

A
CODE OF CONDUCT
FOR
RESPONSIBLE AQUACULTURE DEVELOPMENT
IN THE
U.S. EXCLUSIVE ECONOMIC ZONE

ACKNOWLEDGEMENTS

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NMFS seeks the continued cooperation of stakeholders to promote the understanding of the Code among groups and individuals who wish to develop a national aquaculture industry in the EEZ, and to introduce and promote schemes for its voluntary acceptance.

NMFS seeks continued collaboration of stakeholders to fulfill and implement the objectives and principles of the Code effectively, and subsequently to revise or update the Code to take into account the latest developments in aquaculture technologies and scientific information from all relevant fields.

ACRONYMS OF ORGANIZATIONS AND OTHER USEFUL TERMS

ACOE	Army Corps of Engineers
APHIS	Animal and Plant Health Inspection Service (USDA)
BMP	Best Management Practice
CBD	Council on Biological Diversity
CITES	Convention on International Trade in Endangered Species
COC	Code of Conduct
COP	Code of Practice
CZ	Coastal Zone
DOC	United States Department of Commerce
EPA	United States Environmental Protection Agency
EEZ	Exclusive Economic Zone
EIFAC	European Inland Fisheries Advisory Council
EO	Executive Order
ESA	Endangered Species Act.
FAO	Food and Agriculture Organization (of the United Nations)
FDA	United States Food and Drug Administration
FWS	United States Fish and Wildlife Service
GIS	Geographical Information System
HACCP	Hazard Analysis Critical Control Point
ICES	International Council for the Exploration of the Sea
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service (NOAA)
NNASA	Non-indigenous Nuisance Aquatic Species Act
NOAA	National Oceanic and Atmospheric Administration (DOC)
USCG	United States Coast Guard
USDA	United States Department of Agriculture

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1. THE RATIONALE FOR AQUACULTURE DEVELOPMENT IN THE UNITED STATES EXCLUSIVE ECONOMIC ZONE (EEZ)

Aquaculture is the cultivation of aquatic animals and plants in controlled or selected environments for commercial, recreational, or public purposes. Such organisms are raised primarily to supply (sea)food for human consumption, but they can also be used to enhance wild populations, for breeding programs in public aquariums and zoos, rebuilding populations of threatened and endangered species, baitfish production, and to produce other non-food products, such as pharmaceuticals. Aquaculture supports a variety of commercial and non-commercial markets both in the United States and overseas, and the many and disparate sub-industries of aquaculture provide employment, trade and economic well-being, and recreation for a large number of American people.

The increasing demand for seafood by American consumers is fueling growth of the aquaculture industry. In its latest annual summary of national fisheries statistics, the Department of Commerce (DOC) reports a 1.3% increase in per capita consumption of edible seafood in 2000. Much of this is attributable to the annual increase in imports, which rose to 1.8 million metric tons of high-value products at a cost of \$10.1 billion. Annual exports are also increasing and now approach 1 million metric tons, but by comparison they are low-value products. Consequently, the trade deficit in edible seafood widened to \$7.1 billion. Farmed aquaculture production in the United States remains just below 400,000 metric tons, with a current value of \$970 million of which 24% is of marine origin. In sum, aquaculture farming technologies contribute about 12% to the total edible fish and shellfish landings in the country, and aquaculture enhancement technologies contribute about half as much again.

Whether the target for the industry is increasing fresh and frozen seafood consumption in the next 25 years, or producing more valuable non-food products from cultured raw materials, government planners and policy-makers are required to identify a sensible and practical strategy for growth. It is critical to improve the nation's capacity for increased cultivation of both freshwater and marine species, and the Aquaculture Policy drafted by DOC in 1999 calls for a fivefold increase in the value of domestic aquaculture production by the year 2025, and a threefold increase in employment.

The 5-year Fisheries Strategic Plan for Sustainable Fisheries by the National Oceanic and Atmospheric Administration (NOAA) proposes a three-pronged strategy for marine aquaculture's primary producers, namely:

- Develop and implement environmentally sound aquaculture technologies and practices.
- Promote the commercial rearing of at least seven new species.
- Identify areas in coastal waters and the EEZ suitable for environmentally sound aquaculture development.

In partnership with other line organizations within DOC and NOAA, and in coordination with other federal agencies, the National Marine Fisheries Service (NMFS) has the

mandate to address impediments to the development of a domestic marine aquaculture industry and the necessary environmental safeguards associated with such development.

This clear government strategy to encourage aquaculture development in the offshore waters of the Exclusive Economic Zone (EEZ) has been welcomed by the industry. There are serious constraints to expansion of the marine aquaculture industry, in particular the externalities which are affecting traditional coastal sites where fish and shellfish cultivation have been carried out for over a century. Fundamentally these externalities are the result of the nation's population growth and migration to coastal areas. This has increased competition and conflicts between the traditional coastal resource uses, such as property development, recreation, tourism, and fisheries. In turn this has increased public concern over the effects of such private uses on the environment, and put pressure on government officials to protect near-shore areas critical to fisheries habitat.

One practical solution is to further marine aquaculture development by moving offshore beyond the coastal zone. However, this far-reaching strategy poses its own set of constraints, and different technical, environmental, and socio-economic problems must now be addressed by new policy measures and a concerted effort in research in a number of fields. A Code of Conduct can be used to encourage timely investment in aquaculture opportunities in the EEZ by both private and public sectors, while at the same time promoting responsible behavior and minimizing risk to offshore ecosystems and their biodiversity.

2. BACKGROUND TO THE DEVELOPMENT OF THE CODE

"It is national policy to encourage the development of aquaculture in the United States"
(National Aquaculture Act of 1980).

The national policy is strongly supported by this Code of Conduct (hereafter called simply - the Code) which particularly addresses the responsible development of aquaculture beyond the territorial waters of the coastal states in the EEZ. But experience and the supporting technologies to develop aquaculture in the EEZ are greatly limited. Therefore, while still supporting an aggressive policy for development of aquaculture in this challenging arena, the fundamental purpose of this document is to temper progress with responsibility, and encourage good stewardship of all living and non-living marine resources found offshore. It attempts to lay out a set of basic principles which embrace environmental, managerial, social, and operational concerns, and elaborate general standards of conduct within these areas. These principles are intended to serve not only governments, tribal, and private enterprises attempting aquaculture in the EEZ, but also those individuals and groups who want to ensure development is conducted wisely.

In addition to the development policy laid out in the National Aquaculture Act, further motivation for this document stems from active participation by the United States in developing and adopting the Code of Conduct for Responsible Fisheries with other member countries of the United Nations Food and Agriculture Organization (FAO) in 1995. Within these guiding principles, aquaculture development is specifically identified as an integral part of Responsible Fisheries, and separately addressed in Article 9.

NOAA has taken the responsibility of developing the national Code for aquaculture development in federal waters. Under the authority of the Magnuson - Stevens Fishery Conservation and Management Act of 1976, as amended, NOAA, through NMFS, has responsibility for federally managed species and for conservation and enhancement of essential fish habitat in the zone seaward of coastal state boundaries to the 200-nautical mile limit of the EEZ. NMFS has additional responsibilities for threatened and endangered species under the Endangered Species Act of 1973, and for marine mammals under the Marine Mammal Protection Act of 1972.

In addition to its regulatory authority over the living resources of the EEZ, NOAA has responsibilities for the culture of marine, estuarine, and anadromous species, including research, development, and outreach, for stock enhancement and private sector development, as well as the adoption of appropriate environment safeguards and technology.

The proposed Code has not been conceived in a vacuum. Article 9 of the FAO Code was a starting point and key reference. A second important reference was the Holmenkollen Guidelines for Sustainable Aquaculture promulgated from the Second International Symposium on Sustainable Aquaculture held in Oslo, Norway in 1997. The Code for the nation's EEZ is similar to these other codes in that it includes a wide variety of offshore

ecosystems and species along the full length of the Atlantic and Pacific coasts, in the Gulf of Mexico, and throughout the United States island territories and possessions.

