

**Testimony of Tim Eichenberg, Director, Pacific Regional Office  
The Ocean Conservancy**

**Before the**

**Senate Committee on Commerce, Science and Transportation  
National Ocean Policy Study**

**June 8, 2006**

**INTRODUCTION**

Good morning Mr. Chairman and Members of the Subcommittee. My name is Tim Eichenberg, and I am the Director of the Pacific Regional Office of The Ocean Conservancy. Thank you for inviting me to testify before your Subcommittee.

The Ocean Conservancy strives to be the world's foremost advocate for the oceans. Through science-based advocacy, research, and public education, we inform, inspire, and empower people to speak and act for the oceans. The Ocean Conservancy is the largest and oldest nonprofit conservation organization dedicated solely to protecting the marine environment. Headquartered in Washington, D.C., The Ocean Conservancy has offices throughout the United States, including New England, the Southeastern Atlantic, the Gulf of Mexico, the Pacific, and the Caribbean.

I congratulate you for carefully examining an issue of great importance for the future of our oceans. Some may view offshore aquaculture as the solution to the U.S. seafood deficit and declining ocean fisheries. But two recent national ocean commissions and numerous scientific studies have noted that, unless carefully and sustainably managed, marine finfish aquaculture can exacerbate – not solve – declining ocean health.<sup>1</sup>

I first examined this issue in the early 1990s for the Marine Law Institute at the University of Maine School of Law, just as the salmon farming industry was taking off in Maine.<sup>2</sup> At that time the industry was viewed with great promise for its potential to revive sagging local economies hit hard by decades of overfishing, a vision that has been only partially realized, due in part to stiff competition from inexpensive imports. Maine is where I first encountered farmed salmon teeming with sea lice, and realized that the industry's potential is tempered by risks that need to be addressed.

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<sup>1</sup> Pew Oceans Commission, *America's Living Oceans* (2003); U.S. Commission on Ocean Policy, *An Ocean Blueprint for the 21<sup>st</sup> Century* (2004).

<sup>2</sup> Tim Eichenberg, *Legal Methods for Promoting Local Salmon Farming in Down East Maine, and An Assessment of the Regulatory Framework for Finfish Aquaculture in Marine Waters*, Marine Law Institute (1992); *Improving the Legal Framework for Marine Aquaculture: The Role of Water Quality Laws and the Public Trust Doctrine*, 2 Territorial Sea Journal 339 (1992); *Growing Pains in Maine's Salmon Aquaculture Industry*, 6:1 National Coastal Resources Institute News (1991).

More recently, I worked on two studies by the Center for Marine Policy at the University of Delaware that examined the lack of a coherent policy framework for offshore marine aquaculture in the U.S. Exclusive Economic Zone (EEZ), and developed a set of very detailed recommendations fashioned by stakeholders for a sustainable and precautionary program for planning, siting, zoning, leasing, permitting, monitoring, mitigating, and enforcing offshore aquaculture operations.<sup>3</sup>

And just last month, I completed work on legislation in California signed by Governor Arnold Schwarzenegger on May 26<sup>th</sup>, sponsored by The Ocean Conservancy and California Senator Joe Simitian, that provides comprehensive standards for leasing state waters for marine finfish aquaculture (SB 201, The Sustainable Oceans Act).<sup>4</sup> The bill was supported by more than 30 business, fishing, academic and conservation organizations.<sup>5</sup>

The following testimony discusses the risks associated with marine finfish aquaculture; describes the California bill, which the Subcommittee should consider in developing an appropriate federal regulatory regime; comments on the Administration's proposal, introduced by Senators Ted Stevens and Daniel Inouye as S. 1195, which unfortunately in my view is still insufficient to safeguard our ocean resources; and suggests ways to better protect our oceans from the potential adverse effects of marine finfish aquaculture.

### **RISKS ASSOCIATED WITH MARINE FINFISH AQUACULTURE**

Open ocean aquaculture is promoted as a solution to the ocean's diminishing resources. However, it also poses significant risks, including escapement of fish, damage to the surrounding environment, harmful effects on native fish populations, and pollution. These risks, and their consequences, are largely dependent upon the location of the operation, its size or scope, the management practices, the capacity of the receiving water body, and the choice of species to be raised in a particular area.

