of NEPA. The Army Corps of Engineers had taken the stance that NEPA does not apply to activities beyond the boundary of the territorial sea of the United States, generally beyond the twelve mile mark. Considerable debate arose regarding NEPA compliance for the American Norwegian Fish Farm Inc. proposal to install an extensive salmon net pen operation approximately fifty miles off Gloucester, Massachusetts. The Corps ultimately conceded that NEPA did apply to its permitting decision for the project under Section 10 of the RHA.

68. Id. § 4332(C).
69. NEPA regulations provide that "[a] lead agency shall supervise the preparation of an environmental impact statement," and that "the potential lead agencies shall determine by letter or memorandum which agency shall be the lead agency." 40 C.F.R. § 1501.5(a), (c) (1995).
70. Id. § 4332(2)(C)(i). See also 40 C.F.R. § 1508.12 (1995); 40 C.F.R. § 1508.27 (1995) (defining actions considered to be significant).
73. See Letter from Nancy P. Dorn to Rep. Gerry E. Studds, supra note 36, at 1 ("The position of the United States Government is that the National Environmental Policy Act . . . does not apply beyond the boundary of the territorial seas of the United States.").
74. See infra Part IV.A.
75. See infra notes 99-101 and accompanying text.
G. National Aquaculture Act—Department of Agriculture

In 1980, Congress passed the National Aquaculture Act (NAA) to demonstrate support for the growth of the aquaculture industry. The Act aimed primarily to promote economic development of aquaculture. Congress observed in the Act that the industry could "[augment] existing commercial and recreational fisheries and . . . [produce] other renewable resources, thereby assisting the United States in meeting its future food needs and contributing to the solution of world resource problems." However, the Act created no regulatory oversight authority. The NAA designated the Department of Agriculture as the lead agency for dissemination of national aquaculture information and activities, although the Act failed to fully or clearly define the Department of Agriculture's responsibilities in fulfilling this role, or to what extent other agencies were to be involved. In addition, the Secretary of Agriculture was assigned the task of consulting with the secretaries of Commerce and Interior, as well as other interested parties, to establish a National Aquaculture Development Plan. This task was equally vague. Some of the responsibilities the Act assigned to the agency included serving as a central source for sharing information about aquaculture, encouraging and coordinating efforts for the aquaculture industry, and continually monitoring and assessing the industry.

The provision of the NAA with the greatest potential to affect environmental regulatory oversight was its assignment to the Department of Agriculture the role of identifying "regulatory constraints" to the growth of the industry. The Act established the Joint Subcommittee on Aquaculture (JSA), an interagency body to provide coordination and offer recommendations for improving national aquaculture policy including helping to identify and recommend ways to reduce regulatory constraints. The Secretary of Agriculture serves as permanent chair of the JSA, and other members include the Secretary of Commerce, Secre-

77. Id. § 2801(c).
78. Id. § 2801(b)(3).
79. Id. § 2803(a)(2).
80. Id. § 2804.
82. Id. § 2805.
tary of the Interior, Secretary of Energy, Secretary of Health and Human Services, and the EPA Administrator.  

The JSA has done little to date to address regulatory constraints on the industry in a concrete way, despite its membership. Instead the JSA has focused largely on other constraints, such as the lack of sufficient veterinary pharmaceuticals, market development needs, technology development, and federal research funding. Just recently, however, the JSA has initiated a collaborative process among federal agencies to better coordinate regulatory responsibilities under the federal statutes that apply to aquaculture facilities. This effort has the potential to play a very useful role in identifying the current gaps and inefficiencies in federal environmental regulatory authority over aquaculture facilities, including those in the open ocean. If effective, this effort would result in the JSA proposing, in conjunction with its member agencies, specific regulatory changes under the several principal statutes discussed in this paper, and under specific new memoranda of agreement among the agencies defining their respective roles under NEPA and other statutes.

H. Endangered Species Act—Environmental Protection Agency

Under the Endangered Species Act (ESA) the Department of the Interior, as the lead agency, is responsible for ensuring that any federally permitted operation or activity does not adversely affect any threatened or endangered species. The ESA should play an important role in the proper permitting of aquaculture facilities in the open ocean for several reasons. First, the ESA would be needed to ensure that species introduced or grown in U.S. waters do not threaten species through genetic mixing, introduction of disease, or threats of predation. Second, large operations, if not planned carefully, could interfere with the important breeding patterns of threatened or endangered species if the operations are permitted in critical habitats, or if such operations block important migration routes. Therefore, it is critical that the Department of the Interior continue to play a role in the approval process for aquaculture facilities.

