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PUBLIC COMMENTS WILL BE ACCEPTED THRU OCTOBER 4th, 2021.

Address all comments concerning the ***Science Plan*** to Task Force Chair Dr. Caird Rexroad, National Program Leader for Aquaculture, Agricultural Research Service, Office of National Programs, 5601 Sunnyside Avenue, Room 4-2106, Beltsville, Maryland 20705. Submit electronic comments to AquaSciencePlan@usda.gov.

Address all comments concerning the ***Regulatory Efficiency Plan*** and the National Aquaculture Development Plan to Task Force Chair Kristine Cherry, Chief, Regulatory and Policy Branch at NOAA Fisheries Office of Aquaculture, NOAA National Marine Fisheries Service, 1315 East-West Highway, Room 14461, Silver Spring, MD 20910-3282. Submit electronic comments to Aqua.RegPlan@noaa.gov.

A STRATEGIC PLAN TO ENHANCE REGULATORY EFFICIENCY IN AQUACULTURE

A Report by the Regulatory Efficiency Task Force

SUBCOMMITTEE ON AQUACULTURE

COMMITTEE ON ENVIRONMENT

of the

NATIONAL SCIENCE & TECHNOLOGY COUNCIL

2021

About the National Science and Technology Council

The National Science and Technology Council (NSTC) is the principal means by which the Executive Branch coordinates science and technology policy across the diverse entities that make up the Federal research and development enterprise. A primary objective of the NSTC is to ensure science and technology policy decisions and programs are consistent with the President's stated goals. The NSTC prepares research and development strategies that are coordinated across Federal agencies aimed at accomplishing multiple national goals. The work of the NSTC is organized under committees that oversee subcommittees and working groups focused on different aspects of science and technology. More information is available at http://www.whitehouse.gov/ostp/nstc.

The National Science and Technology Policy, Organization, and Priorities Act of 1976 established the Office of Science and Technology Policy (OSTP) to provide the President, and others within the Executive Office of the President, advice on the scientific, engineering, and technological aspects of the economy, national security, homeland security, health, foreign relations, the environment, and the technological recovery and use of resources, among other topics. OSTP leads interagency science and technology policy coordination efforts, assists the Office of Management and Budget with an annual review and analysis of Federal research and development in budgets, and serves as a source of scientific and technological analysis and judgment for the President with respect to major policies, plans, and programs of the Federal Government. More information is available at http://www.whitehouse.gov/ostp.

About the NSTC Subcommittee on Aquaculture

The National Aquaculture Act of 1980 stated that "Congress declares that aquaculture has the potential for reducing the United States trade deficit in fisheries products, for augmenting existing commercial and recreational fisheries, and for producing other renewable resources, thereby assisting the United States in meeting its future food needs and contributing to the solution of world resource problems. It is, therefore, in the national interest, and it is the national policy, to encourage the development of aquaculture in the United States." To this end, the NSTC Subcommittee on Aquaculture (SCA), and its predecessors, were established as the Federal interagency coordinating group to increase the effectiveness and productivity of Federal aquaculture research, regulation, technology transfer, and assistance programs. The SCA is a statutory subcommittee composed of Federal agency representatives that operates under the Committee on Environment of the NSTC under the OSTP in the Executive Office of the President [National Aquaculture Act of 1980 (Public Law 96-362. 94 Stat. 1198, 16 U.S.C. 2801, et seq.) and National Aquaculture Improvement Act of 1985 (Public Law 99-198, 99 Stat. 1641)].

The SCA consists of three Task Forces: the Science Planning Task Force, the Regulatory Efficiency Task Force, and the Economic Development Task Force. In October 2018, the SCA established the Science Planning Task Force to document Federal science and technology opportunities and priorities for aquaculture by revising and updating the *National Strategic Plan for Aquaculture Research (2021–2025)*. Later, in February 2019, the SCA established the Regulatory Efficiency Task Force to develop a new work plan for interagency coordination to improve regulatory efficiency. Finally, in May 2020, the SCA established the Economic Development Task Force to develop a strategic plan for economic development through aquaculture.

About This Document

The SCA charged the Regulatory Efficiency Task Force to identify Federal agency and partner opportunities for 1) improving efficiencies in aquaculture permitting and authorization programs using existing Federal authorities; 2) implementing a national approach to aquatic animal health management of aquaculture; and 3) refining and disseminating tools for aquaculture regulatory management. This Task Force developed a national *Strategic Plan to Enhance Regulatory Efficiency in Aquaculture* that outlines actions Federal agencies plan to take *within their existing statutory authorities* and budgetary resources to improve the efficiency, predictability, and timeliness and reduce the costs of reviewing, approving, monitoring, and enforcing regulatory requirements for commercial marine aquaculture ventures. These proposed actions will be undertaken while meeting Federal environmental stewardship and human health requirements.

The Science Planning and Regulatory Efficiency Task Forces developed two complementary strategic plans identifying actions Federal agencies can take to advance national aquaculture science and technology and improve regulatory efficiencies. The plans are companion documents designed to improve interagency coordination and promote regulatory efficiency, research and technology development, and economic growth in collaboration with State, Tribal, academic, private sector, and other partners. The Economic Development Task Force's strategic plan will supplement these plans.

The SCA envisions a globally competitive, science and technology–driven sector that meets increasing demands for aquatic products that are affordable and meets high standards for safety, quality, nutrition, human health, and environmental stewardship while providing new opportunities for economic growth. Realizing this vision will require considering a diversity of perspectives on aquaculture. To this end, the SCA seeks public comment on both reports prior to their implementation in 2021.

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Abbreviations and Acronyms

AFWA Association of Fish and Wildlife Agencies

AADAP Aquatic Animal Drug Approval Partnership (USFWS)

AMA Aquaculture management area

APHIS Animal and Plant Health Inspection Service (USDA)

AMS Agricultural Marketing Service (USDA)

ARS Agricultural Research Service (USDA)

BOEM Bureau of Ocean Energy Management (DOI)

BSEE Bureau of Safety and Environmental Enforcement (DOI)

CAHPS Comprehensive Aquaculture Health Program Standards

CIS Comprehensive and integrated surveillance

CVB Center for Veterinary Biologics (USDA–APHIS)

CVM Center for Veterinary Medicine (FDA)

CWA Clean Water Act

DOC U.S. Department of Commerce

EEZ Exclusive Economic Zone

EFH Essential Fish Habitat

EPA Environmental Protection Agency

ESA Endangered Species Act

FDA Food and Drug Administration

FSIS Food Safety Inspection Service (USDA)

FWCA Fish and Wildlife Coordination Act

GAO General Accountability Office

GP General permit

GRAS Generally recognized as safe

IP Individual permit

ISSC Interstate Shellfish Sanitation Conference

MMPA Marine Mammals Protection Act

MOU Memorandum of understanding

MSA Magnuson-Stevens Fishery Conservation and Management Act

NAAHP National Aquatic Animal Health Plan

NEPA National Environmental Policy Act

NOAA National Oceanic and Atmospheric Administration

NPDES National Pollutant Discharge Elimination System

NPS National Permit System

NSF National Science Foundation

NRCS Natural Resources Conservation Service (USDA)

NSTC National Science and Technology Council

NWP Nationwide permit

OCSLA Outer Continental Shelf Lands Act

OIE World Organisation on Animal Health

OMB Office of Management and Budget

OSTP Office of Science and Technology Policy

PGP Programmatic general permit

RGP Regional general permit

RHA Rivers and Harbors Act

RUE Right of use and easement

SCA Subcommittee on Aquaculture

SIP Seafood Inspection Program (NOAA)

U.S. United States

USACE United States Army Corps of Engineers

USDA United States Department of Agriculture

USFWS United States Fish and Wildlife Service (DOI)

USGS United States Geological Survey

VS Veterinary Services (USDA–APHIS)

Executive Summary

A Strategic Plan to Enhance Regulatory Efficiency in Aquaculture (the plan) outlines actions that Federal agencies plan to take within their existing statutory authorities and budgetary resources to improve efficiency, predictability, and timeliness, and reduce the costs of reviewing, approving, monitoring, and enforcing permits and other regulatory requirements for marine commercial aquaculture ventures. The plan describes key interagency and Federal-State issues concerning aquaculture regulation, as well as science and technology needs to facilitate more efficient State and Federal aquaculture management actions. These proposed actions are intended to be undertaken in the context of environmental stewardship, human health, and other Federal requirements.

The Regulatory Efficiency Task Force of the Subcommittee on Aquaculture (SCA) prepared this plan. The SCA is a statutory subcommittee of Federal agency representatives that operates under the Committee on Environment of the National Science and Technology Council (NSTC) under the Office of Science and Technology Policy (OSTP) in the Executive Office of the President [National Aquaculture Act of 1980 (Public Law 96-362. 94 Stat. 1198, 16 U.S.C. 2801, et seq.) and National Aquaculture Improvement Act of 1985 (Public Law 99-198, 99 Stat. 1641)]. In February 2019, the SCA established a Regulatory Efficiency Task Force and charged it with developing a new work plan for interagency coordination to improve regulatory efficiency. The SCA also established a Science Planning Task Force and charged it with documenting Federal science and technology opportunities and priorities for aquaculture by revising and updating the *National Strategic Plan for Federal Aquaculture Research (2014–2019)*. The two plans are companion documents. Lastly, the SCA established an Economic Development Task Force and charged it with developing a strategic plan for economic development through aquaculture. The plan from this Task Force will supplement the two other Task Forces' plans.

U.S. aquaculture producers use environmentally efficient farming systems, with modest space and freshwater requirements, which have low carbon footprints and provide restorative ecosystem services, particularly seaweed and shellfish farming.[1,2,3,4,5,6] Strategically expanding aquaculture will complement fisheries and terrestrial food production to ensure global food security for future generations, increase our capacity to mitigate the effects of climate change, and provide jobs in rural, urban, coastal, and tribal communities.