Because of this great diversity, any code for offshore development of aquaculture cannot be specific to any type of system or any one species. Fortunately, individual national sectors and industries are taking initiatives to meet their own responsibilities for sustainable and environmentally sensible development. The Florida Department of Agriculture and Consumer Services, through Rule 5L-3, has established Best Management Practices (BMP) for all aquaculture producers in the state. A code of best practice for responsible shrimp farming has been produced by the Global Aquaculture Alliance, and for shellfish production by the Pacific Coast Shellfish Growers Association. NOAA is currently funding the development of model codes for aquaculture in the Northeast (Maine), and the NMFS Northwest Fisheries Science Center is assisting the Washington Fish Growers Association to prepare BMPs for net-pen salmon farming based on best available science.

The Code has been developed with the assistance of stakeholders at regional workshops held in the fall of 2000, and by written contributions. Six workshops were held in Seattle, Honolulu, Galveston, Miami, and in the Boston and Washington, D.C. areas. NMFS has since been working with its federal partners to develop this draft which is now open to further public comment. The ultimate goal is to publish the Code of Conduct for Responsible Aquaculture Development in the United States EEZ in 2002.

3. THE NATURE AND SCOPE OF THE CODE

The Code was drafted by NMFS with the collaboration of stakeholders.

The Code is voluntary. It is a 'soft' law to guide policy, development, and research, and to encourage consistency throughout the sector. It is only applicable to aquaculture development in the EEZ but may be incorporated and form part of a national code of conduct for aquaculture when such a code is developed.

The Code provides principles and standards applicable to all systems and practices for the culture of aquatic animals and plants for whatever purpose.

The Code is to be interpreted and applied in a manner consistent with existing federal regulations and international agreements. Many activities in the EEZ, both specific and non-specific to aquaculture systems and practices, are bound by the regulations of different federal agencies and fisheries commissions under legal mandates from the United States Congress (see Appendix II). Some are also bound by provisions of international laws and agreements in which the United States is a signatory (see Appendix III).

The Code is generic in nature and focuses on broad directives. It is elaborated on the basis of desired outcomes for development, rather than a set of procedures to attain those outcomes. This approach allows a flexibility for balancing the needs of conservation with those of social and economic growth. There is a national policy in place to encourage the development of a competitive aquaculture industry in the country, including the EEZ. Therefore it is the responsibility of the Government to ensure development compatible with responsible stewardship by means of clear and achievable development policies based on financial, social, and environmental sustainability.

The Code adopts a precautionary approach combined with adaptive management as the guiding principle for development. This precept enables scientifically undesirable and potentially unacceptable outcomes to be identified, and provides the contingency to mitigate them.

The Code adheres to the spirit and intent of the FAO Code of Conduct for Responsible Fisheries (CCRF) to which the United States is a signatory and strong supporter, and does not in any way contradict its principles.

The Code is a dynamic document. It will be evaluated and revised periodically as information accumulates through its implementation and the monitoring of development.

The Code is directed towards all groups of persons and individuals who may be engaged in any form of aquatic farming, in enhancement of natural stocks, in conservation of aquatic resources or habitat, and those also involved in the processing and marketing of aquaculture products. Their compliance with the Code is encouraged.

4. THE OBJECTIVES OF THE CODE

The Code has several objectives. These are:

Promote the contribution of aquaculture to seafood supplies - The Code should help facilitate the development of offshore aquaculture in line with the policy to encourage sector growth as embodied in the National Aquaculture Act of 1980.

Promote marine stewardship - The Code should support the broad effort by the nation to be a good steward of the marine environment and its resources.

Establish principles for offshore aquaculture - The Code should establish principles which embrace environmental, operational, management, and social concerns.

Provide standards of conduct for the sector - The Code should elaborate general standards of conduct at all levels, including conduct by government, companies and individuals who support these basic principles.

Provide guidance - The Code should provide guidance to both the aquaculture industry and to those in government who must act on petitions to use the EEZ for aquaculture.

Serve as an instrument of reference - As a soft law the Code should serve as a reference document. It should be a starting point for the development of industrial best practices and for individual state codes. As a reference point it should be a living document, periodically updated to reflect new ideas and information.

Facilitate cooperation - As a living document the Code should foster discussion and cooperation between parties with divergent opinions about offshore aquaculture.

5. THE RELATIONSHIP OF THE CODE WITH OTHER LEGAL INSTRUMENTS

The Code is voluntary, and should be interpreted and applied in conformity with all relevant rules and provisions of agreement of international laws and conventions. Nothing in the Code is intended to prejudice the rights, jurisdiction, and duties of the United States under international law, convention, or agreement to which it is a signatory.

The Code should be interpreted and applied with other applicable rules of national law, including the respective obligations of the coastal states pursuant to any national agreements to which they are a party.

The EEZ is a common resource and therefore any and all of the permits, licenses, or the like pursuant to this Code to facilitate aquaculture in the EEZ, for any purpose, cannot constitute a right of property.

6. THE CODE

6.1 The Legal Framework

Aquaculture development in the EEZ will be adequately regulated and protected by an integrated and effective legal framework to ensure its growth in a sustainable manner, and one consistent with comparable industries sharing the nation's offshore resources.

The federal government should provide and maintain the necessary legal framework properly integrated for the effective administration of responsible aquaculture in the EEZ.

Development is currently constrained by laws enacted originally to manage wild-stock fisheries or natural resources without consideration for an aquaculture industry's needs, and may result in unintended consequences. Therefore the government should promulgate coherent legislation specific to aquaculture in the EEZ which would:

- Be consistent with existing international and national laws for activities within the EEZ, and with the laws and regulations of the coastal states where applicable. Many laws and regulations already exist which have a bearing on EEZ-based development (see Appendix II).
- Recognize aquaculture as a legitimate user of the resources of the EEZ, and explicitly include EEZ-based aquaculture in plans for the use of the EEZ to ensure its consideration and evaluation with respect to national development objectives.
- Provide a clear definition of the rights and obligations for the prospective developers. Establishment of rights is essential to encourage and secure investment in EEZ-based aquaculture.
- Recognize that prospective developers could be multinational companies, or companies partially owned by foreign companies.
- Clarify its financial policy instruments, and particularly those which might be shared with the coastal states.
- Address the management and resolution of conflicts.

The legal framework, to the fullest extent possible, should use existing institutional infrastructure to facilitate the administration and management of the national aquaculture industry. It should clearly define the jurisdiction of the many federal agencies involved in the regulation of EEZ-based aquaculture at the present time, and provide a mechanism for their continual close coordination.

Inter-agency coordination is essential to: (a) ensure the uniformity of policies for operating in the EEZ; (b) promote standardization and streamlining of regulations and procedures; (c) monitor and evaluate development; (d) simplify the permitting process; (e) increase efficiency and prevent delays in the elaboration of standards and regulations; (f) resolve or avoid conflicts, and (g) minimize costs.

6.2 The Administrative Framework

Contents

Aquaculture development in the EEZ will be administered by an appropriate national infrastructure, with one agency designated the overall authority to ensure its efficient organization and management.

6.2.1 The designated authority

The federal government should provide and maintain a fully integrated structure to organize and manage aquaculture development in the EEZ. Administration of the structure should be designated in one authority which has the responsibility to coordinate, support, regulate, and promote all aquaculture activities.

The lack of a single designated authority administering the national sector has delayed development of regulatory guidelines, caused problems to producers who improvised in the regulatory vacuum, and discouraged national investment. Because of their broader legal mandates, the administrations managing some part of the sector have invariably considered it of minor importance within their agency and given it low priority.

6.2.2 Coordination

The administrative framework should include a mechanism for continuous close coordination between those federal agencies and the coastal states directly or indirectly involved with aquaculture activities in the EEZ. This would help reduce possible conflicts, streamline permit procedures, facilitate timely development of regulations, and monitor and assess development impact.

Coordination with coastal states is necessary due to: (a) the inter-dependence of certain EEZ-based and land-based aquaculture activities, such as ocean ranching; (b) the practical need for ports of entry and logistical services, (c) possible state regulations, such as interstate transport of aquatic organisms, which may impede marketing aquaculture products harvested outside state boundaries, and (d) the general need for consistency.