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<sup>3</sup> *An Operational Framework for Offshore Marine Aquaculture in U.S. Federal Waters*, The Mangone Center for Marine Policy, University of Delaware (October 2005); *Development of a Policy Framework for Offshore Aquaculture in the 3-200 Mile U.S. Ocean Zone*, Center for the Study of Marine Policy, University of Delaware (2001).

<sup>4</sup> SB 201, Chapter 36, Statutes of 2006. An act to amend Sections 15400, 5405, 15406, 15406.5, and 15409 of, and to add Sections 54.5 and 15008 to, the Fish and Game Code, and to amend Section 30411 of the Public Resources Code, relating to aquaculture.

<sup>5</sup> SB 201 was supported by The Ocean Conservancy (sponsor), Bluewater Network, California Coastkeeper Alliance, California Coastal Protection Network, California League of Conservation Voters, CalTrout, Coastside Fishing Club, Center for Food Safety, Defenders of Wildlife, Environment California, Environmental Center of San Luis Obispo, Environmental Defense, Environmental Defense Center, Environmental Entrepreneurs, Institute of Marine Sciences – US Santa Cruz, Monterey Bay Aquarium – Center for the Future of the Oceans, Natural Resources Defense Council, Oceana, O'Neil Sea Odyssey, Orange County Coastkeeper, Pacific Coast Federation of Fishermen's Associations, Planning and Conservation League, Santa Barbara Channelkeeper, San Diego Baykeeper, San Luis Obispo Coastkeeper, Santa Monica Baykeeper, Save Our Shores, Seaflow, Sierra Club California, The Nature Conservancy, University of California Marine Council.

**Fish Escapement:** Perhaps the single greatest ecological and economic threat associated with the growth of offshore aquaculture is the potential to introduce invasive species to the surrounding ecosystem and nearby coastal communities. Millions of farmed fish escape from fish farms because of storms, human error, and predators. According to the National Marine Fisheries Service (NMFS) and many other authorities, escapes result in harmful interactions with native fish, including competition with wild stock for food, habitat and mates; transfer of potentially deadly diseases and parasites to wild stocks; and genetic modification of wild stocks through inter-breeding.<sup>6</sup> Farmed fish are vastly different and can weaken the genetic makeup of wild populations.<sup>7</sup>

**Threat of Disease and Pollution:** Offshore aquaculture also presents numerous additional biological threats to ocean ecosystems. Fish farms, like animal feed lots, produce enormous pollution. The excreta from an average floating cage farm can produce nutrients and fecal matter equal to a city of 20,000-65,000,<sup>8</sup> and the potential wastes for a \$5 billion U.S. industry – called for by NOAA – would discharge annually the nitrogen equivalent of the untreated sewage of 17 million people.<sup>9</sup> Depending upon pollutant composition and the cumulative effects of similar cages in a particular area, discharges may cause harmful effects on the surrounding environment. Fish farms can change the chemical and biological structure of the sediment under net pens, and in severe cases cause “dead zones.”<sup>10</sup>

Additionally, outbreaks of diseases and parasites are a constant risk because the density of fish in aquaculture operations is so much higher than in nature. Disease, pathogens, and parasites multiply rapidly in crowded pens and can spread to wild fish stocks. Farmed species, depending upon species and diet, can even present increased public health risks to the people who consume them. Concentrations of Polychlorinated

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<sup>6</sup> NOAA Technical Memorandum NMFS-NWFSC-71, *Guidelines for Ecological Risk Assessment of Marine Aquaculture* (December 2005); Goldberg, R., Elliott and Naylor, *Marine Aquaculture in the United States: Environmental Impacts and Policy Options*, Pew Oceans Commission (2001).