[1] Lester, S.E., J.M. Stevens, R.R. Gentry, C.V. Kappel, T.W. Bell, C.J. Costello, S.D. Gaines, D.A. Kiefer, C.C. Maue, J.E. Rensel, R.D. Simons, L. Washburn, and C. White. 2018b. Marine spatial planning makes room for offshore aquaculture in crowded coastal waters. Nature Communications, 9:945. DOI:10.1038/s41467-018-03249-1

[2] Rust. M.B, K.H. Amos, A.L. Bagwill, L.M. Juarez, C.S.Price, J.A. Morris, and M.C. Rubino. Environmental performance of net-pen aquaculture in the United States. Fisheries 39 (2014).

[3] Froehlich, H. E., Runge, C. A., Gentry, R. R., Gaines, S. D., & Halpern, B. S. (2018). Comparative terrestrial feed and land use of an aquaculture-dominant world. Proceedings of the National Academy of Sciences, 115(20), 5295–5300. www.pnas.org/cgi/doi/10.1073/pnas.1801692115

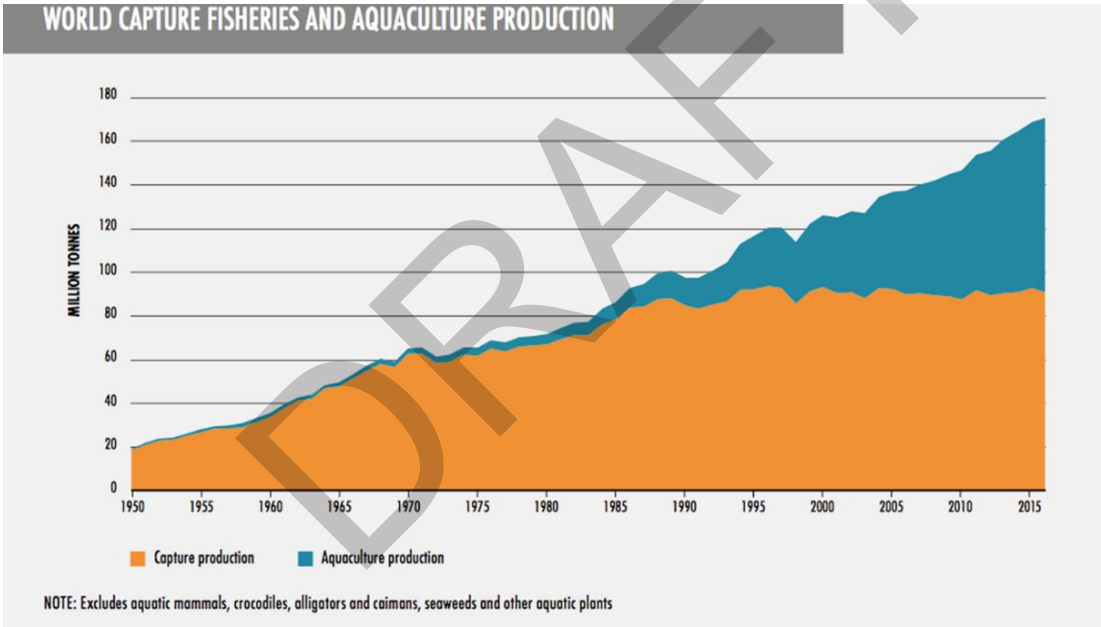
[4] Hilborn, Ray, Jeannette Banobi, Stephen J Hall, Teresa Pucylowski, and Timothy E Walsworth. 2018. The environmental cost of animal source foods. Front Ecol Environ 16(6): 329–335, doi: 10.1002/fee.1822

[5] Bricker, S.B., Ferreira, J.G., Zhu, C., Rose, J.M., Galimany, E., Wikfors, G. Saurel, C., Miller, R.L., Wands, J., Trowbridge, P., Grizzle, R., Wellman, K., Rheault, R., Steinberg, J., Jacob, A., Davenport, E.D., Ayvazian, S., Chintala, M., & Tedesco, M.A. (2017). Role of shellfish aquaculture in the reduction of eutrophication in an urban estuary. Environmental Science & Technology, 52(1): 173–183.

[6] Asplin L, Boyd A, Ellis T, Keeley NB, Mober O, Burgetz I, Engler C, Falconer L, Focken U, Gresfsrud ES, et al. 2020. Working group on environmental interaction of aquaculture (WGEIA). Copenhagen (Denmark): International Council for the Exploration of the Sea. 2(112). [accessed 2021 Jul 12]. http://doi.org/10.17895/ices.pub.7619

The U.S. aquaculture industry is well positioned to expand using a wide variety of responsible farming and production methods to grow finfish, shellfish, algae, and plants on land and in freshwater, estuarine, and marine waterbodies. Despite this, U.S. aquaculture production has been relatively static for the past decade. The constraints to increased production are outlined in several national reports. Regulatory uncertainty is one of the key factors discouraging investment in seafood farming in the United States.[7, 8]

As outlined in this report and elsewhere, Federal agencies have made significant progress working with States and industry to create a more efficient regulatory process for aquaculture.[9] Nevertheless, the regulatory framework for aquaculture is complex, involving multiple jurisdictions, laws, regulations, and agencies that aim to protect public health, conserve environmental resources, and regulate commerce. These laws and regulations were enacted to serve important public purposes. However, the multiple Federal and State approvals required to farm seafood create time-consuming and costly processes and an unclear operating environment for aquaculture businesses. The objective of the plan is to create a more efficient, timely, coordinated, and structured regulatory process, while at the same time fulfilling critical conservation, public health, and other legal requirements.



[7] National Research Council, Aquaculture in the United States: Constraints and Opportunities, Washington D.C.: National Academy Press (1978); National Research Council, Marine Aquaculture Opportunities for Growth, Washington D.C.: National Academy Press (1992); U.S. Commission on Ocean Policy, An Ocean Blueprint for the 21st Century (2004) Washington, D.C.: USCOP.

[8] C.R. Engle and N. Stone. Competitiveness of U.S. Aquaculture Within the Current U.S. Regulatory Framework. *Aquacult Econ Manag* 2013;17:251–280; G. Knapp and M. Rubino. The Political Economics of Marine Aquaculture in the United States. *Rev Fish Sci Aquacult* 2016;24:213–229.

[9] U.S. Government Accountability Office. (February 2019) Army Corps of Engineers, Information on Shellfish Aquaculture Permitting Activities. Publication No. 19-145. Retrieved from: https://www.gao.gov/assets/700/697024.pdf

Figure 1. The growth of aquaculture production compared with wild capture fisheries worldwide.[10]

This plan identifies the following goals:

Goal 1. Improve Efficiencies in Aquaculture Permitting and Authorization Programs

Goal 2. Implement a National Approach to Aquatic Animal Health Management of Aquaculture

Goal 3. Refine, Develop, and Disseminate Tools for Aquaculture Regulatory Management

These strategic goals will help Federal agencies build an interagency collaborative regulatory framework to meet the Nation's aquaculture priorities through coordination with the OSTP/NSTC. These goals will also ensure aquaculture facilities continue to meet all applicable environmental, public health, and other Federal requirements. This report outlines objectives under each goal that Federal agencies have identified as feasible to implement over the next few years.

The plan is not intended to be comprehensive. The plan does not lay out every Federal regulation or outline all State regulatory programs that may pertain to aquaculture. Instead, it focuses on creating efficiencies in the process of obtaining the critical Federal permits and approvals required for aquaculture, particularly requirements administered by more than one Federal agency. The plan also focuses on regulations cited as major costs or impediments by industry, and information and tools that can facilitate Federal agency permitting and oversight of the aquaculture industry. The States also play a critical role in most aquaculture permitting. Although this document outlines measures that can be taken to assist States to positively collaborate with Federal agencies, it does not attempt to set State policy or strategy.

[10] Food and Agriculture Organization (2018) The State of World Fisheries and Aquaculture 2018—Meeting the sustainable development goals. Rome: FAO. License CC BY-NC-SA 3.0 IGO.

Introduction

A Strategic Plan to Enhance Regulatory Efficiency in Aquaculture (the plan) outlines actions that Federal agencies plan to take *within their existing statutory authorities* and budgetary resources to improve efficiency, predictability, and timeliness, and reduce the costs of reviewing, approving, monitoring, and enforcing permits and other regulatory requirements for commercial aquaculture ventures. To do so, the plan describes key interagency and Federal-State issues raised by the aquaculture sector's regulatory framework, and outlines science and technology needs to facilitate more efficient State and Federal aquaculture management actions. These proposed actions are intended to be undertaken in the context of environmental stewardship, human health, and other Federal requirements.

Done responsibly, aquaculture is good for people, the economy, and the planet. Seafood, wild or farmed, is one of the best sources of nutrients essential for human health and well-being.[11] Given limits to terrestrial agriculture and commercial fishing, farming of seafood will be critical to providing protein to a growing global population.[12] Aquaculture is also one of the most environmentally efficient ways to produce food (efficient use of feed, takes up little space, low carbon footprint, and some forms of aquaculture help to restore ecosystems).[13,14] Thus, expanded use of aquaculture will be an essential element of food systems designed to reduce and mitigate the effects of climate change.[15,16] As half of the world's seafood supply, aquaculture is also an inseparable part of broader seafood policy. The market and supply chain disruptions caused by the Coronavirus pandemic point to the need to expand options for local seafood supply and jobs especially in hard hit and underserved rural communities. Like any human activity, seafood farming can have negative environmental and social effects. However, much has been learned during the past thirty years to farm seafood sustainably and safely within the context of informed regulatory regimes to maintain healthy oceans.[17,18,19,20,21]

The Regulatory Efficiency Task Force of the Subcommittee on Aquaculture (SCA) prepared this plan. The SCA is a statutory subcommittee composed of Federal agency representatives that operates under the Committee on Environment of the National Science and Technology Council (NSTC) under the Office of Science and Technology Policy (OSTP) in the Executive Office of the President [National Aquaculture Act of 1980 (Public Law 96-362, 94 Stat. 1198, 16 U.S.C. 2801, et seq.) and National Aquaculture Improvement Act of 1985 (Public Law 99-198, 99 Stat. 1641)]. In October 2018, the SCA established a Regulatory Efficiency Task force and charged it with developing a new work plan for interagency coordination to improve regulatory efficiency. The SCA also established a Science Planning Task Force and charged it with documenting Federal science and technology opportunities and priorities for aquaculture by revising and updating the *National Strategic Plan for Federal Aquaculture Research (2014–2019).* The two plans are companion documents. The research plan includes

[11] https://doi.org/10.1016/j.plefa.2019.10.002
[12] http://www.fao.org/3/ca9229en/ca9229en.pdf
[13] https://www.tandfonline.com/doi/full/10.1080/03632415.2014.966818
[14] https://www.pnas.org/content/115/20/5295
[15] www.oceanpanel.org/future-food-sea
[16] https://www.sciencedirect.com/science/article/pii/S0308597X20309751
[17] https://www.nature.com/articles/s43016-020-0127-5
[18] https://onlinelibrary.wiley.com/doi/abs/10.1111/faf.12351
[19] https://repository.library.noaa.gov/view/noaa/2712
[20] https://onlinelibrary.wiley.com/doi/book/10.1002/9780470960967
[21] https://www.worldfishcenter.org/content/blue-frontiers-managing-environmental-costs-aquaculture

introductory sections defining and describing aquaculture and the current status of the industry in the United States. Lastly, the SCA established an Economic Development Task Force and charged it with developing a strategic plan for economic development through aquaculture. The National Aquaculture Development Plan will use the plans from all three Task Forces for its revision pursuant to the Order.