6.3 The Policy Environment

Contents

Aquaculture development in the EEZ will have a policy environment to: (a) provide guidelines for development plans and management strategies; (b) encourage entrepreneurs to invest in projects without difficulty and adopt responsible production practices, and (c) promote the development of appropriate regulation and efficient enforcement.

6.3.1 Planning

The competent authority, in cooperation with state and local governments, and stakeholders should prepare a policy, management strategy, and development plan for

EEZ-based aquaculture to promote and guide development to ensure it is consistent with marine stewardship. The development plan should be regularly updated.

6.3.2 Permitting

Federal agencies, in cooperation with state authorities, should develop an efficient and open permitting process, including a single consolidated permit, and a designated authority to coordinate the permitting process. Openness is also advisable in issuing and revoking permits, monitoring and evaluation of information, and processes for the appeal of decisions.

To assist in the permitting process, a framework should be developed for the evaluation of aquaculture projects which assesses the benefits and costs in relation to the objectives and priorities of area-specific development, and the management of resources and the environment. To have significant and practical meaning, this framework should include predetermined standards, or allowable limits of impacts.

The development of best management practices (BMPs) for various species-production systems should be given high priority to establish a basis for performance-based management plans, and to provide an objective basis for monitoring and enforcement. Until the regulatory system is put in place, the permit may be used to prescribe interim operational/management standards.

Federal authorities should consider the establishment of long-term leases for aquaculture in the EEZ. Leases would grant appropriate security of tenure for private industry development and improve the financial acceptability of development projects.

Guidelines for remedial compensation for damages caused or suffered by aquaculture producers should be elaborated and made part of permit conditions.

6.3.3 Siting

EEZ-based aquaculture should operate using practices and in locations where negative impacts are minimized while successful production of healthy farmed aquatic organisms is promoted and the economic viability of the operations is maintained. Siting criteria should be developed to promote clarity, consistency and precaution in the permit process. The criteria should be revisited and amended periodically to respond to new information and technology. Inappropriate siting of aquaculture facilities can increase the nature and magnitude of any adverse effects from the production processes.

Criteria for selection of individual sites or broader aquaculture zones for development in the EEZ should be elaborated on the basis of best available scientific, economic, and sociological information. The potential for remediation should also be considered.

A siting guide should be developed for the preparation of site assessments which contains advice to applicants on information sources and documents, appropriate site assessment

methods and content of site assessment submissions, including required categories of impact and submission format. The use of Geographic Information System (GIS) methods to synthesize and map available information for siting purposes may be useful technology and should be encouraged.

Although sites for aquaculture development in the EEZ are offshore, it is necessary to address potential economic and social impacts on local communities. Local communities should be made aware of any proposed offshore development and their participation sought in any decision-making processes.

Permitted aquaculture sites should be protected by law against degradation of water quality, theft of both living and non-living property, and public trespass.

Consideration should be given to the establishment of aquaculture zones to facilitate permitting, monitoring and impact assessment, and to allow an integrated area approach to management.

6.3.4 Zoning

The competent authority, in cooperation with stakeholders and other federal and state authorities, should establish aquaculture zones to improve efficiency and timeliness of siting and management decisions. Pre-identification of suitable areas or zones for aquaculture after a thorough environmental review and consideration of other pertinent factors would contribute to EEZ aquaculture development. Such zones would also enable monitoring on an area-wide basis which could use a more ecosystem-oriented approach, and take advantage of techniques such as satellite monitoring.

The use of designated aquaculture zones, perhaps planned and financed in ways similar to zones for marine parks, ocean dumping, or areas closed to fishing, would speed up development, as individual permit requests for activities in pre-approved areas would receive rapid responses. Designated zones would also help reduce conflicts between resource users and protected habitats, and minimize the potential for any negative impacts on the environment.

6.3.5 Enabling participation and minimizing conflict

The process for decision-making regarding the policy environment should be transparent. This would include the participation of stakeholders in planning and permitting decisions, and in the review of monitoring information and decisions to revoke or extend permits. Because the EEZ is in the public domain, all information on aquaculture in the EEZ, except confidential business information, should be a matter of public record.

Proactive mechanisms should be emphasized for the prevention of disputes and conflicts. These may include, for example, inter-agency and inter-sector consultation, refined siting criteria, aquaculture zoning, strengthened public participation in siting and management

decisions, and similar cooperative measures. Some models exist in some states already, and these should be reviewed and used as appropriate.

6.4 The Fiscal Environment

Aquaculture development in the EEZ will be the responsibility of the private sector, and assisted by appropriate federal policy instruments designed to encourage implementation of the Code, facilitate investment, and minimize the costs of compliance.

The federal government should provide a fiscal environment which encourages investment in responsible development. Federal action is needed to facilitate access to investment capital constrained by the perception of the high risk of EEZ-based aquaculture, and unfamiliarity of working offshore. There is also a need for structural grants, similar to those provided by the European Union, to stimulate aquaculture development in remote rural coastal areas faced with declining fisheries. Financial incentives are appropriate policy instruments to encourage enterprises which, *inter alia*: (a) provide an ecological benefit; (b) protect the environment; (c) support research and development on new and more ecologically suitable species, or (d) require special start-up marketing as the products are new to the public.

The federal government should seek to minimize development costs by encouraging industry-government partnerships in research, in monitoring and enforcement; zoning for aquaculture development, enforcement of BMPs by producer organizations, etc., and by focusing more efforts on prevention and avoidance than on remediation and conflict resolution. Public costs should be reduced or recovered by, *inter alia*, better coordination among federal agencies, simplifying mechanisms for the permit process, and collecting annual registration fees.

Major cost reductions would be achieved in the long term by reducing uncertainties which require vigorous precautionary approaches, establishing a record of compliance and responsible management by the industry, and developing cost-effective measurement systems for monitoring purposes. The federal government might also consider bearing the main burden of monitoring as a financial incentive until the industry is established and can assume full responsibility. In such cases the federal government would use concerned farms as indicators and fit them for more comprehensive data collection.

6.5 Managing Risk and Uncertainty

Aquaculture development in the EEZ will adopt the guiding principle of a precautionary approach combined with adaptive management to achieve sustainable development in offshore waters.

6.5.1 Adaptive management

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A precautionary approach combined with adaptive management should be the guiding principle of responsible aquaculture development by all stakeholders. Adaptive management enables periodic amendment on the basis of information collected during monitoring, and advances in science and technology. Combining the precautionary approach with adaptive management is appropriate to EEZ-based aquaculture because the offshore industry is new to the world, and information on production systems and their interaction with the environment is minimal. Accordingly, this approach calls for careful monitoring of pre-agreed parameters, record keeping, and reporting on pre-agreed schedules.

This broader application of the precautionary approach requires a management plan for aquaculture in the EEZ to be in place which clearly specifies management objectives, and how impacts of development are to be assessed, monitored, and addressed. The plan should also specify mobilization of the necessary resources for management, monitoring, and research. Standards, reference points, pre-agreed actions, contingency plans, and other parameters will be critical and need to be developed in consultation with stakeholders. In the interim, responsible and practical measures should be applied until such time as a management plan is in place.

Pilot projects should be encouraged and supported at specific sites to provide information which would improve the information base, assess environmental effects, and help improve standards for environmental protection. An expedited review and permit procedure should be used for projects of this nature.

6.5.2 Conserving biodiversity

All stakeholders should conserve the genetic diversity and maintain the functional integrity of the many ecosystems in the EEZ, and minimize the risks by carefully evaluating each activity on a case-by-case basis through the permitting process.

Regulations and decisions regarding the risk to biodiversity, particularly from introduction of aquatic organisms and use of genetically-altered organisms, should be guided by internationally accepted codes of practice, existing federal regulations and procedures (e.g. NEPA, ESA, NNASA, etc.) and, where appropriate, by approaches and regulations in use at the state level. The same protocols should be used as tools in any evaluations of impact subsequent to the agency's decisions. Protocols in use or in preparation at the international level, and existing relevant federal regulations, are listed in Appendix II.