<sup>7</sup> Hindar, K., *Interactions of cultured and wild species (draft)*. Marine aquaculture and the environment: a meeting for stakeholders in the Northeast, University of Massachusetts, Boston. 11-13. January 2001; McGinnity et al., *Genetic impact of escape farmed Atlantic salmon on native populations: use of DNA profiling to assess freshwater performance of wild farmed and hybrid progeny in a natural river environment*, ICES Journal of Marine Science, 54:998-1008 (1997); Naylor, R and Burke, *Aquaculture and ocean resources: Raising tigers of the sea*, Annual Review of Environment and Resources, 30: 185-213 (2005).

<sup>8</sup> Hardy, R.W., *Fish, feeds and nutrition in the new millennium*, *Aquaculture Magazine*, 26(1):85-89; See also, *What's Behind That Farmed Salmon Steak?* Salmon Nation (2002) at <http://www.salmonnation.com/farmed.html>, citing David Suzuki Foundation, (2002) *Ocean Pollution from Salmon Farming*, [http://www.davidsuzuki.org/Oceans/Fish\\_Farming/Salmon/Pollution.asp](http://www.davidsuzuki.org/Oceans/Fish_Farming/Salmon/Pollution.asp).

<sup>9</sup> Goldberg, R and Naylor, *Transformed seascapes, fishing, and fish farming*, *Frontiers in Ecology and the Environment*, 3:21-28 (2005).

<sup>10</sup> Beveridge, M.C.M., *Cage Aquaculture*, 2d ed. Fishing News Books, Edinburgh, Scotland, 346 (1996); EAO, British Columbia Environmental Assessment Office, *The Salmon Aquaculture Review Final Report*, April 8, 2001, <http://www.eao.gov.bc.ca/project/aquacult/salmon/report/toc.htm>; Folke C., Kautsky and Troell, *The costs of eutrophication from salmon farming: Implications for management*, *Journal of Environmental Management*, 40: 173-182 (1994).

Biphenyls (PCBs), toxaphene, and dieldrine have been found to be significantly greater in farmed salmon species than in wild species.<sup>11</sup>

Fish farms also use a wide variety of antibiotics, pesticides, parasiticides, hormones, anesthetics and other chemicals that enter the marine environment.<sup>12</sup> Wild fish near fish farms accumulate higher amounts of mercury,<sup>13</sup> and drugs can select for resistant bacteria, sometimes even in wild fish consumed by humans.<sup>14</sup>

**Harmful Ecosystem and Marine Wildlife Effects:** Seals, sea lions and other marine wildlife prey on farmed fish and are targets for predator controls and, in some cases, are shot. Acoustic deterrents such as seal bombs and intense underwater loud speakers cause disorientation, pain or hearing loss, and alter the behavior of marine species.<sup>15</sup> Aquaculture operations also may require dredging, drilling, the use of large heavy anchors, and other disturbances to sediment and bottom habitats, which can displace ocean wildlife, smother bottom-dwelling animals, destroy hiding places for young fish, and cause other ecological changes to the sea floor.

The use of fish meal to feed farmed carnivorous fish produces a net loss of fish protein, reduces wild fish populations, and can change the distribution and reproductive success of other species throughout the marine ecosystem. It can take from 2-5 pounds of wild fish to produce one pound of some farmed fish species.<sup>16</sup> Farmed fish are fed 12 percent of the world's catch, and consume about 40 percent of the world's fishmeal supply (20 billion pounds of fish).<sup>17</sup>

### **CALIFORNIA'S "SUSTAINABLE OCEANS ACT"**

Our oceans are a public trust, and any commercial farming of them must be done sustainably and with precaution. Unfortunately, current regulations and mitigation strategies at the federal level are inadequate to guide the aquaculture industry or manage its risks. Regulatory agencies with overlapping and conflicting authority have caused significant confusion regarding environmental requirements, siting considerations, leasing procedures and jurisdictional responsibility.<sup>18</sup>

Without careful legislative coordination of NOAA's jurisdiction and responsibilities with those of other agencies, we believe problems will persist, with potentially serious

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<sup>11</sup> See Hites, et. al, *Global Assessment of Organic Contaminants in Farmed Salmon*, 203 SCIENCE at 226.