The U.S. national policy on aquaculture (from the National Aquaculture Act of 1980) states:

> **"**Congress declares that aquaculture has the potential for reducing the United States trade deficit in fisheries products, for augmenting existing commercial and recreational fisheries, and for producing other renewable resources, thereby assisting the United States in meeting its future food needs and contributing to the solution of world resource problems. It is, therefore, in the national interest, and it is the national policy, to encourage the development of aquaculture in the United States."[22]

The rationale for domestic aquaculture production includes the following key drivers:[23,24]

- Federal nutrition guidelines recommend that Americans increase their seafood consumption.
- Although domestic wild capture fisheries could provide some increased seafood production, most increases in seafood production nationally and globally will come from aquaculture.
- Aquaculture creates job and business opportunities from working waterfronts to the agricultural heartland.
- Expanding domestic production of seafood will enhance national food and seafood security. By value, nearly 90 percent of the seafood we eat comes from abroad; more than half of it from aquaculture.[25]
- In the context of global food systems, aquaculture is one of the most resource-efficient ways to produce animal protein.[26,27] With limited arable land and fresh water, human populations will increasingly turn to the ocean and to technologies that efficiently use space, water, and nutrients to source food.[28]

The U.S. aquaculture industry is well positioned to expand using a wide variety of responsible farming

[22] National Aquaculture Act of 1980, 16 U.S.C. §2801.

[23] National Aquaculture Act of 1980, 16 U.S.C. §2801.

[24] National Research Council (1978); National Research Council (1992); U.S. Commission on Ocean Policy (2004).

[25] The State of World Fisheries and Aquaculture (2018) http://www.fao.org/3/I9540EN/i9540en.pdf

[26] Froehlich, H. E., Runge, C. A., Gentry, R. R., Gaines, S. D., & Halpern, B. S. (2018). Comparative terrestrial feed and land use of an aquaculture-dominant world. Proceedings of the National Academy of Sciences, 115(20), 5295–5300. www.pnas.org/cgi/doi/10.1073/pnas.1801692115

[27] Hilborn, Ray, Jeannette Banobi, Stephen J Hall, Teresa Pucylowski, and Timothy E Walsworth. 2018. The environmental cost of animal source foods. Front Ecol Environ 16(6): 329–335, doi: 10.1002/fee.1822

[28] FAO. 2020. The State of World Fisheries and Aquaculture (SOFIA). Rome (Italy): Food and Agriculture Organization of the United Nations. [accessed 2021 Jul 12]. https://doi.org/10.4060/ca9229en

and production methods to grow finfish, shellfish, algae, and plants on land and in freshwater, estuarine, and marine water bodies. Despite this, U.S. aquaculture production has been relatively static for the past decade. The constraints to growth are outlined in several national reports.[29] Uncertainty in the regulatory process is cited as one of the key factors discouraging investment in seafood farming in the United States.[30] The regulatory framework for aquaculture in the United States is complex, involving multiple jurisdictions, laws, regulations, and agencies that aim to protect public health, conserve environmental resources, and regulate commerce.[31] These laws and regulations were enacted to serve important public purposes. However, the multiple Federal and State approvals required to farm seafood create time-consuming and costly processes and an uncertain operating environment for aquaculture businesses. As outlined in this report, Federal agencies have made significant progress working with States and industry to create a more efficient regulatory process for aquaculture.[32] The objective of the plan is to create a more efficient, timely, coordinated, and predicable State and Federal regulatory process, while at the same time fulfilling conservation, public health, and other legal requirements. This plan identifies the following goals:

Goal 1. Improve Efficiencies in Aquaculture Permitting and Authorization Programs

Goal 2. Implement a National Approach to Aquatic Animal Health Management of Aquaculture

Goal 3. Refine, Develop, and Disseminate Tools for Aquaculture Regulatory Management

These strategic goals will help State and Federal agencies build an interagency collaborative regulatory framework to meet the Nation's aquaculture priorities through coordination with the OSTP/NSTC. These goals will also ensure aquaculture facilities continue to meet all applicable environmental, public health, and other Federal requirements. This report outlines specific objectives under each of these goals that Federal agencies have identified as feasible to implement.

The plan is not intended to be comprehensive. It focuses on the critical Federal permits and approvals required for aquaculture, requirements administered by more than one Federal agency, regulations cited as major costs or impediments by industry, and information and tools that can facilitate both Federal and State agency permitting and oversight of the aquaculture industry.

[29] National Research Council (1978); National Research Council (1992); U.S. Commission on Ocean Policy (2004).

[30] Engle and Stone (2013); also see Knapp G, Rubino M. The Political Economics of Marine Aquaculture in the United States. *Rev Fish Sci Aquacult* 2016;24:213–229.

[31] For an overview of laws and regulations applicable to aquaculture see https://www.ars.usda.gov/SCA/factsheet.html. For water discharge requirements see https://www.epa.gov/npdes/npdes-aquaculture-permitting. For an overview of net pen fish farming regulations see Rust M, et. al. Environmental Performance of Marine Net-Pen Aquaculture in the United States. *Fisheries* 2014;39:508–524 and Fisheries and Oceans Canada and the National Oceanographic and Atmospheric Administration, "A Joint-Report: Regulatory Regimes for Environmental Management of Marine Net Pen Aquaculture in Canada and the United States" (2018) at https://www.fisheries.noaa.gov/resource/document/regulatory-regimes-environmental-management-marine-net-pen-aquaculture. For shellfish farming regulations see Shumway SE, ed. Shellfish Aquaculture and the Environment. Ames, Iowa: James Wiley & Sons, Inc. (2011) and State-by-State Shellfish Aquaculture Permitting Information (October 2017) on the NOAA Fisheries website at https://www.fisheries.noaa.gov/aquaculture-library

[32] U.S. Government Accountability Office (February 2019) "Information on Shellfish Aquaculture Permitting Activities." Publication No. 19-145. Available at https://www.gao.gov/assets/700/697024.pdf

Staff from the National Oceanic and Atmospheric Administration (NOAA), an agency of the U.S. Department of Commerce; U.S. Army Corps of Engineers (USACE); U.S. Environmental Protection Agency (EPA); several agencies of the U.S. Department of Agriculture [Animal and Plant Health Inspection Service (APHIS), Agricultural Research Service (ARS), Natural Resource Conservation Service (NRCS), Agricultural Marketing Service (AMS), and Food Safety and Inspection Service (FSIS)]; the Department of the Interior's U.S. Fish and Wildlife Service (USFWS); U.S. Food and Drug Administration (FDA); and Office of Management and Budget (OMB) participated in drafting the plan.

Figure 2. Commercial shellfish aquaculture operations (*Photo: NOAA Fisheries*).

Goal 1. Improve Efficiencies in Aquaculture Permitting and Authorization Programs

Navigating application and review processes for multiple local, State,[33] and Federal requirements can be challenging, given the number and variety of current laws, regulations, and administrative protocols that exist. For example, agencies must evaluate the potential conflicts with uses (fishing, recreation, energy production, shipping, etc.) and potential impacts on a range of concerns (water quality, marine ecosystems, wild fish stocks, protected species, habitats, cultural resources, etc.). For applicants, permitting and authorization processes can be time-consuming, difficult to navigate, duplicative, and expensive. Once a venture is operational, the permittee is responsible for monitoring and reporting requirements concerning discharge, management measures, aquatic animal health, public health, and other requirements. Although these requirements are necessary to protect public interests, aquaculture operators may have challenges understanding and implementing them.

Federal agencies have taken several actions in recent years to improve interagency coordination and make regulatory processes more efficient. Several of these are noted in the subsections below. Federal agencies intend to work with State and Tribal agencies and others to build on these coordinating efforts and address challenges that affect specific aquaculture sectors and the industry nationwide. Additionally, Federal agencies intend to improve efficiencies in Federal aquaculture permitting and authorization processes, such as expanding the range of aquaculture activities authorized under general permits (discussed below) through programmatic approaches to environmental review and other applicable authorizations.

Efforts to make the permit process and management of permit compliance more efficient (sometimes termed "streamlining") are not intended to eliminate, circumvent, or reduce conservation, environmental stewardship, and public health requirements. The intent is to improve coordination across Federal agencies to reduce redundancies and shorten permitting timelines through concurrent rather than consecutive processes.

To address these challenges, Federal agencies with aquaculture regulatory responsibilities identified six priority areas on which they will work together to improve the efficiency and predictability of aquaculture permitting in State and Federal waters outlined in the objectives that follow.

[33] Most aquaculture in the United States is located either on land or in nearshore waters and is subject to both State and Federal laws and regulations.

Objective 1.1: Expand the range of aquaculture activities authorized under general permits and through programmatic consultations.