Biodiversity in the territorial waters of neighboring countries as well as the coastal states should be safeguarded when there is a significant potential for the spread of introduced and genetically altered species with reproductive capabilities. This can be achieved by sharing information, and through consultation and cooperation on preventive and remedial measures.

Regulations should be flexible and distinguish between aquaculture activities which differ in nature and impact, and consequently may require different regulatory approaches and levels of precaution. Distinctions should be made also regarding the sensitivity and uniqueness of species and ecosystems.

6.5.3 Introductions and genetically altered species

The competent authority, in cooperation with concerned federal agencies, should regulate the introduction of non-indigenous aquatic organisms and genetically-altered indigenous species into EEZ waters to prevent threats to the diversity and abundance of native species, and to the ecosystems on which they depend. For stock enhancement, risks to wild stocks should be minimized by adoption and enforcement of production strategies which provide organisms with minimal genetic divergence from their wild counterparts.

The competent authority should encourage the use of a single, unified, federal permitting process for introduction and transplantation, and any use of genetically altered aquatic organisms, through federal-state-private sector partnership. Existing national regulations should be consolidated into a single body of law relevant to aquaculture in the EEZ.

Priorities to conserve genetic biodiversity should not deter research to improve breeds in ways which will avoid any future threats to the environment.

6.5.4 Aquatic animal health

All stakeholders should take any necessary action to minimize any potential for the transmission of diseases and parasites which may occur in aquaculture facilities, or associated with organisms released for stock enhancement, to wild populations. This can be achieved by using healthy stocks, maintaining good growing conditions, and by frequent monitoring to facilitate early detection. Disease diagnostic services and veterinary expertise should be made available, and utilized by the aquaculture industry.

6.5.5 Managing other risks

Critical habitats, protected areas, endangered species, predators, etc. should be safeguarded by means of refined siting criteria, inclusion of adequate parameters in the monitoring and assessment process to allow evaluation of impact on a broader ecological scale, and by enforcing specific precautionary measures at the production level. These strategies should be combined with careful record keeping, and monitoring and assessment of impacts at a frequency commensurate with risk.

Measurable performance standards, such as the sediment biological effects standard, should be adopted to prevent degradation in sediments beneath aquaculture facilities, and in the vicinity of farming sites.

6.5.6 Monitoring, evaluation, and enforcement

Federal authorities, in cooperation with the states, should establish effective procedures for environmental monitoring and impact assessment to minimize potential adverse ecological changes, and economic and social consequences of EEZ-based aquaculture development. These efforts should be guided by pre-determined development priorities and well-founded objectives for the management of resources and the environment.

The federal government and the private sector should be prepared to work together to monitor aquaculture development in the EEZ. Monitoring of compliance in distant locations in the EEZ poses considerable problems, and cost-effective means of monitoring the offshore waters pose a challenge to the regulatory agencies. Therefore new cooperative approaches should be considered, including the use of voluntary compliance through self-regulation and a fiscal environment to encourage investment in sustainable technologies and operational practices.

The near-field and far-field effects of development should be monitored, and both the adverse and positive effects of aquaculture should be recorded.

6.6 Responsible Aquaculture at the Production Level

Aquaculture development in the EEZ will establish and enforce measures to ensure responsible management practices and attitudes at the farm level to minimize potential harm to the environment and ensure its sustainability.

6.6.1 Best management practices

The federal government, in cooperation with states, industry, and other stakeholders should establish and enforce measures to ensure responsible management practices at the farm level to minimize potential harm to the environment and ensure sustainable development. It should assist and cooperate with each sub-industry working in the EEZ to promote best management practices and attitudes, and include them as enforceable elements of permits. Best management practices (BMPs) are recognized as valuable tools for industries to set responsible performance and production standards which can be used in lieu of government regulation, and serve as a '*seal of quality*' for products.

The federal government should encourage and support the development of BMPs for various production systems. These would help set standards for specific culture systems which could serve as conditions for permits and references for monitoring compliance. Industry sub-sectors would prepare and periodically update their BMPs based on the best available scientific information and assessment of risk. As BMPs are voluntary instruments the federal government and other concerned agencies should adopt appropriate procedures to monitor compliance.

6.6.2 Information and record keeping

Given the novelty of EEZ-based aquaculture, the federal government should place emphasis on operators keeping records on their stocks and on specific environmental parameters to enable effective assessment of impact. This should be done in the most cost effective way. Information collected by operators should also be used to improve responsible farm management, and as an information source for adaptive management. Reporting of environmental information or farm events which have potential negative environmental consequences should be carried out in a timely manner to minimize these consequences and allow rapid mobilization of remedial measures.

Required information collection and reporting requirements should be described in the federal permit, and these conditions periodically reviewed for their utility and relevance.

6.6.3 Prevention of escapes and endangerment to other species

Escape prevention, combined with remedial action to address significant escape events, should be the key strategy for reducing potential risk to other species. Prevention should be given the highest priority, but contingency plans to recover escaped stock, or otherwise prevent interactions with wild stocks should also be developed and implemented in the case of significant escape events. Escape prevention and management plans should be prepared in consultation with fishery management bodies and constitute an enforceable element of the permit.

Where possible inventory tracking systems and sufficient record keeping should be used to identify stocks, and to monitor losses from various causes, including losses to predation, disease, escape events, and unexplained losses, where relevant. The use of a comprehensive inventory-tracking information system, and other reporting requirements specified in the permit, would ensure consistency, and make review, auditing, and assessment of risks easier and more effective. Inclusion of records on the origin and genetic modifications made to broodstock could also help assess potential genetic impact of escapees.

Aquaculture facilities and cultured stocks should not endanger natural predators. Producers should have effective anti-predation plans, and use selective anti-predator devices where feasible.

6.6.4 Product quality and safety

The quality and safety of any aquaculture product cultured in the EEZ for human consumption should be assured by compliance with existing regulations and standards. Applications currently required for producing and marketing seafood, and ensuring its quality and safety for human consumption include (a) the United Nations Codex Alimentarius, of which the United States is a signatory, (b) Hazard Analysis Critical Control Point methods for the safe handling, processing, and transportation of seafood,

which are universally accepted and used, and (c) existing Food and Drug Administration regulations in the United States.

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6.6.5 Management of aquatic health

Producers should reduce incidence and loss to disease, and the possible spread of disease to wild populations, by managing the aquatic health of their stocks. Desirable practices include using disease-free and robust seed stock or fry from reputable dealers, reducing stress through good husbandry and hygiene, providing adequate nutrition, and controlling and preventing disease through the use of vaccination and approved therapeutics.

Producers should report significant losses due to disease, and outbreaks of reportable diseases. Remedial actions should be taken as appropriate, and proper methods for the disposal of dead or infected organisms should be utilized.

Management of the health of aquatic organisms cultured in EEZ sites would benefit from a unified and complete federal aquatic animal health infrastructure and strategy, and an adequate aquatic animal health service.

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6.7 Research and Development

Aquaculture development in the EEZ will support an effective program for applied research by stakeholders and help achieve the goal of responsible development. It will encourage and facilitate cooperative research at the regional and sub-regional levels, and promote sharing of results to achieve industrial uniformity and efficiency.

The federal government should strengthen the existing institutional framework and allocate adequate funding for cooperative research and development in the EEZ. Investment in research and development in offshore aquaculture is justified in terms of U.S. leadership in fundamental science, long-term economic growth, the expansion of domestic and export markets for aquaculture products and services, reduction in the trade deficit of seafood, the creation of a diverse range of jobs, and decreased pressure on threatened commercial stocks.

The federal government should recognize that the industry can make technological advances in many areas, including safeguarding the environment. Consequently it should invest in research and development in collaboration with the industry and continue to provide critical support services within its own research centers. It should also support scientific exchange programs to benefit from research and technologies developed abroad in identified priority areas.

The federal government should ensure proper linkage between applied research and development and promote the use of results for management decisions, and encourage regulatory agencies to set reference points and performance criteria. Production-scale

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pilot research should be strengthened as it is a key link in the development chain. The federal government should consider establishing a number of research stations in the EEZ for the purpose of scaling up research results, demonstration, and training.