83. Id. § 2805(a).
84. See generally JSA REPORT, supra note 4.
85. Id. at 15-16.
87. See supra Part II.
I. The Lacey Act Amendments of 1981—U.S. Fish and Wildlife Service

The Department of Commerce, through the United States Fish and Wildlife Service (USFWS), also plays a role in the aquaculture permitting process under the Lacey Act Amendments of 1981. Specifically, the Act makes it a crime to "import, export, transport, sell, receive, acquire, or purchase any fish... taken, possessed, transported, or sold in violation of any law, treaty, or regulation of the United States." The Act gives the USFWS authority to regulate the introduction of exotic species into the United States that might be injurious to humans or other species.

This Act may become an important means of regulating aquaculture facilities, as increasing numbers of species are introduced to U.S. waters that could pose dangers to native species. For instance, the introduction of Grass Carp and Tilapia, two species native to Asia, Africa, and the Middle East, have been regulated under the Act, due to concerns that "escapees might reproduce and out compete native species for resources," or even "that they could overpopulate an area and overconsume its vegetation which might lead to disruption in nutrient cycles and possible water quality deterioration."

J. The Public Trust Doctrine

The public trust doctrine is a set of common law principles that gives states control of the navigable waters within their boundaries, and requires that states act as stewards of the resources in these waters for the benefit of the public. States are under an affirmative duty to "safeguard and enhance public interest in those lands and manage those lands for the benefit of the public," and thus must be careful not to allow private uses

89. Id. § 3372(a)(1).
91. Rychlak & Peel, supra note 1, at 857-58.
of the resources to unduly infringe on public uses of the resource. There is dispute about whether the federal government is under a similar obligation to preserve and protect federally owned waters as well. If courts are willing to recognize and impose the public trust doctrine upon the federal government, the aforementioned federal agencies would have another source of authority and responsibility upon which to protect the public's interest in healthy marine ecosystems from threats posed by open ocean aquaculture.

K. International Treaties and Protocols

International organizations and commissions in which the United States is a participant, and international treaties and protocols to which the United States is a party, may influence federal agencies' decisions about whether and how to exercise environmental oversight over open ocean aquaculture facilities, particularly those proposed for sites in the EEZ outside territorial waters. For example, the North Atlantic Salmon Conservation Organization (NASCO) developed Protocols for the Introduction and Transfer of Salmonids. The North American Commission adopted these protocols and guidelines for the introduction and transfer of salmonids, based upon concerns regarding the health and survival of the species. Federal agencies should turn to this and similar expressions of international scientific consensus and establish international procedures for reducing the environmental risks of open ocean aquaculture.

93. MARINE LAW INSTITUTE, supra note 8, at 8.
94. See, e.g., Charles F. Wilkinson, The Headwaters of the Public Trust: Some Thoughts on the Source and Scope of the Traditional Doctrine, 19 ENVTL. L. 425, 425 n.1 (1989) (noting that there are fifty state public trust doctrines, as well as one federal public trust doctrine). See also United States v. 1.58 Acres of Land, 523 F. Supp. 120, 125 (D. Mass. 1981) (where U.S. Coast Guard condemned piece of land on Boston waterfront, the court recognized federal trusteeship duties by declaring that the federal government could obtain ownership of the waterfront property). But see Alabama v. Texas, 347 U.S. 272, 277 (1953) (Black, J., dissenting) ("The United States holds [such] resources ... in trust for its citizens in one sense, but not in the same sense that a private trustee holds for a cestui que trust. The responsibility of Congress is to utilize the assets that came into the hands of the sovereign in the way that it decides best for the nation.").
96. Id. at 1.
The U.S. State Department's Bureau of Oceans & International Environmental & Scientific Affairs has expressed concern over large aquaculture facilities in the EEZ, and has noted that the EEZ remains an area outside U.S. territorial waters. Thus, aquaculture facilities may raise "unique questions in terms of consistency with United States law of the sea and international fisheries policy." In addition, the National Security Council Policy Coordinating Committee on Law of the Sea and Oceans Policy (PCC) has expressed the view that aquaculture projects "cannot be approved on the sole basis of the Rivers and Harbors Act, which does not take into account international ramifications." The PCC stresses that a broad range of legal and policy interests must be addressed before large-scale aquaculture operations are allowed to proceed.