Multiple Federal agencies play a role in authorizing and regulating aquaculture operations, depending on the nature of the operation. The USACE—under section 10 of the Rivers and Harbors Act of 1899 [RHA (33 U.S.C. §403)], as extended to the limits of the outer continental shelf by the Outer Continental Shelf Lands Act {OCSLA [43 U.S.C. §1333(a)(1)]} and section 404 of the Clean Water Act [CWA (33 U.S.C. §1344)]—renders decisions for activities affecting navigable waterways and discharges of dredged or fill material into waters of the United States. The EPA issues coverage under sections 402 and 403 of the CWA; National Pollutant Discharge Elimination System (NPDES) permits are required for the discharge of pollutants into waters of the United States. USACE and EPA permitting actions usually trigger review requirements under the National Environmental Policy Act (NEPA) and consultations with NOAA and USFWS concerning endangered species, essential fish habitat, marine mammals, and migratory birds.

The USACE or EPA may develop General Permits (GPs) for categories of activities that are similar in nature and will have only minimal individual and cumulative adverse environmental effects. GPs are currently available for some categories of aquaculture activities. GPs may make the process more efficient for the permittee by reducing the amount of time between submitting a permit application and verifying the permit authorization. However, whereas a GP often is an efficiency tool that streamlines permit processing, developing one can be a lengthy process and some types of activities may not be eligible. The agencies may pursue other programmatic approaches to environmental compliance as appropriate, including programmatic NEPA documents. For example, NOAA and USFWS, in their consultations with the USACE, sometimes undertake programmatic consultations to cover a group of similar activities or operations, especially when sufficient baseline information exists.

USACE

In most cases, entities that wish to undertake aquaculture activities in navigable waters need to apply to the USACE for authorization. The USACE regulates activities associated with aquaculture within inshore and offshore waters. The CWA is limited to certain activities within the territorial seas to three miles from the shoreline. The RHA authority also extends to ocean and coastal waters within three nautical miles from the shore; however, the authority extends to the limits of the outer continental shelf through the OCSLA, thus applying to "all artificial islands, and all installations and other devices permanently or temporarily attached to the seabed…"[34]

The USACE decision-making authority for these activities involves, among other things, determining whether an activity is contrary to the public interest and complies with other applicable Federal laws, such as the Magnuson-Stevens Fishery Conservation and Management Act (MSA), Endangered Species Act (ESA), NEPA, and the National Historic Preservation Act.

[34] 43 U.S.C. § 1333(a)(1).

USACE General Permits

The USACE promotes the use of General Permits (GPs) whenever possible because GPs are intended to streamline the authorization process for defined categories of activities that only result in minimal adverse effects to the environment. GPs include Nationwide Permits (NWPs), Regional General Permits (RGPs), and Programmatic General Permits (PGPs). GPs are renewed every 5 years and proposed activities are verified if they meet the terms and conditions of the GP. USACE divisions and districts may add regional and project-specific conditions to NWPs, and USACE districts may develop RGPs to address State or regional laws and environmental concerns. The most commonly used aquaculture GP is NWP 48, which was developed in 2007 for commercial shellfish aquaculture. Initially, only existing commercial shellfish aquaculture operations were eligible for the GP, but eligibility now extends to new operations that qualify under the permit's terms and conditions. The USACE most recently reissued NWP 48 in March 2017, and remains in effect until March 2022. NWP 48 defined the activities that constitute new commercial aquaculture activities, and included other revisions. Individual Permits (IPs) may authorize aquaculture activities that do not qualify for a GP.

USACE Individual Permits

Individual Permits (IPs) are customized for specific activities that do not qualify for a GP. Currently, any non-shellfish aquaculture activities, including finfish operations, require an IP. The USACE district can grant IPs for a specified time as well. The USACE IP process includes steps such as reviewing the application, publishing a public notice with comment period, coordinating internal and external agency input, consulting with Tribes, documenting decision-making processes, and drafting the permit.

A recent Government Accountability Office (GAO) report titled "Information on Shellfish Aquaculture Permitting Activities" (February 2019) found that the USACE has effectively used GPs to process shellfish farm permit applications. GAO found that the USACE received 3,751 shellfish aquaculture applications from 2012 to 2017 and authorized 87 percent (of the 3,751 applications, 466 were withdrawn and four were denied). Of the 38 total USACE districts, 19 have coastal waters within their geographic areas of responsibility, and 17 of those 19 districts received and authorized aquaculture applications. Of the 3,751 applications, 65 percent were authorized through NWP 48, 32 percent were authorized using another type of GP, and 3 percent were authorized via IPs.

EPA and Authorized State Programs

Under the authority of part 402 of the CWA (and State authorities as relevant), EPA and State agencies issue NPDES permits to point-source discharges of pollutants to waters of the United States. EPA authorizes State programs to implement the NPDES program, and both the EPA and authorized State programs rely heavily on GPs to improve administrative efficiencies. In fact, GPs cover approximately 94 percent (approximately 680,500) of facilities with NPDES coverage in the United States. Aquaculture constitutes a very small percentage of the total NPDES permits issued, but GPs State programs and the EPA issue GPs for aquaculture hatcheries, ponds, farms, research facilities, aquaria, and enhancement[35] net pens. To date, EPA, who is the permitting authority, issued one NPDES IP for aquaculture in Federal

[35] Enhancement refers to hatchery-produced aquatic animals or plants that are used to enhance, supplement, or restore commercial and recreational fisheries, endangered species, and habitats such as oyster reefs and marsh grass.

waters of the Gulf of Mexico. EPA is currently in the pre-permitting and permitting processes for one additional IP for net pen operations in the Gulf of Mexico, one in the Pacific and two in the Atlantic.

NOAA and USFWS

Federal agencies, including the USACE and EPA, must consult with NOAA and the USFWS on Federal actions that may affect listed endangered and threatened species and any designated critical habitat pursuant to the ESA. Federal agencies must also consult with NOAA if their actions may adversely affect designated Essential Fish Habitat (EFH) under the MSA. If the potential effects caused by an aquaculture activity could cause unintended take (e.g., harassment) of any marine mammal species, the project proponent needs to obtain authorization from NOAA or the USFWS (depending on the species) for the incidental take of marine mammals pursuant to the Marine Mammals Protection Act (MMPA). Additionally, the Migratory Bird Treaty Act makes it unlawful for any person to "take … any migratory bird, any part, nest, or egg of any such bird" except as permitted by regulation. USFWS depredation and control orders authorize the take of specific species of migratory birds for specific purposes, such as aquaculture, without a Federal depredation permit, as long as the control and depredation actions comply with the regulatory requirements of the order. Additionally, the Fish and Wildlife Coordination Act (FWCA) requires Federal agencies that construct, license, or permit water resource development projects to first consult with NOAA, USFWS, and State fish and wildlife agencies regarding the impacts on fish and wildlife resources and to implement measures to mitigate potential impacts. Some aquaculture activities may also require State consistency certifications pursuant to the Coastal Zone Management Act, which NOAA administers. Permittees must complete these processes before the USACE or EPA can issue their IPs or verify that activities qualify for a GP.[36]

Programmatic Consultations

One approach to reducing permit processing times is through programmatic and/or coordinated consultations. Action agencies typically initiate programmatic consultations by seeking consultation on a programmatic action (such as a GP) or by bundling a group of individualized actions into a single consultation. If appropriate, the consulting agencies then work with the action agencies to consult on the suite of actions at the same time. A programmatic approach streamlines the procedures and time involved in consultations for broad agency programs or numerous similar activities with predictable effects and can thus reduce the amount of time spent on individual project-by-project consultations. Although this process may initially take time and resources to gather data and conduct analyses for all the activity types that occur, it results in significantly reduced workloads in the long run.

During such consultations, NOAA and USFWS identify conservation measures that may be added as special conditions to Federal USACE and NPDES permits to protect endangered and threatened species and their critical habitat, marine mammals, and essential fish habitats. These three agencies (USACE, NOAA, and USFWS) have completed consultations for some shellfish farming GPs. USFWS, USACE, and NOAA plan to undertake the actions listed below to streamline the permitting process for those seeking to enter into the aquaculture industry.

[36] GPs are issued every 5 years for certain categories of work that authorize no more than minimal individual and cumulative adverse effects. Because the permits are already issued, proposed applications, when approved, result in "verifications," meaning the proposed work has been verified to comply with all the terms and conditions of the issued GP.

- **Action 1.1.1** NOAA, working with Federal and State agencies and other partners, will continue to refine and develop science information and tools (such as siting, water quality, and genetics models) needed by Federal and State agencies to conduct programmatic permit reviews. This work is described in Goal 3 below.
- **Action 1.1.2** EPA may develop a GP for finfish farming in the future. A significant number of aquaculture production facilities with similar effluent discharge characteristics is necessary before a GP would deliver any permitting efficiencies. To develop one or more GPs that will achieve efficiencies for the applicant and the agency, collated information would be needed on site selection factors such as depth, the speed and direction of prevailing currents, presence of threatened/endangered species and habitats, and use conflicts, to identify low-risk areas for use for which GPs could be issued. NOAA's National AquaMapper and OceanReports spatial planning tools, described under Objective 3.2 below, will support this effort, but to date the criteria have not yet been established, nor areas identified (see discussion of potential aquaculture management areas in Objectives 1.3 and 3.2).
- **Action 1.1.3** The USACE proposed to modify NWP 48 to improve the efficiency of its review and approval process while still providing the necessary environmental protections required for issuance of a GP. Additionally, two new NWPs were proposed, one to authorize finfish and multi-trophic mariculture and one to authorize seaweed and multi-trophic mariculture. Once agency and public comments are received and reviewed, USACE will finalize its final permit decisions.
- **Action 1.1.4** Although there is already a high use of NWPs and other GPs for aquaculture, the USACE will continue to encourage coastal districts to develop RGPs and PGPs that could further improve the efficiency of the aquaculture permitting process while meeting the needs of their respective regions.

Objective 1.2: Maintain and update State-by-State information on shellfish farming requirements.