<sup>12</sup> Naylor, R. et al, *Effect of Aquaculture on World Fish Supplies*, Nature, 405:1017-1024 (2002).

<sup>13</sup> deBruyn, A. et al., *Ecosystemic Effects of Salmon Farming Increase Mercury Contamination in Wild Fish*, Environment Science and Technology, 40(11): 3489 – 3493 (2006).

<sup>14</sup> Evrik, A. et al, *Impact of administering antibacterial agents on wild fish and blue mussels in the vicinity of fish farms*, Diseases of Aquatic Organisms, 18:45-51 (1994); Krosek, M, Lewis and Volpe, Transmission dynamics of parasitic sea lice from farm to wild salmon, Proc. Royal Society B., 272:689-696 (2005).

<sup>15</sup> Hastings M.C., et al, *Effects of low-frequency underwater sound on hair cells of the inner ear and lateral line of the teleost fish*, Journal of the Acoustical Society of America, 99(3):1759-1766 (1996); Natural Resources Defense Council, *Sounding the Depths: Supertankers, Sonar and the Rise of Undersea Noise* (1999); Naylor, R. et al., *supra* note 11.

<sup>16</sup> Goldburg and Naylor, *supra* note 9; Naylor, R, et al., *Id.*; Naylor and Burke, *supra* note 7.

<sup>17</sup> Tacon, A.G.J. and Forster, *Global trends and challenges to aquaculture and aquafeed development in the new millennium*, International Aquafeed-Director and Buyers Guide, 2001:4-25 (2000)

<sup>18</sup> See, *An Operational Framework*, *supra* note 3.

environmental consequences. Moreover, it is imperative that any management regime address specifically and comprehensively the potentially serious risks of offshore aquaculture to marine ecosystems, consumer health and safety, fisheries, and fishing communities.

It was with this in mind that The Ocean Conservancy sponsored the “Sustainable Oceans Act,” recently passed by the California legislature, and signed by Governor Schwarzenegger on May 26. I am submitting a copy of this legislation for the record. Sponsors of this new law worked with stakeholders and government agency officials for more than a year to develop the most comprehensive standards in the nation for marine finfish aquaculture. We believe the standards developed for the State of California could serve as a good model for any legislation to manage offshore aquaculture within waters under federal jurisdiction.

The Sustainable Oceans Act establishes a process for leasing state marine areas for offshore finfish aquaculture, and does so in a way that aims to protect marine life, water quality, and consumers.

The Act requires finfish farmers to obtain a lease from the California Fish and Game Commission (Commission) in order to conduct marine finfish aquaculture. It also requires that a programmatic environmental impact report (PEIR) for commercial aquaculture operations be prepared to provide a framework for managing aquaculture in an environmentally sustainable manner throughout the State. In addition to identifying coastal locations best suited for finfish farming, the PEIR must consider: the effects on human health and the marine environment from the chemical and biological products used in fish farming; the effects of fish farming on mammals, birds and sensitive habitats; the effects of the use of fish meal; and the threat of escaped fish on the environment. In addition to the PEIR, the California Environmental Quality Act also requires that a separate environmental analysis be conducted for each lease to determine if an individual environmental impact report (EIR) must also be prepared.<sup>19</sup>

Under the Act, the Fish and Game Commission may lease marine areas for aquaculture only after consultation with affected stakeholders through a fair and transparent public process that includes notice and comment. In addition, the Commission may only issue leases that meet a comprehensive list of standards, all of which are designed and are essential to minimize harmful effects on human health and the marine environment. These standards include, but are not limited to, the following:

- 1) Leases may only be adopted by the Fish and Game Commission for commercial finfish aquaculture if the site has been considered appropriate in a programmatic EIR.
- 2) Leases cannot interfere with fishing or other public trust uses, disrupt or harm wildlife and habitats, or otherwise harm the marine environment.
- 3) Operations must minimize the use of fish oil and fish meal, due to their adverse affects on ocean ecosystems, and alternatives must be used where possible.

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<sup>19</sup> California Public Resources Code §§2100-21177.