The establishment, growth, and competitive position of responsible EEZ-based aquaculture in the global marketplace will be directly related to the resources invested in research and development of sustainable technology. Responsible aquaculture requires the availability of sound scientific information to assist industry develop cost-effective and environmentally sound facilities and technologies and to assist the federal government, industry and other interested parties in making decisions. As there is no current aquaculture industry extant in the EEZ little information is available.

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6.8 Public Education, Outreach, and Information Dissemination

Aquaculture development in the EEZ will make a special effort to increase public awareness about the rationale for offshore aquaculture, and in particular to provide information addressing issues of concern to the public.

The federal government, industry, non-federal researchers, and other interested parties should participate in programs of awareness to educate consumers, policy makers, and the public about aquaculture in the EEZ, to communicate promising research results, and to demonstrate environmentally sound and cost-effective technologies. They should also seek to improve coordination of aquaculture education, training, and extension between public agencies.

Technology transfer, information dissemination, and access to national and global information and technology can be improved and strengthened. The development of appropriate data bases linked to electronic delivery systems would enhance information exchange and facilitate timely communication and implementation of the latest research results and advances by the industry. Participation in international information networks would improve access to important technology.

The industry, in cooperation with the federal government, should support the development of effective market information systems. In addition to improving industry awareness, technologically modern systems would help formulate policies and strategies.

APPENDIX I. DEFINITION OF TERMS

Adaptive management — describes a process that uses best available knowledge to generate a “best guess” management strategy, which is then changed as new information modifies the “best guess.”

Aquaculture — describes the production of aquatic animals and plants, for whatever purpose, above what is produced naturally.

Aquaculture industry — describes all primary producers of aquatic animals and plants for whatever purpose; processors and manufacturers of equipment and feed, individuals providing supporting services, and all those active in the national infrastructure in institutions and government.

Best management practice (BMP) — describes a specific (and often detailed) set of protocols, practices, or procedures to manage and carry out specific operations in a responsible manner, with respect to the social and ecological environment, based on the best available scientific information and an assessment of risk. BMPs are voluntary in principle but invariably the overarching organization makes them mandatory in the interest of the specific industry.

Codes of conduct (COC) — describes a set of principles and general standards to guide human conduct in a specific endeavor for the respect of the social and ecological environment in which it is conducted. COCs are usually voluntary.

Codes of practice (COP) — describes a set of general practices and standards to guide human conduct in a specific endeavor in order to maintain conformity and consistency. COPs are voluntary in principle but invariably the overarching organization makes them obligatory in universal interest.

Community — An assemblage of people having common organization or interests, or living in the same place.

Contingency plan — describes pre-agreed actions to be taken in the event of adverse impacts

Environmental impact assessment — describes a management tool that predicts the likely environmental impacts of projects, finds ways to reduce unacceptable impacts and to shape the project so that it is appropriate to the local environment, and presents predictions and options to decision-makers.

Exotic species — describes all species of plants and animals not naturally occurring, either presently or historically, in any ecosystem of the United States.

Genetically altered organism — describes an organism which has been genetically selected or genetically modified.

Genetically modified organism (GMO/transgenic) — describes an organism in which the genetic material has been altered anthropogenically by means of gene or cell technology.

Genetically selected organism — describes an organism produced by selective breeding.

Groups of persons and individuals — describes all regional organizations, federal and state government organizations, tribal authorities, non-governmental organizations, research institutions, educational institutions, and private enterprises incorporated for profit or non-profit, and their personnel.

Habitat — The place or type of site where species and biological populations normally live or grow, usually characterized by relatively uniform physical features or by consistent forms.

Hazard — an agent or a condition with the potential to cause harm.

Indicators — Signals of processes (inputs, outputs, effects, results, outcomes, impacts, etc.) which enable them to be judged or measured. Both qualitative and quantitative indicators are needed for management learning, policy review, and monitoring and evaluation.

Introduced species – describes all species of plants and animals released into an environment within or outside their present range in the United States.

Limit reference point — indicates the state of a resource which is considered undesirable. Development should be stopped before this level is reached thus reducing the risk of inadvertently crossing the limit. Limits are usually expressed in biological rather than economic terms.

Monitoring — describes the regular collection, generally under a regulatory mandate, of biological, chemical, and physical data, using predetermined procedures and sample locations, such that any ecological changes attributable to a development activity can be quantified.

Nuisance species — according to NNASA, describes an introduced species “...that threatens the diversity and abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters.”

Policies — describes government commitments to follow particular courses of action in pursuit of approved objectives which may or may not be codified as law or may provide further elaboration on the application of law.

Precautionary approach — describes a set of measures taken to implement the Precautionary principle. A set of agreed cost-effective measures and actions, including future courses of action, which ensures prudent foresight, reduces or avoids risk to the resource, the environment, and the people, to the extent possible, taking explicitly into account existing uncertainties and the potential consequences of being wrong.

Reference point — describes a quantitative criterion (limit) adopted to allow the detection of adverse effects before critical levels of harm are reached; i.e. allowable limits of impact. A reference point can be site specific. It is an estimated value derived from an agreed scientific procedure and an agreed model to which corresponds a state of a resource which can be used as guide for management.

Regulation — describes a rule or order having the force of law issued by the executive authority of government.

Resource management plan — describes a sub-regional or regional process for developing management plans which consider and address all resource values through active public participation, interagency coordination, and consensus-oriented decision-making.

Risk — is an estimate of the probability and severity of the effects resulting from a hazard.

Species — A group of organisms all of which have a high degree of physical and genetic similarity, can generally interbreed only among themselves, and show persistent differences from members of allied species. Species may include subspecies, populations, stocks, or other taxonomic classifications less than full species.

Stakeholder — describes any individual or any regional organization, federal and state government organization, tribal authority, non-governmental organization, research institution, educational institution, and private enterprise incorporated for profit or non-profit which has the potential of being affected by or can affect the responsible production of aquatic animals and plants, for whatever purpose, and their subsequent utilization, and trade.

State, or States — One or more of the fifty States of the United States of America or United States Territories.

Sustainability — Describes the capability of a state or process to be maintained indefinitely. In development planning, it describes an approach whereby the principles of sustainability are applied to the closely linked needs of the economy, the environment, and the social system.

Target reference point — corresponds to the state of a resource which is considered desirable and at which management aims. In most cases it is expressed as a level of desirable output and will correspond to a specific objective.

Transferred species — any species intentionally or accidentally transported and released by humans into a new environment inside its present range in the United States.

Uncertainty — the incompleteness of knowledge about the state or processes of nature.

U.S. Exclusive Economic Zone (EEZ) — is the zone contiguous to the territorial sea of its fifty States, the Commonwealth of Puerto Rico, the Northern Mariana Islands (to the extent consistent with the Covenant and the United Nations Trusteeship Agreement), and its overseas territories and possessions. Except where the marine boundary is equitably shared with a neighboring nation, the EEZ extends to a distance of 200 nautical miles from the baseline from which the breadth of the territorial sea is measured. For the most part the baseline established for the federal portion by all the United States is 3 nautical miles from the shoreline, but two states have fixed the baseline at 9 nautical miles.

Zone (or Zoning) — An area set off or characterized as distinct from adjoining parts.

APPENDIX II. ABBREVIATED SYNOPSES OF LEGAL AND REGULATORY FRAMEWORKS RELEVANT TO AQUACULTURE IN THE EEZ

Particular aspects of locating and operating an aquaculture facility in federal waters of the Exclusive Economic Zone (EEZ) are regulated by federal agencies under laws not drafted specifically for aquaculture. Federal agencies are working to clarify roles and authorities with respect to aquaculture, which is a relatively new use for areas of the EEZ under federal jurisdiction (most marine aquaculture currently takes place closer to shore in areas under state jurisdiction). A noteworthy gap is the lack of authority to issue aquaculture leases in areas of the EEZ which fall under federal rather than state jurisdiction.