Shellfish farms are subject to multiple State and local regulatory requirements that vary around the country. There is also some variation in Federal requirements, such as regional conditions imposed by USACE districts on NWP 48 (some of which result from efforts to coordinate with NOAA and/or USFWS about regionally specific endangered species issues), as well as RGPs. In 2018, NOAA released a report[37] that reviewed shellfish aquaculture permitting systems (including Federal, State, and local requirements) in 22 States, and made recommendations on how to improve those systems. The report indicated that in many instances, problems that exist for one State were already experienced and addressed by another. Therefore, those involved in shellfish permitting at the Federal, State, and local levels could benefit from the establishment, sharing, and maintenance of a depository of shellfish

[37] Evaluation of U.S. Shellfish Aquaculture Permitting Systems: Recommendations to Improve Permitting Efficiencies and Industry Development. A Report to NOAA Fisheries. Final Report Submission – June 2018. Prepared by Tom O'Connell, Earth Resource Technology, Inc.

aquaculture permitting information. Detailed State-by-State information collected in this study is available in an online Excel spreadsheet.[38]

- **Action 1.2.1** NOAA, USFWS, and other agencies will regularly update the State-by-State information on shellfish farming requirements, and the geographic scope will be expanded to include information on Hawaii/Pacific Islands and Puerto Rico/Caribbean.

Objective 1.3: Establish regional interagency coordinating groups and processes for implementation of permits and authorizations for aquaculture in Federal waters.

Multiple Federal agencies play a role in authorizing and regulating offshore[39] aquaculture operations in Federal waters. The USACE issues coverage under section 10 of the RHA, as extended by the OCSLA, which would require a permit for facilities that are permanently or temporarily attached to the seabed. The EPA issues coverage under sections 402 and 403 of the CWA; NPDES permits are required for the point source discharge of pollutants into waters of the United States. NOAA considers offshore aquaculture to be a form of fishing that is subject to the MSA because it ultimately involves the harvest of fish from the sea. This determination means that NOAA has the potential to regulate certain types of activities in offshore aquaculture operations. However, litigation has led to uncertainty that presents challenges for individuals considering development of aquaculture operation in the U.S. Exclusive Economic Zone (EEZ).[40]

The U.S. Coast Guard provides authorization for private aids to navigation, such as lights or buoys (33 U.S.C. §1221 et seq.). Additionally, the Coast Guard may require an assessment of navigation interference and traffic analysis. The Department of Interior's Bureau of Ocean Energy Management (BOEM) and Bureau of Safety and Environmental Enforcement (BSEE) must establish a right of use and easement for any offshore aquaculture operation that utilizes or tethers to an existing oil and gas facility (OCSLA; Energy Policy Act of 2005).

Several branches of the U.S. military, NOAA, USFWS, FDA, and other agencies play important roles in siting decisions to avoid conflicts with shipping and navigation, oil and gas activities, military operations, fishing, threatened and endangered species and critical habitats, marine mammals, historic properties, impacts to human health, and other protected resources. Many of these activities require consultations, reviews, or permitting under a variety of Federal statutes that are invoked whenever there is a Federal action.

[38] The spreadsheet is available here: https://www.fisheries.noaa.gov/webdam/download/75332515

[39] For purposes of the permitting discussion, "offshore" refers to Federal waters, which extend from three to 200 nautical miles from shore. Although the State/Federal waters near shoreline may vary for a few States with respect to submerged lands (per the Submerged Lands Act), this does not affect CWA jurisdiction for NPDES permit issuance. Authorized State programs issue NPDES permits in State waters (up to 3 nautical miles from shore) and the EPA issues NPDES permits in Federal waters (from 3 to 200 nautical miles from shore) and in waters for States, Tribes, and territories that are not authorized to administer the NPDES program. The USACE issues permits in both State and Federal marine waters.

[40] A National Marine Fisheries Service (NMFS) Gulf Aquaculture Permit requirement was suspended by a district court ruling challenging NMFS' authority under MSA to regulate aquaculture. That decision is currently controlling only in the 5th Circuit and does not prevent the development of aquaculture in the Gulf of Mexico or other parts of the U.S.

Federal agencies have set up regional coordination groups or committees to create a more efficient and streamlined regulatory process. For example, USACE, EPA, NOAA, USFWS, FDA, BOEM, BSEE, and the Coast Guard established a coordinated process for permitting offshore aquaculture in the Gulf of Mexico. A memorandum of understanding (MOU) and several guidance documents developed by this work group provide a model for other potential regional efforts.[41]

Future regional processes, where appropriate, need not mirror the Gulf of Mexico model exactly, but a coordinated process should include, at a minimum, the following:

- **A preapplication phase** focused primarily on siting of the aquaculture operation. Siting is one of the most complicated and expensive parts of the permitting process and has the potential to generate numerous associated conflicts. Thus, having all interests represented up front avoids sending the applicant back to the drawing board because of one or more previously unidentified conflicts. A preapplication process clarifies the expectations of all agencies for the applicant. One Federal agency would serve as the initial point of contact and coordinate the preapplication meeting, at a minimum, although this could also be extended to coordination of other elements of the process as well.
- **Identification of species** for propagation and rearing is a key element in the success of a sustainable aquaculture industry. The ability to farm a variety of species will help expand seafood production and create new opportunities. Existing regulations concerning federally managed commercial or recreational fisheries can limit species selection for aquaculture in Federal waters.
- **Coordinated environmental reviews and consultations** will eliminate duplication of effort by the permitting agencies (USACE and EPA), the Federal consulting agencies (e.g., NOAA and USFWS), State and Tribal agencies, and other public interests (e.g., the regional fishery management councils). One potential approach is using the NEPA process to synchronize other environmental reviews and authorizations if the necessary information to initiate the consultation is available. The NEPA document could be used as a single consultation document for consultations conducted under the ESA, FWCA, or MSA (for EFH); this can be an efficient way to coordinate concurrent environmental reviews and could avoid the need for agencies to undertake those assessments sequentially.
- **Coordinated monitoring, reporting, and enforcement activities** (including a review of monitoring reports and real-time data and site visit inspections) will help create a more coordinated regulatory and management process. Models of Federal and State agency coordinated compliance inspections already exist (e.g., for aquaculture, oil and gas platforms, fishing, and ships entering U.S. ports).

[41] The MOU, a permit applicant guide, and more technical guidance on specific requirements (e.g., the baseline environmental survey, genetics) are available here: https://www.fisheries.noaa.gov/southeast/aquaculture/marine-aquaculture-noaa-fisheries-southeast-region

Some countries establish aquaculture management areas (AMAs) as a way to coordinate and manage aquaculture operations in a defined region.[42] AMAs "can be aquaculture parks, aquaculture clusters, or any aquaculture area within a zone where farms share a common water body or water source and that may benefit from a common management system aimed at minimizing environmental, social and fish health risks."[43] The May 2020 Executive Order[44], Promoting American Seafood Competitiveness and Economic Growth, requires NOAA to begin a similar effort to identify geographic areas containing locations suitable for commercial aquaculture and complete a programmatic Environmental Impact Statement (PEIS) to assess the impact of siting aquaculture facilities in each area, referred to as Aquaculture Opportunity Areas (AOAs). This allows NOAA to proactively use a combination of spatial mapping, scientific review, and stakeholder input to identify the geographic areas and use the best available data to account for key environmental, economic, social, and cultural considerations to identify areas that may support sustainable aquaculture development. The potential impacts to protected species and habitats will be considered at multiple points in the process.

The PEIS for each AOA will analyze alternative scenarios for siting aquaculture within the identified geographic areas and will present the best available science on the potential effects of commercial aquaculture there. The PEIS will include information to inform future permitting and environmental consultations for aquaculture operations that are prosed within an AOA, creating permitting efficiencies by reducing the need for duplicative efforts by federal and state agencies. Additional NEPA analysis may be required during the permitting process to consider the effects of a proposed farm in more detail. Proactively considering NOAA-trust resources and stakeholder uses of a defined area will help to encourage the sustainable growth of aquaculture by siting aquaculture farms in ways that minimize impacts to these natural resources and reduce user conflicts while maximizing public input in the APA identification process.

- **Action 1.3.1** The Federal agencies that participate in the Gulf of Mexico coordinating group described above are currently processing two permit applications for fish farms in Federal waters.
- **Action 1.3.2** NOAA, EPA, and USACE are jointly developing the NEPA document for a proposed fish farm off San Diego in Federal waters.
- **Action 1.3.3** NOAA will continue to refine OceanReports, the AquaMapper, waste discharge and genetics models, and other scientific information to support programmatic approaches.
- **Action 1.3.4** NOAA will begin identifying geographic areas containing locations suitable for commercial aquaculture and completing a PEIS to assess the impact of siting aquaculture facilities in each area, known as Aquaculture Opportunity Areas.

[42] Aguillar-Manjarrez J, Soto D, Brummett R. (2017) Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. A handbook. Report ACS 18071. Rome: FAO and Washington, D.C.: The World Bank.

[43] Food and Agriculture Organization of the United Nations. "Aquaculture zoning, site selection, and area management under the ecosystem approach to aquaculture." http://www.fao.org/3/a-i5004e.pdf

[44] E.O. 13921 of May 7, 2020

Objective 1.4: Improve aquaculture-specific outreach on the NPDES program and continue to provide information on the water quality risks associated with aquatic animal production.

Approximately 680,500 facilities in the United States have NPDES permits. Fewer than 600 of those, even very broadly categorized, can be classified as aquaculture. That small group contains disparate operations such as enhancement net pens, research institutions, trout farms, fish hatcheries, shrimp farms, and alligator farms. EPA and State NPDES programs focus most outreach, training, and technical assistance on large operations and those with discharges that pose significant risks to water quality. Recent events—including concerns expressed by different aquaculture sectors, a circuit court decision regarding shellfish hatcheries,[45] and conflicting information about the environmental impacts of aquaculture—have highlighted the need for clarifying how NPDES regulations apply to aquaculture facilities and assessing water quality risks associated with aquaculture operations.