- 4) Finfish farmers must establish “best management practices” that include regular monitoring and reporting, and site inspections. The state Fish and Game Commission can remove fish stocks, close facilities, or terminate a lease if the operations are not in compliance with best management practices or are damaging the marine environment.
- 5) Lessees must conduct baseline assessments of the site prior to undertaking operations, and must monitor the habitat during operation.
- 6) The numbers of finfish raised and their density within the site must remain limited to what can be safely raised without harming the marine environment.
- 7) Lessees must minimize the use of chemicals and drugs, and may only use drugs, therapeutic substances and antibiotics as approved by the U.S. Food and Drug Administration for marine finfish aquaculture.
- 8) The Commission must require in a lease that all farmed fish are marked, tagged or otherwise identified as belonging to the operator of the operation.
- 9) Facilities must be designed to prevent the escape of farmed fish into the wild, and to withstand severe weather and accidents.
- 10) Aquaculture operators must prevent discharges of pollutants to the maximum extent possible, and must meet all the water quality requirements of the State Water Resources Control Board and the applicable regional water quality control board.
- 11) Lessees must restore an area to its original condition upon termination of the lease, and are responsible for any damages caused by their operations.

The standards and requirements established by the Sustainable Oceans Act represent an innovative yet common-sense approach toward minimizing the risks posed by this emerging industry. California has long led the way in protecting the oceans, and once again has set an example that Congress can follow to protect our federal marine areas.

#### **S. 1195: THE NATIONAL OFFSHORE AQUACULTURE ACT OF 2005**

In light of the foundation laid by the Sustainable Oceans Act, and after carefully reviewing the bill before your Subcommittee, I regretfully conclude that it does not meet the high standards needed to address the impacts of offshore aquaculture for a number of reasons briefly summarized below. Nor has NOAA addressed key questions on how the legislation will prevent offshore fish farming from exacerbating the serious problems that face the oceans. We are submitting a copy of these questions for the record.<sup>20</sup>

**Findings:** As currently drafted, the findings of Congressional policy in section 2 generally promote the development of aquaculture with little acknowledgement of its risks or effects on other ocean uses. While the findings acknowledge “wild stocks” and “marine ecosystems,” we recommend the findings be expanded to ensure the policy reflects a more balanced perspective on the development of a new ocean use and its potential risks to other ocean uses and the marine environment.

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<sup>20</sup> Letter to Susan Bunsick, NOAA Fisheries, from Anne Mosness, Go Wild Campaign, August 25, 2005.

**Definitions:** Section 3 defines “demonstration” to include both pilot scale-testing of aquaculture science and technologies, or farm-scale research. This definition is too vague to give sufficient guidance. “Pilot scale,” “science,” “technologies,” and “farm-scale research” are subjective terms not defined further in the bill. We recommend that you clarify these terms to ensure that demonstration projects are conducted in an ecologically protective manner.

**Offshore Aquaculture Permits:** Section 4 should be amended to provide a stronger framework to ensure offshore aquaculture is well coordinated with other ocean uses and protects the public trust. This section directs the Secretary of Commerce to establish a site and operating permit process to make areas of the U.S. EEZ available to persons to develop and operate offshore aquaculture facilities. However, it leaves too much agency discretion to the particular procedures that will be followed in granting permits, including timing of regulatory processes, and the necessary criteria for permitting aquaculture operations.

The bill requires the Secretary to specify the size and location of an offshore aquaculture facility in individual site permits, and requires consultation with other federal agencies to ensure that a specific offshore aquaculture facility is compatible with other uses of the EEZ. The bill lacks, however, a mechanism to determine, in advance of individual siting decisions, where offshore aquaculture is, and is not, generally appropriate within the EEZ. Similar to the PEIR in the California bill, federal legislation should include a process that would clearly articulate criteria and a process for NOAA to follow in establishing zones appropriate for development of offshore aquaculture operations and areas that are inappropriate such as marine sanctuaries, marine protected areas, and essential fish habitat.

The bill should also include language prohibiting the issuance of any aquaculture permits under this section until the agency has promulgated comprehensive regulations to guide its decision-making, including a process for including the public in the permitting process. The timely establishment of clear, consistent, and enforceable regulations is critical for both the public and industry.