(i) The U.S. Army Corps of Engineers (ACOE)

The authority of the ACOE under the Rivers and Harbors Act (1899), Section 10, to preserve unhindered navigational access of the nation's waters was extended into the EEZ by the Outer Continental Shelf Lands Act (1953). Under 43 U.S.C. §1333(a), (e) 1999, the ACOE now regulates "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."

The permit is called the Section 10 Permit.

(ii) The U.S. Environmental Protection Agency (EPA)

Under Section 318 of the Clean Water Act, the EPA asserts its jurisdiction to require point source pollution discharge permits for aquaculture projects in the open ocean. The regulations are found under the National Pollutant Discharge Elimination System (NPDES) 40 C.F.R. §122.24. The EPA may delegate authority to the states for implementation.

Under the Ocean Dumping Act, 33 U.S.C. §1412, 1999, the EPA is authorized to permit the dumping of material into U.S. waters when such dumping will not unreasonably degrade or endanger human health or the marine environment, ecological systems, or economic potentialities.

The permits are called National Pollutant Discharge Elimination System (NPDES) Permit and, when necessary, the Ocean Discharge Permit.

(iii) The National Marine Fisheries Service (NMFS)

Under the Magnuson-Stevens Fishery Conservation and Management Act, NMFS has responsibilities for regulating and managing commercial fishing operations. As harvesting living resources in federal waters by U.S. vessels constitutes fishing under the Act, then aquaculture operations are commercial fishing operations under the Act (50 C.F.R. §229.2 1999).

Under the authority of the Fish and Wildlife Coordination Act, the Endangered Species Act of 1973, and the Marine Mammal Protection Act of 1972, NMFS is entitled to comment on any project under review by the ACOE or other agency if there is federal involvement in the project (i.e., a permit, license, funding, etc.).

A Letter of Acknowledgement by NMFS is required to conduct research in federal waters.

A permit may be required to exempt aquaculture operations from federal fishery management restrictions on wild stock.

In certain circumstances, NMFS may review and comment on permit applications submitted to the ACOE or other federal agency.

(iv) The Fishery Management Councils

Eight regional Fishery Management Councils were established under the (1976) Magnuson-Stevens Fishery Conservation and Management Act with responsibility to manage fishery resources beyond the jurisdictional limit of state waters to the 200-mile limit of the Exclusive Economic Zone. As aquaculture operations constitute fishing under the Act (50 C.F.R. §229.2 1999), the Councils have the authority to manage aquaculture in the EEZ. Fishery management plans may need to be amended by the Councils to accommodate aquaculture activities.

Fishery Management Council may comment on proposed operations and, where necessary, make relevant amendments to any fishery management plan.

(v) The U.S. Coast Guard (USCG)

The USCG is responsible for the regulation and enforcement of various activities in the navigable waters of the United States and requires that aquaculture-related structures are marked with lights and signals in order to ensure the safe passage of vessels. Installation and maintenance of markers is the responsibility of the aquaculture operators as long as the structures are located in navigable waters. The requirements for the markers are specified by the USCG.

No permit is required from the USCG, but conformity with USCG regulations for markers is stipulated in the permits approved by the ACOE and/or the EPA.

(vi) U.S. Fish and Wildlife Service (USFWS)

Under the authority of the Fish and Wildlife Coordination Act, the Endangered Species Act of 1973, and the Marine Mammal Protection Act of 1972, the USFWS is entitled to comment on any project under review by the ACOE or other agency if there is federal involvement in the project (i.e., a permit, license, funding, etc.).

No permit is required from USFWS, only review and comment in certain circumstances.

(vii) Minerals Management Service

The Minerals Management Service has authority to lease sites for minerals development over submerged lands on the outer continental shelf under jurisdiction of the Outer Continental Shelf Lands Act.

No permit is required, but aquaculture facilities using oil and gas platforms require MMS approval for the removal of a platform or transfer of ownership.

In certain circumstances, MMS may review and comment on permit applications submitted to the ACOE or other federal agency.

(viii) U.S. Department of Agriculture (USDA)

The National Aquaculture Act (1980), as amended, established the Joint Subcommittee on Aquaculture (JSA), chaired by the USDA. The JSA produced the National Aquaculture Development Plan which identified the roles of the major agencies (U.S. Departments of Agriculture, Commerce, and the Interior) and established strategies and priorities for development.

No permit is required from the JSA.

The Animal and Plant Health Inspection Service (APHIS) within USDA enforces regulations to prevent the spread of aquatic animal diseases from a foreign country or between states.

(ix) Other Possible Acts and Regulations

The Merchant Marine Act of 1920
Anadromous Fish Conservation Act
Aquatic Nuisance Species Act (1994)
Clean Water Act (1977)
Coastal Zone Management Act (1990 & 1996, as amended)
Endangered Species Act (1973)
Executive Order No. 11987 (EO 11987)
Fish and Wildlife Act (1956)
Fish and Wildlife Conservation Act (1980)
Lacey Act (1981, as amended)
Marine Mammal Protection Act (1972)
Marine Protection, Research and Sanctuaries Act (1972)
National Aquaculture Act (1980)
National Aquaculture Improvement Act (1985)
National Environmental Policy Act (1969)
National Sea Grant Colleges Program Act (1966)
Non-indigenous Aquatic Nuisance Prevention and Control Act (1990)
Rivers and Harbors Act (1899)
Sustainable Fisheries Act (1996)
Title XI, Merchant Marine Act (1936, as amended)
Water Quality Act (1965)

APPENDIX III. INTERNATIONAL AND NATIONAL CODES OF PRACTICE AND PROTOCOLS

AFS (1986). The position of the American Fisheries Society on introduced aquatic species.

CITES. The Convention on International Trade in Endangered Species.

CBD. The Convention on Biological Diversity, Bio-safety Protocol

ICES (1984). Guidelines for implementing the ICES code of practice concerning introductions and transfers of marine organisms. ICES Cooperative research Report No. 130, 20p.

ICES (1988). Codes of practice and manual of procedures for consideration of introductions and transfers of marine and freshwater organisms. ICES Cooperative research Report No. 159, 44p.

ICES (1994). Code of practice on the introduction and transfer of marine organisms. ICES Cooperative Research Report No. 204, 5p.

EEC (1990). European Economic Community Council Directive of 23 April 1990 on the Deliberate Release into the Environment of Genetically Modified Organisms (990/220/EEC). J. Eur. Comm. L117:15-27.

EIFAC (1988). Codes of practice and manual of procedures for consideration of introductions and transfers of marine and freshwater organisms. European Inland Fisheries Advisory Commission, FAO, Rome, EIFAC/OP 23, 45p.

EIFAC (1996). Framework for the responsible use of introduced species. European Inland Fisheries Advisory Commission, FAO, Rome, EIFAC/XIX/96/Inf., 19p.

FAO (1995). Code of conduct for responsible fisheries. FAO, Rome, 41p.

FAO (1996). Precautionary approach to capture fisheries and species introductions. FAO Technical Guidelines for Responsible Fisheries No. 2, 54p.

FAO (1997). Aquaculture development. FAO Technical Guidelines for Responsible Fisheries No. 5, 40p.

North Atlantic Salmon Conservation Organization

APPENDIX IV. WORKSHOP ORGANIZATION AND LOGISTICAL SUPPORT

The following personnel and offices of the National Marine Fisheries Service coordinated the local organization and logistics for the six workshops.