- **Action 1.4.1** To respond to concerns expressed by different parts of the aquaculture industry, EPA, in conjunction with authorized State NPDES programs as appropriate, will improve communication on:
    - Which facilities may be subject to NPDES permitting,
    - Best management practices for water quality and other elements of implementing permit requirements,
    - Monitoring and reporting requirements, and
    - How applicants/permittees can effectively participate in the permit development and compliance processes.

After consulting with industry organizations and State programs about the most effective communication venues and mechanisms, the EPA will develop web-based and in-person outreach and technical assistance efforts, as resources allow. In addition, the EPA will continue to work with government and academic institutions to provide clear, scientifically based information on the water quality risks from aquatic animal production facilities.

Objective 1.5: Establish a clear and transparent Federal process for ensuring the safety of molluscan shellfish grown in Federal waters.

While the FDA currently provides oversight for seafood safety, with the exception of *Siluriformes* (catfish) species, seafood safety responsibilities are often shared between State and Federal authorities. The FDA and NOAA Seafood Inspection Program (SIP) share information and responsibilities under an MOU, and any new aquaculture activity in Federal waters will require this type of MOU to address food safety issues. The FDA coordinates with State governments and the Interstate Shellfish Sanitation Conference (ISSC) to establish safety requirements for molluscan shellfish harvested from Federal and State waters. Previously, the National Shellfish Sanitation Program (NSSP) did not explicitly provide a process for meeting safety requirements for farmed molluscan shellfish harvested from the EEZ; yet the FDA and NOAA worked with States and industry within the ISSC to

[45] See: http://cdn.ca9.uscourts.gov/datastore/opinions/2018/03/09/16-35957.pdf

address Federal waters specifically in the NSSP. The Seafood HACCP regulations (21 CFR 123) address and control food safety hazards associated with finfish and other possible food products, such as marine algae, which may also pose food safety issues and involve several Federal agencies.

- **Action 1.5.1** To ensure that food safety requirements are met for molluscan shellfish commercially grown and harvested from the EEZ, the FDA, NOAA, and ISSC are developing a process whereby the FDA and NOAA SIP will provide oversight of each agency's respective responsibilities outlined in the NSSP Model Ordinance. This will require setting appropriate controls for authorizing harvest of farmed product in Federal waters. The most pressing issue is to develop an efficient vessel permitting process that ensures molluscan shellfish are safely harvested from Federal waters. Requirements for obtaining permits will include providing evidence that hazards, such as biotoxins, are effectively controlled by a firm's operations. NOAA is leading an effort for managing the permitting by or through NOAA SIP using the National Permit System to track harvests through each point in the chain of custody.
- **Action 1.5.2** NOAA and FDA are also examining how to integrate site mapping tools to assist in identifying sites for aquaculture in Federal waters relative to food safety issues.

Goal 2. Implement a National Approach to Aquatic Animal Health Management of Aquaculture

Figure 3. Atlantic salmon broodstock. (*Photo: NOAA Fisheries*)

Aquatic animal health is paramount for the success of the aquaculture industry. Both infectious and noninfectious diseases affect animal productivity and well-being. The inevitable bridges between natural resources and aquaculture farms create an opportunity for the introduction and transmission of pathogens throughout and between facilities and jurisdictions. Therefore, aquatic animal health, whether in farm-raised or wild animals, must be addressed with a uniform approach on a national level. This approach must assess animal health using a risk-based approach based upon best available science. It must protect animal health, safeguard wild stocks and environmental quality, and instill confidence in animal production practices. Also, Federal and State agencies must develop a unified road map and collaborative framework to implement a national approach to managing aquatic animal health.

Effective aquatic animal health management depends on a unified approach to how health is determined, reported, maintained, and protected on aquatic animal farms. This approach must involve all Federal and State agencies with authority for aquatic animal health and aquaculture. These authorities have oversight of pathogen surveillance and testing in aquaculture farms and wild aquatic animal populations. They also oversee drug approval and licensing of vaccines, which can minimize the use of drugs on a farm and help keep farmed animals healthy.

To this end, Federal agencies will take the actions outlined in Objectives 2.1 through 2.5 below, which focus on aquatic animal health and food safety. Some sectors of our domestic aquaculture industry rely on Federal aquatic animal health attestations or certifications to access global markets for both import and export purposes. Objectives 2.7 and 2.8 outline actions related to achieving the international trade component of this goal.

Objective 2.1: Review, evaluate, and update the National Aquatic Animal Health Plan.

The National Aquatic Animal Health Plan (NAAHP), released in 2008, presented a baseline for how to address aquatic animal health in the United States, after several years of meetings with APHIS, USFWS, NOAA, and external partners. The NAAHP has remained largely unimplemented, and the opportunity remains to establish a unified national approach to aquatic animal health. In addition to the NAAHP itself, the three Federal entities—APHIS, USFWS, and NOAA's National Marine Fisheries Service—drafted two MOUs at the inception of the NAAHP: one MOU establishes authorities for aquatic animal health and the other delineates roles for export health certification for aquatic animals. Both MOUs expired in 2020 and federal partners are working to update these as a new national plan is drafted.

There is a need for a national integrated and comprehensive plan addressing aquatic animal health in aquaculture. APHIS in consultation with the aquaculture industry and others drafted voluntary program standards, known as the Comprehensive Aquaculture Health Program Standards (CAHPS).[46] The standards outline principles of health management in aquaculture settings. Principles include pathogen surveillance, biosecurity, disease investigation, and response. CAHPS is designed to be scalable, responsive, and specific for the facilities implementing the standards. The CAHPS site-specific health plans are tailored to the species being cultured, production methods, known risks, and business goals. CAHPS can only be successful if there is a uniform Federal-State approach to evaluate risks. However, on-farm livestock management is one component of a much larger and more complex challenge of standardizing testing and inspection protocols for aquatic animals. This type of integrated system does not currently exist, so commercial operations must follow a patchwork of movement and export regulations that in some cases have resulted in expensive and unnecessary testing.

APHIS, USFWS, and NOAA plan to update the following Federal aquatic health management policies and procedures.

- **Action 2.1.1** Re-sign the existing or updated MOUs because these documents remain meaningful for how to conduct export endorsements.
- **Action 2.1.2** Sunset the current NAAHP, and either update or redraft the NAAHP to incorporate the CAHPS into the NAAHP.

Objective 2.2: Work with partners and stakeholders to establish proficient, efficient, and equivalent standards or guidelines for diagnostics and inspections of aquatic animals.

The U.S. aquaculture industry needs an integrated approach to establish and maintain optimal health status at the farm level. Groups charged with certifying or verifying health certifications or confirming detection of pathogens need equivalent standards for sample collection and diagnostic assays. To accomplish this, all involved need case definitions for priority pathogens [listed by the World Organisation on Animal Health (OIE)] or other significant diseases to know when a detection is classified as “suspect” and when is it “confirmed.” Currently, many States regulate the interstate movement of aquatic animals based on policies developed using the American Fisheries Society Fish Health Section’s “Blue Book.” The Blue Book sets forth guidelines for inspection and diagnostics, primarily for fish pathogens. The Blue Book is outdated and not aligned with international standards established by the OIE and other organizations.

APHIS, USFWS, and NOAA plan to undertake the actions described below to improve diagnostics and inspections of aquatic animals.

- **Action 2.2.1** Draft case definitions for priority and emerging pathogens of aquatic animals.
- **Action 2.2.2** Assess laboratory standards and needs to support aquatic animal health.
- **Action 2.2.3** Participate and assist with the update of the American Fisheries Society’s Blue Book on guidance for diagnostics and animal inspection.

[46] USDA–APHIS. “Comprehensive Aquaculture Health Program Standards.” https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/aquaculture/cahps

- **Action 2.2.4** Establish a diagnostic standards committee to establish criteria and methods for detecting aquatic animal pathogens.

Objective 2.3: Improve efficiencies for drug approvals, biologics licensing, and food additive petitions for animal feed.

Drugs and biologics (e.g., vaccines) must be approved or registered by the appropriate regulatory authority before they can be legally marketed for use in U.S. aquaculture. FDA's Center for Veterinary Medicine (CVM) regulates animal drugs and the APHIS Center for Veterinary Biologics regulates biologics. Obtaining legal marketing status through these agencies requires companies to generate and submit information to demonstrate that their products are both safe and effective. The small size of the U.S. aquaculture markets make it difficult to justify significant investment required to generate this information. Improvements in the efficiency with which aquaculture products can navigate these regulatory processes will benefit domestic commercial aquaculture food production and public and private enhancement hatcheries (e.g., for trout and salmon restocking or restoration) by allowing more safe and effective products to come to market.

The FDA CVM understands the constraints associated with drug approvals for minor species, including aquaculture, and programs are in place to offer incentives for the development of drugs for these species. Also, State and Federal agencies, such as the USFWS Aquatic Animal Drug Approval Partnership (AADAP) program, are working with private companies to conduct the studies required to support new animal drugs for aquatic species. Continued coordination between Federal agencies and partners is critical to most efficiently obtain additional FDA drug approvals, ensuring that aquatic animal health professionals have the necessary tools.

FDA's CVM regulates animal food. Approval of feed additives is analogous in many ways to the drug approval process. Ingredients used in animal food in the United States must either be approved animal food additives or be Generally Recognized as Safe (GRAS) for the intended use. The *Official Publication* of the Association of American Feed Control Officials (AAFCO) contains the most complete list of animal food ingredients with their definitions. The *Official Publication* list includes approved animal food additives as well as substances that are GRAS for an intended use. In addition, many of the ingredients listed are not approved animal food additives and may not meet the criteria needed to be recognized as GRAS for a use. Nevertheless, FDA policy is to accept the listing of ingredients in the *Official Publication* for their marketing in interstate commerce, provided there are no animal food safety concerns about the ingredient. The production of fish and shrimp in aquaculture systems has relied in part on the use of fish meal and fish oil in diets, because these ingredients are a source of essential amino acids and essential fatty acids. The demand for fish meal and fish oil has increased, yet the availability of these products has not. Plant-based protein sources, such as soybean meal, are used in fish diets, but their use is limited by deficiencies in certain essential amino acids, low palatability, and the presence of anti-nutritional factors. Similarly, the use of vegetable oils has not completely replaced the need for fish oil in aquaculture diets, mainly because most fish require long-chain omega-3 fatty acids that are present in fish oil but mostly absent in vegetable oil. Thus, it is important to identify and evaluate feed ingredients that are palatable, provide essential nutrients, and do not have deleterious effects on the growth and health of the fish. Also, it is important to ensure that the quality and safety of fish products are not impacted by feed ingredients.