IV. CASE STUDIES

This section briefly describes three proposed open ocean aquaculture projects and highlights aspects of their experiences of complying with federal environmental regulations. The purpose of this section is to illustrate deficiencies in the federal regulatory framework covering open ocean aquaculture facilities. The three examples are the American Norwegian Fish Farm, Inc. project (approximately fifty miles off Gloucester, Massachusetts), the Westport Scallop Project (approximately twelve miles off Martha's Vineyard), and the Sea Pride Industries, Inc. project (approximately four miles off Fort Morgan, Alabama). Each of these projects has experienced a long and difficult approval process due to the numerous environmental and user conflict concerns that have been raised, and due to the absence of clear regulatory pathways.

98. Id. at 2.
99. Id. at 3.
100. Id.
A. American Norwegian Fish Farm, Inc.—Gloucester, Massachusetts

American Norwegian Fish Farm, Inc. (ANFF), a private enterprise, has sought permission for nearly ten years to construct and operate a finfish (salmon) aquaculture facility approximately fifty miles east of Gloucester, Massachusetts.\(^{101}\) ANFF initially proposed ninety floating pens, each with a diameter of ninety feet, to be anchored to the seabed.\(^{102}\) As proposed, the facility would occupy approximately forty-seven square nautical miles.\(^{103}\) This would make the ANFF project the largest finfish operation in federal waters.\(^{104}\) After federal agencies expressed significant concern about the size of the facility and the unknown and potentially significant environmental impacts, ANFF subsequently proposed a prototype for the same location, consisting of only ten pens.\(^{105}\) ANFF’s prototype facility is awaiting approval.

Various factors have prevented approval. The Corps has asserted authority to issue a Section 10 permit for the facility under the RHA.\(^{106}\) This proposed action has triggered a dispute as to the Corps’ obligations under NEPA. Several federal agencies, including the EPA, NMFS, and


\(^{102}\) Id.; Letter from Ambassador David A. Colson to Policy Coordinating Committee on Law of the Sea and Oceans Policy, supra note 97, at 2.

\(^{103}\) Letter from Allen E. Peterson, Jr., to Colonel Brink P. Miller, supra note 101, at 1.

\(^{104}\) Letter from Dinah Bear, General Counsel, Executive Office of the President, Council on Environmental Quality, to Lt. General Henry J. Hatch, Commanding General, U.S. Army Corps of Engineers (May 6, 1992) (stating that given the “precedent setting nature of the project due to its large size and offshore location,” an EIS should be completed) (on file with Ocean and Coastal Law Journal).

\(^{105}\) Letter from Allen E. Peterson, Jr., to Colonel Brink Miller, supra note 101, at 1; Letter from Richard S. Emmet, Senior Attorney, Conservation Law Foundation, to Grant Kelly, Chief, Permits Branch, New England Army Corps of Engineers (May 25, 1994) (on file with Ocean and Coastal Law Journal).

the U.S. Fish and Wildlife Service, have called for a full environmental impact statement (EIS). The Corps only grudgingly conceded that it has any duty under NEPA, after asserting for a long time that a Section 10 permit for a project outside twelve miles did not trigger NEPA. The Corps also denied it had to prepare any more than an environmental assessment (EA). The Conservation Law Foundation (CLF) disagreed, and filed suit against the Corps for refusing to prepare an EIS, thereby blocking Corps Section 10 approval.

Other federal agencies have also asserted authority to address environmental concerns raised by the project, including impacts on water quality, transfer of diseases to wild fish, genetic pollution, and potential interference with important habitats such as Stellwagen Bank. In order to ensure that environmental impacts are minimized, NMFS has requested that a complete baseline survey be conducted for the subject area, as well as a detailed and comprehensive monitoring system due to the project's size and lack of information currently available. Additionally, the EPA has asserted authority to regulate the facility under the CWA but has done little to define how it will implement this authority.