1. 7 September, 2000

Northwest Fisheries Science Center, Seattle, WA

Robert N. Iwamoto, Dawn Cordiano, Linda R. Carlquist, and Bernadette Parenteau

The workshop was held in the NWFSC Auditorium

2. 14 September, 2000

Northeast Regional Office, Gloucester, MA

Harry C. Mears, and Deirdre Kimball

The workshop was held in the Conference Room of the Kings Grant Inn, Danvers

3. 21 September, 2000

NMFS Galveston Laboratory, Galveston, TX

Roger J. Zimmerman, and Rhonda S. O'Toole

The workshop was held in the Conference Room of the Holiday Inn, Galveston

4. 14 November, 2000

NMFS Honolulu Laboratory, Honolulu, HI

R. Michael Laurs, and Wende M.H. Goo

The workshop was held in the Imin International Conference Center, East West Center

5. 16 November, 2000

Southeast Fisheries Science Center, Miami, FL

Nancy B. Thompson, Kimrey D. Newlin, and E. Anne Overby

The workshop was held in the Rosenstiel School Auditorium, University of Miami

6. 20 November, 2000

NMFS Headquarters, Silver Spring, MD

Edwin W. Rhodes, Eric Barber, Pamela Luck, and Melanie Lyles

The workshop was held in the NOAA Auditorium, Silver Spring

APPENDIX V. WORKSHOP FACILITATORS AND SESSION LEADERS

Central Organization and Principal Facilitators

Colin E. Nash (NMFS/WASC Manchester), Ziad H. Shehadeh (Consultant, ex-Fisheries Department, FAO, Rome), Edwin W. Rhodes (NMFS/HQTR Silver Spring)

Workshop Session Leaders (in order of their sessions as indicated in Appendix V1)

1. Seattle

Charles E. Belknap (USEC/WASC Seattle), F. William Waknitz (NMFS/WASC Manchester), Robert N. Iwamoto (NMFS/WASC Seattle), and Peter Granger (Washington Fish Growers Association)

2. Gloucester

Harry C. Mears (NMFS/EASC Gloucester), Gene S. Martin (USEC/EASC Gloucester), Sheila Stiles (NMFS/EASC Milford), Kenneth L. Beal (NMFS/EASC), and George Nardi (Great Bay Aquafarms Inc.)

3. Galveston

Colin E. Nash (NMFS/WASC Manchester) and Ziad H. Shehadeh (ex-Fisheries Department, FAO, Rome)

4. Honolulu

John S. Corbin (State of Hawaii, Department of Agriculture), Paul K. Bienfang (CEATECH Inc.), Bruce C. Mundy (NMFS/WASC Honolulu), and Ronald Weidenbach (Hawaii Fish Company)

5. Miami

Daniel O. Suman (RSMAS, University of Miami), Kevan L. Main (Harbor Branch Oceanographic Institute), Edward R. Scura (Shrimp Improvement Company), Daniel Benetti (RSMAS, University of Miami)

6. Silver Spring

Bernard Cody (USEC/HQTR Silver Spring), Regina L. Spallone (NMFS/EASC/HQTR Silver Spring), James P. McVey (OAR/HQTR Silver Spring)

APPENDIX VI. STRUCTURE OF THE WORKSHOP

The structure of each workshop was based on the four categories for responsible development of aquaculture (Article 9) in the FAO Code of Conduct for Responsible Fisheries. The topics for discussion within each of the four session were based on the FAO Technical Guidelines for Responsible Fisheries, #5 Aquaculture Development.

Session 1. Institutional and Regulatory Framework for Responsible Aquaculture

- The Legal and Administrative Framework
- Goals, Strategies, and Plans for Research and Development
- Monitoring and Assessing Impacts of Development on the Environment and Resources
- Supporting Public Programs and Services

Session 2. Responsible Aquaculture within Trans-boundary Ecosystems

- Transfer of Species and Pathogens
- Introduction/Transfer of Non-Indigenous Species and Use of Genetically Modified Aquatic Organisms
- Quality and Safety of Exported Aquaculture Food Products
- Collection, Sharing, and Dissemination of Information
- Monitoring and Evaluating Trans-boundary Impacts of Development

Session 3. Responsible Aquaculture for Protection of Resources and the Environment

- Conservation of Biodiversity
- Stock Enhancement
- Disease Transfer
- Conservation of Social and Cultural Traditions

Session 4. Responsible Aquaculture at the Production Level

- National Policies for Participation of Producers and Their Communities
- The Use of Best Management Practices
- Selection and Use of Farm Inputs (Feed, Fertilizer, Etc.)
- Health Management Practices on the Farm
- Hazards to Human Health and the Environment
- Product Safety

APPENDIX VII. POINTS OF CONTACT

In addition to the two public announcements in the Federal Register, the following lists indicate specific points of contact regarding the six workshops. In the cases of agencies, notification was made at central, regional, and local levels.

FEDERAL AGENCIES

Environmental Protection Agency
NMFS, Office of Habitat Conservation
NMFS, Office of Industry and Trade
NMFS, Office of Protected Resources
NMFS, Office of Science and Technology
NMFS, Office of Sustainable Fisheries
NMFS, National Seafood Inspection Laboratory
NMFS, Northeast Regional Office, Gloucester
NMFS, Northeast Fisheries Science Center,
Woods Hole
NMFS, Milford Laboratory
NMFS, Southeast Regional Office,
St. Petersburg
NMFS, Southeast Fisheries Science Center,
Miami
NMFS, Galveston Laboratory
NMFS, Northwest Regional Office, Seattle
NMFS, Northwest Fisheries Science Center,
Seattle
NMFS, Southwest Regional Office, Long Beach
NMFS, Southwest Fisheries Science Center,
La Jolla
NMFS, Honolulu Laboratory
NMFS, Alaska Regional Office, Juneau
NMFS, Alaska Fisheries Science Center, Seattle
NOAA, Center for Coastal Environmental
Health, Charleston
NOAA, Federal Consistency Coordinator
NOAA, National Center for Coastal
Oceanography and Science
NOAA, National Marine Fisheries Service
NOAA, Office of Coastal Programs
NOAA, Office of General Counsel
NOAA, Office of International Affairs
NOAA, Office of Oceanic and Atmospheric
Research
NOAA, Office of Oceanic and Atmospheric
Research International
NOAA, Office of Oceanic and Atmospheric
Research, National Sea Grant College
Program
NOAA, Office of Ocean and Coastal Resource
Management

NOAA, Office of Sustainable Development and
Intergovernmental Affairs
US Army Corps of Engineers
US Coast Guard
US Coast Guard, Galveston Group
US Congress
US Department of Agriculture
US Department of Agriculture Coordinator
US Department of Agriculture, Cooperative
State Research Education and Extension
Service
US Department of Agriculture, Cooperative
State Research Education and Extension
Service, Division of Plant and Animal
Systems
US Department of Agriculture, National Animal
Health
US Department of Commerce, Economic
Development Administration
US Department of the Interior, Fish and Wildlife
Service
US Department of the Interior, Minerals
Management Service
US Food and Drug Administration
US Food and Drug Administration, Center for
Veterinary Medicine
US Food and Drug Administration, Center for
Food Safety and Applied Nutrition,
Office of Seafood
US Geological Survey, Woods Hole, Stellwagen
Bank National Marine Sanctuary
US Department of State
US Department of State, Agency for
International Development

STATE AGENCIES

Alabama Department of Conservation and
Natural Resources
Alaska Department of Fish and Game
California Aquaculture Coordinator
California State Senate (McPherson)
Florida Department of Agriculture and
Consumer Services
Florida Department of Agriculture, Bureau of
Seafood and Aquaculture
Florida Department of Community Affairs

Florida Department of Economic Development
and Planning
Hawaii Department of Land and Natural
Resources
Louisiana Department of Wildlife and Fisheries
Maine Department of Marine Resources
Maryland Department of Agriculture
Maryland Department of Agriculture,
Aquaculture Seafood Program
Maryland Department of the Environment
Maryland Department of Natural Resources
Massachusetts Department of Food and
Agriculture
Massachusetts Department of Marine Fisheries
Massachusetts Shellfish Restoration Program
Mississippi Department of Marine Resources
New Hampshire Department of Fish and Game
New Jersey Department of Agriculture
North Carolina Department of Agriculture and
Consumer Services
Pennsylvania Department of Agriculture
Rhode Island Department of Environmental
Management
Rhode Island Oliver Stedman Government
Center
South Carolina Department of Agriculture
South Carolina Department of Natural Resources
South Carolina Waddell Mariculture Center
Texas Department of Agriculture
Texas General Land Office
Texas Department of Parks and Wildlife
Virginia Department of Agriculture and
Consumer Services
Virginia Aquaculture Advisory Board
Washington Department of Fisheries and
Wildlife