FDA, USDA, USFWS, and NOAA plan to undertake the actions listed below to improve the efficiency of drug approvals and licensing processes of biologics for aquatic animals and approval processes of food additives for use in aquaculture feeds.

- **Action 2.3.1** AADAP will continue to assess opportunities to advance development of the most necessary drug projects and provide scientific expertise to advance them as described in the *National Strategic Plan for Aquaculture Research 2021–2025*. Continued Federal collaboration with the Association of Fish and Wildlife Agencies (AFWA) Drug Approval Working Group will help address animal health and production needs for resource management. Furthermore, USFWS, NOAA, and USGS need to renew their memorandum of agreement with the AFWA.
- **Action 2.3.2** FDA intends to finalize guidance to assist sponsors in incorporating complex adaptive and other novel investigational designs, data from foreign countries, real-world evidence, biomarkers, and surrogate endpoints into proposed clinical investigation protocols and applications for new animal drugs. FDA will also take into consideration comments it receives on Draft Guidance for Industry #61, entitled "Special Considerations, Incentives, and Programs to Support the Approval of New Animal Drugs for Minor Uses and for Minor Species."
- **Action 2.3.3** FDA will continue to encourage firms to submit specific uses of ingredients exempted from the statutory premarket approval requirements based on the notifier's determination that such use is GRAS. Firms are encouraged to meet with FDA prior to submitting a GRAS notice.
- **Action 2.3.4** FDA intends to finalize guidance for industry to streamline the communication between FDA and firms applying for food additive petitions or submitting notices for GRAS determinations to ensure efficiency in the process. Guidance for Industry #262, "Pre-Submission Consultation for Animal Food Additive Petitions or [GRAS] Notices", will provide information on all the services that the FDA offers to the industry for individuals interested in the premarket approval of new animal feed ingredients.
- **Action 2.3.5** APHIS is updating Veterinary Services Memorandum 800.202, which will include guidance regarding efficacy studies for aquaculture biologics. (Veterinary Services Memorandum 800.204 has been updated to provide additional guidance regarding field safety studies to support licensure of biologics used in aquaculture.)

Objective 2.4: Review and clarify requirements for domestic movement of live aquatic animals across State lines.

Recent surveys conducted across sectors of domestic aquaculture indicated that regulations for interstate movement, primarily at the State level and including those for animal health testing, are complex and burdensome for commercial aquaculture operations. To improve regulatory efficiency, Federal agencies will work with State partners and other groups to develop science and risk-based equivalent and standardized procedures allowing for the safe and efficient movement of aquatic animals across State lines.

USFWS, USDA, FDA, and NOAA plan to undertake the actions listed below to review and clarify requirements for domestic movement of live animals across State lines.

- **Action 2.4.1** Improve coordination and communication of Lacey Act implementation and impact on farm-raised aquatic animals.
- **Action 2.4.2** Clarify Federal aquatic nuisance species regulations and review standards for implementation and enforcement.
- **Action 2.4.3** Work with States to clarify and incorporate best available science into requirements for movement of shellfish seed across State lines (ISSC and State requirements).
- **Action 2.4.4** Examine opportunities to reduce the regulatory burden on stakeholders when moving aquatic animals interstate while continuing to protect the health of wild and farmed species.
- **Action 2.4.5** Develop a database system that allows data to be securely stored and queried so that attestations about animal health can be determined to support the creation of zones or regions where pathogens are or are not present.

Objective 2.5: Develop surveillance strategies and emergency response plans for priority aquatic animal pathogens.

Effective and timely communication, surveillance, and response to animal health emergencies are critical to protecting domestic livestock, natural resources, and the ability to trade animal products on a global level. When an animal health emergency occurs, it is often too late to develop a meaningful plan and react effectively. If proactively developed and exercised, these plans and strategies will remain relevant.

Comprehensive and integrated surveillance (CIS) is an approach to animal disease surveillance that connects and engages partners from APHIS Veterinary Services (VS) and other entities involved in animal health, including Federal programs, laboratories, State/Tribal agencies, experts, and industry partners. CIS aims to exchange information across VS business units and partners to maintain up-to-date knowledge about health despite ever-changing animal populations and conditions. The CIS approach contains an ongoing evaluation and improvement process that allows VS to increase or reduce animal disease surveillance efforts based on current needs. CIS provides multi-disease and multi-evidence stream surveillance. Because aquaculture encompasses many commodity groups and production systems, this initial version of CIS-Aquaculture is not commodity- or disease-specific; rather, it provides a general framework for surveillance intended to meet the objectives of a variety of producers.

The integration of surveillance information sources includes close interaction with other national bio-surveillance initiatives led by the Department of Homeland Security and other government agencies. The main goal of this new approach is to gain efficiencies from a continual, dynamic, and standardized evaluation process for all VS surveillance activities. When CIS is fully implemented, this approach will include well-identified metrics and ongoing cost-benefit evaluations for all surveillance activities.

CIS-Aquaculture is designed as a corollary to the non-regulatory CAHPS. These standards aim to uphold health and prevent pathogen dissemination by movement or trade through the implementation of uniform criteria for the detection of and response to aquatic animal pathogens reportable to the OIE. Participants meet CAHPS objectives through engagement of an Aquatic Animal Health Team and

systems that support effective risk characterization and management, surveillance, disease investigation and reporting, and response. CIS-Aquaculture provides a voluntary framework to guide efficient and effective surveillance to meet objectives set forth in the CAHPS. CIS-Aquaculture aligns with CAHPS priorities, leveraging data through partnerships and identifying efficiencies in surveillance design and analysis. Because Federal funds are limited, the APHIS-VS initial role in CIS-Aquaculture has been focused on identifying mechanisms for improved efficiency and efficacy in existing surveillance systems.

APHIS, in collaboration with Federal and State agencies and other partners, will undertake the actions listed below to develop surveillance strategies and emergency response plans for priority aquatic animal pathogens.

- **Action 2.5.1** Define Federal and State agency authorities for reporting and responding to priority aquatic animal pathogens.
- **Action 2.5.2** Establish a communication plan and standard operating procedure for reporting detections of priority aquatic animal pathogens.
- **Action 2.5.3** Develop surveillance strategies to support domestic zoning or regionalization for specific aquatic animal pathogens.

Objective 2.6: Clarify and define Federal agency roles in aquatic animal health attestations/certifications and import/export of aquatic animals.

To support and regulate the flow of international trade, Federal entities must improve the efficiency of the process for exporting healthy animals. Federal entities must also protect domestic aquatic livestock and natural resources, including wild fish stocks and their ecosystems, from the potential threats posed by pathogens, contaminants, genetic introgression, and invasive species that may introduced into the United States.

The Federal agencies responsible for overseeing the import and export of aquatic animals, in collaboration with State agencies where appropriate, will undertake the actions listed below.

- **Action 2.6.1** Review and renew the MOU between APHIS, NOAA, and USFWS for interagency export coordination of aquatic animals. This MOU expires in 2020.
- **Action 2.6.2** Review and strengthen, where appropriate, the MOU between NOAA and FDA for interagency cooperation and coordination of seafood product inspection.
- **Action 2.6.3** Review, strengthen, and, when appropriate, draft MOUs between APHIS and FDA to prevent the introduction of aquatic animal pathogens entering the United States on live aquatic animals intended for human consumption (i.e., seafood).
- **Action 2.6.4** Review and, where appropriate, fill possible gaps between different agency roles in aquatic animal health attestations/certifications and import/export.

Objective 2.7: Establish standard operating procedures for agency communication and points of contact for Federal and State agencies involved in the movement (import/export) of aquatic animals.

Current government channels of communication are based on legacy contacts and connections and a range of different agency MOUs, agreements, and directives. Documenting these contacts and connections and establishing standard operating procedures for communication will provide guidance for Federal coordination and enforcement of import and export procedures for aquatic animals.

- **Action 2.7.1** The following responsible agencies will establish standard operating procedures and points of contact within the various Federal agencies specific to the aquatic animals and/or regulatory jurisdiction:
    - FDA Center for Food Safety and Applied Nutrition – Food safety.
    - State/Federal coordination – Bivalve molluscan shellfish interstate shipments, contacts on Interstate Certified Shellfish Shippers List responsible for growing area, risk reduction, patrol, and plant and shipping sanitation.
    - NOAA Seafood Inspection Program – Export health certificates.
    - Department of Homeland Security/U.S. Customs and Border Patrol – Import customs control and documentation.
    - USDA FSIS – *Siluriformes* (catfish).
    - USDA APHIS – Aquatic animal disease control.
    - DOI/USFWS – Import animal control.

Goal 3. Refine and Disseminate Tools for Aquaculture Regulatory Management

Figure 4. Open ocean aquaculture fish cages (*Photo: NOAA Fisheries*).

Regulatory processes require objective, efficient, and timely decisions based upon the best available science, so science has a key role in improving regulatory decision-making.[47] Science-based tools are needed, for example, to site and manage aquaculture facilities, identify strategies to minimize, and avoid negative impacts to protected species and habitats, reduce the risk of invasive species introductions, minimize use conflicts, and evaluate risks associated with disease and genetic risk interactions between farmed and wild populations. Decision-support tools grounded in sound science can greatly improve the quality, consistency, and efficacy of regulatory decision-making for the benefit of industry, society, and the environment. Science tools can include risk assessment models, GIS tools and maps, guidance and synthesis documents, disease countermeasures, epidemiology reports, production statistics, and health/species certifications. Realizing the goals of economic performance, legal compliance, improved trade, and environmental compatibility will require such critical science-based management tools.