108. See supra note 73 and accompanying text. Although the Corps stated that NEPA did not apply, they were willing to prepare an Environmental Assessment in order to satisfy Executive Order 12114, which requires an evaluation where there is a potential for environmental problems. See Letter from Lester Edelman, Chief Counsel, Dept. of the Army, Office of the Chief of Engineers, to Dinah Bear, General Counsel, Executive Office of the President, Council on Environment Quality (June 1992) (stating that "I am concerned by . . . [the] suggestion that [NEPA would] . . . require the Corps to prepare an environmental impact statement (EIS) for the proposed aquaculture facility. It is my understanding that the position of the United States . . . is that NEPA does not apply outside territorial boundaries of the United States . . . . Nevertheless, the Corps has chosen voluntarily to prepare an environmental assessment (EA) on this proposed facility.") (on file with the Ocean and Coastal Law Journal).


110. Memorandum from Allen E. Peterson, Jr., to Colonel Brink P. Miller, supra note 101.

111. Id.

112. See Memorandum from Joseph Freedman, supra note 41 (noting assertion of jurisdiction over American Norwegian, Inc. aquaculture project).
B. Westport Scallop Project—Martha’s Vineyard

Westport Scalloping Corp., a private entity, and the Massachusetts Institute of Technology (MIT) Sea Grant College Program, are seeking approval for a sea scallop grow-out facility approximately twelve miles southwest of Martha’s Vineyard, Massachusetts. The project, which would occupy nine square miles, would include bottom culture grow-out, and a moored string supporting a grow-out array of nets suspended from buoys. This project has also faced delays since it was originally proposed in 1994, due to uncertainties about the roles that federal agencies should play. Concerns that have been addressed include: water quality and other environmental impacts, conflicts with local fishermen arising from the placement of the facility relatively close to shore, and potential conflicts with migratory paths of marine mammals, such as northern right whales.

The New England Fishery Management Council has asserted authority over the project and has developed a proposed amendment to the Sea Scallop FMP that would prohibit certain types of fishing within the site (including trawling, dredging and gillnet fishing) and restrict but allow others (including lobster pots and longlining). Although there is limited expertise among Council members or staff for evaluating highly technical environmental issues, the Council has been able to review the potential environmental impacts of the proposed project, and has made a formal determination that the project “would not significantly affect the quality of the human environment” under the terms of NEPA; thus eliminating the need for an EIS.

C. Sea Pride Industries, Inc.—Fort Morgan, Alabama Project

Sea Pride Industries, Inc., a private company, has obtained a Section 10 permit from the Corps and a CWA ocean discharge permit from the...
for a technologically advanced aquaculture facility to be sited in shallow water (fifty feet) in the northern Gulf of Mexico, approximately four miles southeast of Fort Morgan, Alabama. Several years were required to design the project and to obtain the requisite permits.

Significant remaining technological and engineering uncertainties will require the development of the Sea Pride-Fort Morgan project to proceed gradually, as different elements of its complex finfish and oyster containment and feeding systems are tested and refined. Catastrophic failure during a hurricane presents the largest technological risk, and potentially the most significant environmental risk, due to the possible sudden release of massive numbers of farmed finfish. Siting a large aquaculture facility in shallow marine water with weak tidal or other mixing can raise special environmental concerns relating to excess nutrient loads, which can exacerbate local hypoxic or anoxic conditions. These and other environmental concerns suggest that continuous environmental monitoring will be critical to maintaining adequate environmental regulatory oversight of this project.

V. RECOMMENDATIONS

The National Marine Fisheries Service is well suited for assuming the role of the lead federal agency to be generally responsible for protecting the environment from impacts of open ocean aquaculture operations. It

119. United States Environmental Protection Agency, Region IV, Authorization to Discharge Under the National Pollutant Discharge Elimination System, Permit No. AL0067237 (effective Nov. 1, 1994). See also Cake & Ericson, supra note 118, at 6.

120. Cake & Ericson, supra note 118, at 6.


122. See NATIONAL RESEARCH COUNCIL, MARINE AQUACULTURE: OPPORTUNITIES FOR GROWTH 101-06 (1992) (discussing environmental impacts associated with the introduction of nonindigenous species).