SEA GRANT COLLEGE PROGRAM CENTERS

Massachusetts Institute of Technology
Mississippi-Alabama Sea Grant Consortium
Mississippi-Alabama Sea Grant Legal Program
University of Alaska
University of California
University of California, Sea Grant Extension
University of California, Hancock Institute
University of Connecticut
University of Delaware
University of Florida
University of Georgia
University of Hawaii
Universities of Illinois-Indiana
University of Louisiana

University of Maine
University of Maryland
University of Massachusetts
University of Michigan
University of Minnesota
University of New Hampshire
University of New Hampshire, Sea Grant
Program and Marine Resources
University of New Jersey
University of New York, Sea Grant Extension
Program
University of North Carolina
University of Ohio
University of Puerto Rico
University of Rhode Island
University of South Carolina
University of Texas
University of Virginia
University of Washington
University of Washington, Sea Grant Advisory
Service
University of Wisconsin
Woods Hole Oceanographic Institution

EDUCATION AND RESEARCH INSTITUTIONS

Auburn University
Clemson University
Cleveland State University
Cornell Cooperative Extension Suffolk County
Center
East-West Center, University of Hawaii
Florida State University
George Washington University
Gulf Coast Research Laboratory
Gulf Marine Institute of Technology
Harbor Branch Oceanographic Institution
Hawaii Institute of Marine Biology, University
of Hawaii
Louisiana State University, Aquaculture
Research Station
Massachusetts Institute of Technology
Medical University of South Carolina
Mississippi State University, SRAC
North Carolina State University
Northwest Indian College, Bellingham, WA
Prairie View A&M University
Rutgers University (NJ Ocean County Extension
Center)
Rosensteil School, University of Miami, FL
Rutgers Univ. (Haskin Shellfish Laboratory)
Salem State College, Biology Department, MA
Southeast Massachusetts Aquaculture Center,
Cape Cod
Southampton College, Natural Sciences Division

Texas A & M University
 Texas A & M University at Galveston
 Texas A & M University at Corpus Christi
 University of Alabama
 University of Alaska at Fairbanks
 University of Arizona
 University of Connecticut, Department of
 Ecology and Evolutionary Biology
 University of Connecticut, Marine Science
 Institute
 University of Delaware, College of Marine
 Studies
 University of Delaware, Center for Marine
 Policy
 University of Florida, Department of Fisheries
 Science
 University of Florida
 University of Hawaii at Hilo
 University of Maryland, Biotechnical Institute
 University of Massachusetts, Marine Policy
 Center
 University of Massachusetts, Dartmouth, NRAC
 University of Massachusetts, Dartmouth,
 CMAST
 University of New Hampshire
 University of North Carolina, Wilmington,
 Center for Marine Science
 University of Oregon, Hatfield Marine Science
 Center
 University of Oregon, Sea Grant Extension
 Service
 University of Rhode Island
 University of Rhode Island, Department of
 Fisheries, Animal, and Veterinary
 Science
 University of Rhode Island, Environmental and
 Natural Resource Economics
 Department
 University of Southern Mississippi
 University of Texas, Marine Biomedical Institute
 Virginia Technical College, Department of Food
 Science
 Virginia Technical College, VASREC
 Virginia Institute of Marine Science
 University of Washington, Western Regional
 Aquaculture Center
 University of Washington, School of Marine
 Affairs
 Washington County Technical College
 Woods Hole Oceanographic Institute

ORGANIZATIONS

Alabama Catfish Producers Association
 Alabama Farmers Federation
 American Alligator Farmers

American Shrimp Processors Association
 American Tilapia Association
 Battelle Marine Research Laboratory, WA
 California Aquaculture Association
 Caribbean Aquaculture Association
 Center for Coastal Studies, Provincetown
 Center for Marine Conservation
 Chesapeake Bay Foundation
 Coastal States Organization
 Coastal Conservation Association, TX
 Conservation Law Foundation
 Environmental Defense Fund
 Florida Alligator Farmers Association
 Florida Aquaculture Association
 Florida Aquatic Plant Growers Association
 Florida Aquatic Plant Management Society
 Florida Tropical Fish Farmers Association
 Georgia Aquaculture Association
 Global Aquaculture Alliance
 Gloucester Aquaculture Project
 Gulf and South Atlantic Fisheries Foundation
 Gulf of Mexico Fishery Management Council
 Gulf States Marine Fisheries Commission
 Hawaii Aquaculture Association
 Hubbs Sea World Research Institute
 Humane Society of the U.S., MA
 International Fisheries Technology
 Island Institute
 Lower Cape Cod Community Development, MA
 Maine Aquaculture Innovation Center, ME
 Maine Marine Aquaculture Association, ME
 Mangrove Action Project, WA
 Maryland Aquaculture Association, MD
 National Aquaculture Association, SC
 National Fisheries Institute, VA
 National Ocean Industries Association
 National Fisheries Institute
 National Shellfish Association
 Natural Resources Defense Council
 North Carolina Crawfish Growers Association
 North Carolina Trout Growers Association
 Northeast Fisheries Development Foundation
 Ocean Technology Foundation
 Overseas Fishery Consultant Association
 Pacific Aquaculture Caucus
 Pacific Coast Oyster Growers Association
 Pacific Shellfish Growers Association
 Piedmont Association of Caged Fish
 Portsmouth Fishermens Cooperative
 Shellfish Farmers Association
 South Carolina Aquaculture Association
 South Carolina Aquatic Plant Management
 Society
 South Carolina Crawfish Growers Association
 South Carolina Shrimpers Association
 Southeastern Fisheries Association

Stellwagen Bank Marine Sanctuary
Striped Bass Growers Association
Texas Shrimp Association
US Aquaculture Suppliers Association
US Chapter, World Aquaculture Society
US Marine Shrimp Farming Association
Washington Farmed Salmon Commission
West Alabama Catfish Producers
West Coast Seafood Processors Association
World Bank
World Wildlife Fund

COMMERCIAL ENTERPRISES

Alabama Fish Farming Center, AL
Anguilla Fish Farm, FL
Aqua Bounty Farms
Aquaculture Magazine, NC
Aquaculture Research Center
Aquaculture Technology Systems
Aquafuture Inc. MA
Aquaseed Corporation, WA
Aquatic Eco-Systems Inc., FL
Atlantic Salmon of Maine LLC
Ball Janick, DC
Beals Island Shellfish Hatchery
Bon Secour Fisheries, Inc. AL
Cates International, HI
Connors Aquaculture
Conservation Consortium, Inc.
Coonamesset Farm, MA
Davlin Report
Dodge Cove Marine Farms
Duckstrap River Fish Farm
East Coast Fish Farms
East Coast Tuna Association
Ednoff
Forster Consulting, WA
Friendship Fisheries
Great Bay Aquafarms, Inc.
Great Eastern Mussel Co.
Harlingen Shrimp Farm
Highliner, FL
Island Salmon
Kennebec Aquaculture
Kent Seafarms Corporation, CA
Kim Newlin Seafood Consultants
LMR Fisheries Research Inc. CA
Lummi Indian Nation, WA
Makah Tribal Council, WA
Maine Seaweed Co. ME
Maine Salmon, ME
Mariculture Systems
Mariculture Technologies Inc.
MER Assessment Corp. ME
Mission City Management Aquaculture Project

Mook Sea Farms
Mote Marine Laboratory, FL
Nellie B. Fisheries
North Atlantic Aquaculture
North East Salmon
Northwest Salmon Farms, WA
Ocean Spar Technologies, WA
Oceanic Institute, HI
Palmetto Aquaculture Corporation, SC
Peacock Canning Co.
Permaquid Oyster Co.
Plexus Consulting
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Private (Dutra)
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Proteus SeaFarms International, CA
Rabobank International, NY
Rowan Companies, Inc.
Safety Boats, HI
SeaFish
SeaWeb Aquaculture Clearinghouse
Sea Web, MD
Seniorita Fisheries Inc.
South Florida Aquaculture Inc., FL
Southland Fisheries Corporation
Spinney Creek Oyster Co.
Stolt Sea Farm California, LLC
Striped Bass Company, NC
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