Translating scientific information garnered from robust science programs into operational decision support tools is critical to regulatory efficiency, fulfilling environmental requirements, and supporting industry development. Science information provides the foundation for evidence-based tools that inform decision-making at multiple levels of government. Industry uses this information to help understand and meet regulatory requirements, and it is critical to increase public understanding of the benefits and risks of aquaculture.

Optimizing the development of science-based management tools for aquaculture is complex. Multiple programs and institutes play a role in creating, funding, directing, transferring, and ultimately using science and technology for meaningful aquaculture development. The process of creating new ideas often occurs when a diverse mix of basic and applied research[48] projects interact. The development of Federal science tools for aquaculture management occurs through a combination of work at Federal research laboratories; Federal funding of university, nonprofit, and industry scientists through

[47] "Best available science" is often called out in legislation but has a somewhat ambiguous definition. For a definition, see National Standard 2—Scientific Information, 78 Fed. Reg. 43066, 43088 (July 19, 2013). Also see National Standard 2 in the Magnuson-Stevens Fishery Conservation and Management Act and guidance provided by the American Fisheries Society at https://fisheries.org/policy-media/science-guidelines/defining-and-implementing-best-available-science-for-fisheries-and-environmental-science-policy-and-management/

[48] Stokes Donald E (1997). Pasteur's Quadrant – Basic Science and Technological Innovation. Washington, DC: Brookings Institution Press. p. 196. ISBN 9780815781776.

competitive grants or contracts; cooperative extension work by USDA, the National Sea Grant College Program, and State extension agents; and other public-private research partnerships.

Specific science needs for aquaculture regulatory management and industry development are featured in the companion *National Strategic Plan for Aquaculture Research, 2021–2025.* Examples of priority actions to refine, adapt, and further develop science-based tools to support regulatory decisions and management oversight include the following:

- Models to understand tradeoffs during siting, genetic risks from escapes, nutrient fates, habitat implications from aquaculture development, economic performance, and aquatic epidemiology, among others.
- Risk assessments to inform decisions such as stock transfer, location and management of farms, and consultations under ESA and MMPA, among others.
- Specific research products leading to approvals for therapeutants and other compounds, feed additives, and other government approvals.
- Best management practices to encourage constant improvement in food safety, environmental, economic, and social performance of the industry in all areas.
- Specific science-based advice products that conforms to the Information Quality Act.

Much of the work to develop tools for aquaculture management occurs through Federal and State agency and public-private collaboration currently in place or underway. Examples of collaborations include the following:

- NOAA and BOEM continue to collaborate on the development of OceanReports and the National AquaMapper with information from other State, Federal, and other databases.
- The FDA, NOAA's SIP, the ISSC, and State agencies are collaborating to develop an established process ensuring the food safety and the landing of molluscan shellfish grown in and harvested from Federal waters.
- Examples of coordination of drug approval research include the AFWA Drug Approval Working Group involving AFWA, USFWS, and NOAA as well as the Minor Use Animal Drug Program and recent collaboration between AFWA, USFWS, and the National Aquaculture Association on a survey of aquaculture drug needs.

Objective 3.1: Identify additional science information needed to inform Federal and State permit reviews, consultations, and policy decisions.

For research to proceed from the discovery to use stages in a timely and efficient manner, regular communication between the regulatory community, the scientific community, and the aquaculture industry needs to occur. Federal agencies and others are currently developing a suite of science-based tools to aid in reviewing aquaculture permits and managing the environmental, social, and economic effects of existing and emerging forms of aquaculture production. Additional transitional scientific work is typically required to refine these science and risk management tools and adapt the tools to new forms of aquaculture (species, gear types, locations) and changes in environmental conditions. However, there is a disconnect sometimes between the needs of the end users of science-based tools and the

scientists developing the tools. Scientists need to refine science tools developed in isolation of their use to address real-world situations, such as applying the tools to the siting and permitting of pioneering commercial operations or pilot and demonstration projects.

Federal agencies will continue to conduct external peer and industry review of Federal agency science priorities to assess and refine Federal work on management tools for aquaculture, including those actions listed below.

- **Action 3.1.1** USDA's ARS and National Institute for Food and Agriculture hold an industry review session (or sessions) every 5 years to review the results of the previous 5 years and to obtain public comment on proposed research priorities for the next 5 years.
- **Action 3.1.2** An update to the NOAA's aquaculture science strategy will include the recommendations of an external peer review of NOAA's aquaculture science portfolio, which was completed in 2019 to identify strengths, weaknesses, and needs of NOAA's aquaculture science program.
- **Action 3.1.3** The National Sea Grant College Program is currently reviewing and conducting strategic planning for Sea Grant's aquaculture activities.
- **Action 3.1.4** International collaboration can also yield information about science tools and comparisons of the applications of these tools. A number of Federal agency staff will continue serving as members of expert working groups under the Aquaculture Steering Group of the International Council for the Exploration of the Seas. This forum is used to share information about science tools. The working groups address topics such as genetics, aquatic health, scenario planning, environmental interactions, carrying capacity, and social and economic dimensions of aquaculture-related issues.

To ensure that science is aligned with the highest priority regulatory needs, the regulatory and supporting Federal science agencies will arrange a regular meeting or meetings (or other contacts) between the aquaculture science and regulatory communities. The SCA will develop the format for these meetings and contacts.

Objective 3.2: Refine and test science tools for regulation and management.

Coordinated adaptive management and co-development of tools and applications become essential as new types of aquaculture develop and existing types of aquaculture adapt to environmental and social changes. Developing science tools by working with aquaculture projects is an excellent way to learn from real-world applications of the tools and to refine them based on their applications in commercial aquaculture. For example, spatial planning and siting tools (e.g., OceanReports and AquaMapper) applied earlier versions of the data layers to the siting of projects in Federal and State waters off California, Florida, Hawaii, New York, and in the Gulf of Mexico. These tools will continue to improve as new projects and management needs are added. Similarly, fish farms growing different species in several parts of the United States have tested and adapted U.S. and European water column and benthic impact models developed for salmon in recent years. These models provide a robust basis to build upon as new diets, species, and regions emerge. Scoping, identifying, and establishing the first of several aquaculture management areas is a current opportunity to co-develop siting tools and build close and adaptive working relationships between scientists and regulators (see Goal 1, Objective 1.3).

- **Action 3.2.1** To develop science tools that take into account adaptive management and meet regulatory needs, the regulatory agencies will continue to work with State, Tribal, university, and private sector scientists to develop tools and tests and refine those tools in aquaculture settings. The companion document *National Strategic Plan for Aquaculture Research, 2021–2025*provides more specific topical areas ready to be refined for regulatory and management use.

Objective 3.3: Implement coordinated priority actions in tool development.

Agencies have different scientific mandates and varying levels of resources to address aquaculture. Mandates include communicating science information and tools to decision-makers, maintaining Federal aquaculture laboratories, running extramural grant programs, and developing research partnerships on priority science needs. In some cases, the best resource overall is using key scientific assets from one agency to develop tools needed by another agency. Agencies, when appropriate, may coordinate their science and research activities to make efficient use of Federal resources. When warranted, Federal agencies work together to develop and refine science tools. In other cases, several agencies may work together with outside State, university, or other partners to develop management tools. Agencies may also co-fund partnerships with industry, universities, and other research organizations (e.g., consortia, collaborative agreements, and international partners). Agencies can facilitate these through a regular cross-agency priority-setting exercise that includes aligning scientific assets to the greatest need, regardless of the agency needing the tool and the agency possessing the scientific asset.

There is an ongoing need to focus grants, consortia, and cooperative agreements (extramural work via partnerships with industry, universities, and research institutes) on priority science work. For example, Federal grant programs within USDA, NOAA, National Science Foundation, and the Foundation for Food and Agriculture collaborate to a varying extent on the design and implementation of competitive grant programs for aquaculture.

Communicating and making science information available to agency decision-makers, the aquaculture industry, the public, and other stakeholders should be a coordinated part of all science programs. Examples include educational, decision-making, and reference tools for Federal and State agency staff such as online databases of permitted projects, consultation reference material, screening tools, webinars, videos, and “virtual tours” of various types of aquaculture facilities/operations. Agencies need to improve coordinating communication within and outside of the Federal government.

To improve Federal agency coordination on the development of science tools for aquaculture management, the responsible Federal agencies will take the actions listed below.

- **Action 3.3.1** Periodically (every 5 years) update the pertinent components of the *Strategic Plan to Enhance Regulatory Efficiency in Aquaculture* and the *National Strategic Plan for Aquaculture Research (2021-2025)*, set priorities for aquaculture regulatory science, and identify the science resources across agencies to address these priorities.

- **Action 3.3.2** The agencies will develop opportunities for the Federal science assets (Federal laboratories and grant programs) to work together and with other science groups (private sector, State, Tribal, and international partners) on common science needs for management and regulation.
- **Action 3.3.3** To improve communication about science tools for aquaculture management, the agencies will develop common communication tools and key points for an external audience about the role of science in management and regulation.
- **Action 3.3.4** The agencies will also further interagency communication and coordination tools so that all agencies have access to the science assets and tools developed by the other agencies.

THIS IS A DRAFT DOCUMENT OF THE NSTC SUBCOMMITTEE ON AQUACULTURE

PUBLIC COMMENTS WILL BE ACCEPTED THRU SEPTEMBER 10, 2021.

Address all comments concerning the ***Science Plan*** to Task Force Chair Dr. Caird Rexroad, National Program Leader for Aquaculture, Agricultural Research Service, Office of National Programs, 5601 Sunnyside Avenue, Room 4-2106, Beltsville, Maryland 20705. Submit electronic comments to AquaSciencePlan@usda.gov.

Address all comments concerning the ***Regulatory Efficiency Plan*** and the National Aquaculture Development Plan to Task Force Chair Kristine Cherry, Chief, Regulatory and Policy Branch at NOAA Fisheries Office of Aquaculture, NOAA National Marine Fisheries Service, 1315 East-West Highway, Room 14461, Silver Spring, MD 20910-3282. Submit electronic comments to Aqua.RegPlan@noaa.gov.