123. See id. at 96-97 (discussing water quality impacts associated with aquaculture effluents and waste discharge).
has the broad scientific expertise for analyzing impacts on marine ecosystems, including the impacts associated with escapes, parasites and pathogens, and risks to marine mammals. NMFS, through the regional fishery management councils, is also uniquely positioned to address the user conflict problems associated with any proposal to set aside, for the exclusive use of one entity, a large area of the sea surface, water column, and possibly the seabed. There are obvious impacts on wild capture fisheries and on marine mammals which no other federal agency could more effectively evaluate.

Other federal agencies could fill in specific gaps. For example, the EPA could address water quality impacts by requiring NPDES permits under the CWA. Additionally, the Corps could address general impacts on navigability by requiring a Section 10 permit under the RHA.

NMFS should use its broad authority for fishery conservation and management under the Magnuson Act to promulgate regulations requiring that open ocean aquaculture facilities be approved by NMFS through a Fishery Management Plan. NMFS should use the same broad criteria for approving an aquaculture FMP or FMP amendment that it uses for writing capture fishery FMPs. The Magnuson Act specifies that the term “conservation and management” refers to all rules, regulations, conditions, methods, and other measures:

(A) which are required to rebuild, restore, or maintain, and which are useful in rebuilding, restoring, or maintaining, any fishery resource and the marine environment; and

(B) which are designed to assure that—

(i) a supply of food and other products may be taken, and that recreational benefits may be obtained, on a continuing basis;
(ii) irreversible or long-term adverse effects on fishery resources and the marine environment are avoided; and
(iii) there will be a multiplicity of options available with respect to future uses of these resources. 

Thus, NMFS would have adequate authority to consider all potential environmental impacts of open ocean aquaculture facilities in determining whether to approve a facility, and in drafting specific FMP conditions on the siting, construction and operation of a particular facility. Further-

more, as the federal agency principally responsible for reviewing and approving open ocean aquaculture facilities, NMFS could be designated by memorandum of agreement with the Corps, EPA and other federal agencies, as the lead federal agency under NEPA. NMFS already has a well established procedure for NEPA compliance in connection with approval of FMPs for capture fisheries in the EEZ. This procedure could be easily extended to cover FMPs for aquaculture facilities.

VI. CONCLUSION

The development of federal regulations for biotechnology products offers a model for the development of federal regulations for open ocean aquaculture operations. Recombinant DNA techniques, the foundation of the modern biotechnology industry, were developed at Stanford University in 1972. Genetic engineering quickly became a commercial technology, and by the early 1980s federal regulators began to consider how to regulate biotechnology products. In 1984, the White House Office of Science and Technology Policy (OSTP) charged an interagency working group with developing a federal policy for regulation of biotechnology products.

Since the biotechnology industry was new, there were no federal statutes specific to biotechnology to which OSTP could turn. Rather than seek new legislation, the OSTP group decided that federal agencies should apply existing statutes to biotechnology products. In 1984, OSTP proposed a policy statement outlining how existing statutes administered by USDA, EPA, FDA and other agencies would be applied. Following a comment period, OSTP published a revised version of the Coordinated Framework for Regulation of Biotechnology in 1986.

125. See Alek P. Szecsy, From the Test Tube to the Dinner Table in Record Time: Liberalizing Effects on Domestic and International Regulatory Frameworks for Controlled Environmental Introduction of Genetically Engineered Agricultural Organisms, 2 DICK. J. ENVTL. L. & POL’Y 177, 178 n.3 (1993).
129. Coordinated Framework for Regulation of Biotechnology; Announcement of
subsequently promulgated several regulations under the Framework and the FDA published a policy on the regulation of genetically engineered foods. 130

Various commentators, including the Environmental Defense Fund, have criticized the Coordinated Framework on a number of grounds. 131 Nevertheless, federal agencies have issued thousands of permits and other federal approvals under the Framework, and most biotechnology companies support the Framework. As a model for open ocean aquaculture, experience with biotechnology regulation demonstrates that federal agencies can work cooperatively to create a functional regulatory system for new technology, using statutes not specifically written for such a purpose.

The JSA may be able to provide the necessary leadership to stitch together from existing federal laws an efficient, and environmentally protective, federal coordinated framework for the regulation of open ocean aquaculture.

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130. See Szecsy, supra note 125, at 185-87.