Section 4 should also ensure that permitting fees are adequate to pay for the costs of administering the program, and that lease or royalty payments adequately compensate for the use of public resources consistent with the government’s public trust responsibilities and other federal laws (such as oil and gas extraction).

Finally, section 4 should prohibit the use of non-native and transgenic species in marine aquaculture operations. States like California have already implemented such prohibitions in legislation to protect state waters.

**Environmental Requirements:** We are concerned that S. 1195 establishes few parameters to guide agency consideration of the ecological impacts of aquaculture facilities. Although subsection (4)(c) authorizes the Secretary to issue operating permits under “such terms and conditions as the Secretary shall prescribe” and subsection (4)(d)

directs the Secretary to “consult as appropriate” with other federal agencies to ensure that offshore aquaculture facilities meet the environmental requirements established under section 5(a) of the bill, section 5(a) does not establish any new requirements. Instead, it simply directs the Secretary to consult with other federal agencies to identify the environmental requirements applicable to offshore aquaculture under existing laws and regulations,

While the bill authorizes the Secretary to establish additional environmental requirements, the process for consultation with other stakeholders as well as the content of any such additional requirements is left to the discretion of the Secretary. Furthermore, subparagraph (d)(6) requires only that the Secretary “periodically review” the criteria for issuance of site and operating permits. Given the unique risks posed by the burgeoning aquaculture industry, we recommend that the bill include standards for siting and operating permits that are precautionary, comprehensive, clear, and legally binding, based on NOAA’s own “2002 Code of Conduct for Responsible Aquaculture,” the standards for siting, cultured species, pollution control, monitoring and leasing in California’s Sustainable Oceans Act listed above, and on the principles set forth in The Ocean Conservancy’s November 1, 2005, letter to Senators Stevens and Inouye, submitted for the record.

**Research and Development:** S. 1195 allows the Secretary to conduct research and development to advance technologies that are compatible with the protection of marine ecosystems. This work should be carried out in close coordination with other relevant agencies. The bill should direct NMFS to develop and publish such research in time to help guide development and promulgation of regulations under section 4 of the bill.

**Administration:** S. 1195 should establish reasonable timelines and deadlines for the promulgation of regulations necessary to administer this program. As outlined earlier, we believe that the bill should make clear that permitting for commercial aquaculture facilities may not proceed until the National Marine Fisheries Service has promulgated those regulations.

Additionally, we recommend amendments to subsection 4(c) to detail processes for resolving disputes that may arise in decision making. Other than requirements that the Secretary consult with other relevant agencies “as appropriate” (section 4(d)(1)) and the requirement to obtain “concurrence” (section 4(a)(2)) from the Department of Interior on some decisions, the bill currently does not articulate a process for resolving interagency disputes.

Despite the language of subsection 5(f), subsection 5(g) takes the highly unusual step of authorizing the Secretary to apply the provisions of any other federal statute to offshore aquaculture facilities if the Secretary determines that it is in the public interest. In our view, Congress, and not the Secretary, should determine in the first instance whether those laws apply to offshore aquaculture facilities.

**Authorization of Appropriations:** Section 8 authorizes to be appropriated to the Secretary such sums as are necessary to carry out the Act. Although this section gives the appropriators wide latitude, an authorization for a specific dollar amount in each of the fiscal years authorized by the bill would give the members of the appropriations committee and the public some indication of the resources needed to fully and effectively implement this program. We suggest that this section also include specific authorizations for research and the promulgation of regulations.

**Enforcement:** Section 10 of the bill should further clarify the circumstances and use of available enforcement authority and incorporate a citizen suit provision, similar to those utilized in other federal statutes regulating biological pollution. In addition, we believe section 11 should be amended to include a liability in rem provision, and that section 13 should include language ensuring that forfeited resources made available for sale do not endanger public health.

### **CONCLUSION**

Thank you again for the opportunity to address the Subcommittee. The Ocean Conservancy looks forward to working with you to develop an effective and efficient management regime that safeguards the environment and protects the public trust.