Analysis of State Legal Requirements for Aquatic Invasive Species Biosecurity at Fish Hatcheries

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I. Introduction

Invasive species can be spread in many ways, both intentionally and unintentionally. Fish hatcheries are an important vector, or pathway, in the spread of aquatic invasive species (AIS), including fish, invertebrates, plants, and pathogens. Invasive species may become established within a hatchery and impact operations by, for example, clogging pipes or screens or causing disease outbreaks. Invasive species may be transferred inadvertently from the water source, as eggs and fish are distributed among hatcheries, or through the movement of equipment and vehicles. They may be released into the environment through escape or regular hatchery activities, such as the stocking of public waters.

Biosecurity plans and the routine use of biosecurity measures can help hatchery managers minimize the risk of introduction and spread of AIS. Biosecurity has traditionally referred to the practices, procedures, and policies used to prevent the introduction of pathogens and other disease-causing organisms, but increasingly the term is being more broadly defined to include any biological risk, including invasive species [1] Australia and New Zealand have the most comprehensive approaches to biosecurity for invasive species risks, but there is growing attention in the United States. In 2016, the State of Hawaii released its 10-year "Hawaii Interagency Biosecurity Plan" laying out a comprehensive approach to protecting the state from invasive species threats.[2] In 2013, Texas Parks and Wildlife released a more targeted biosecurity plan to address potential aquatic invasive species risks associated with fish hatchery activities.[3]

Most states have laws and regulations that prohibit the import and release of non-native species. States also regulate the general operations of both private and government-run fish hatcheries. However, state laws and regulations are not uniform and the extent to which they require or encourage biosecurity planning for AIS is largely unknown. To address this knowledge gap, the National Sea Grant Law Center (NSGLC) received funding from the Mountain-Prairie Region of the U.S. Fish and Wildlife Service in 2018 to compile existing federal and state laws and regulations governing fish hatchery operations and analyze the extent to which state law requires or encourages biosecurity planning.

II. Methodology

The NSGLC began its analysis by compiling a comprehensive inventory of the laws, regulations, and policies related to fish hatcheries in the eight states within the Mountain-Prairie Region (Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming). The relevant statutory and regulatory provisions were identified through traditional legal research methods and downloaded from legal databases, such as Westlaw, and state legislative and agency websites. The state compilations can be found in Appendix A.

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[1] Laura A. Meyerson & Jamie K. Reaser, *Biosecurity: Moving toward a comprehensive approach: A comprehensive approach to biosecurity is necessary to minimize the risk of harm caused by non-native organisms to agriculture, the economy, the environment, and human health*, 52 BIOSCIENCE 593–600 (2002).

[2] STATE OF HAWAII, HAWAII INTERAGENCY BIOSECURITY PLAN 2017-2027 (2016).

[3] TEXAS PARKS AND WILDLIFE DEP'T, A BIOSECURITY MANUAL FOR INLAND FISHERIES DIVISION HATCHERIES (2013).

The NSGLC next conducted a review of both scientific journals and grey literature (e.g., agency reports, policy manuals) to identify the key aquatic invasive species biosecurity measures recommended for fish hatchery operations. A bibliography of sources identified and reviewed by NSGLC is included following Appendix A. A small technical advisory committee was formed to review the compiled best management practices (BMPs) and provide feedback to the NSGLC. The following individuals graciously volunteered their time to serve on the advisory committee:

- Elizabeth Sunshine, Fish Biologist, U.S. Fish and Wildlife Service
- Lacey Hopper, Center Director (Acting), Bozeman Fish Technology Center, U.S. Fish and Wildlife Service
- Ron Hopper, FWS, Hatchery Project Leader, Ennis National Fish Hatchery, U.S. Fish and Wildlife Service

The NSGLC then undertook an analysis of the compiled state laws and regulations to determine the extent to which they require or encourage the implementation of the identified BMPs. This report presents the NSGLC's findings with respect to this comparative analysis. This analysis may assist state natural resource managers and policy-makers in identifying gaps within their respective states, as well as commonalties and differences among states in the Mountain-Prairie Region. Such comparative analysis can provide the foundation for the development of policy recommendations and coordinated legislative or regulatory efforts to address key areas of concern.

III. Best Management Practices for Aquatic Invasive Species Biosecurity

Twelve key BMPs for AIS biosecurity at fish hatcheries emerged from the NSGLC's review of the literature. A brief overview of these BMPs is included below. Additional detail for each BMPs is provided in the remaining sections of this report.

- Hazard Identification/Risk Assessment: Fish hatcheries should engage in a risk evaluation process to identify and assess the AIS-related risks of their facilities and operations. This could be accomplished through an existing risk assessment framework, such as the Hazard Analysis Critical Control Point (HACCP) system, or another similar process.

- Biosecurity Plan: Fish hatcheries should develop and adhere to biosecurity plans that address both structural and operational concerns in order to limit AIS-related risks.

- Property Management: Fish hatcheries should implement measures that control the entry and traffic of personnel, vehicles, and equipment into their facilities in order to reduce the risk of AIS introduction. This could be accomplished by installing fences and gates to restrict access to hatchery personnel and approved visitors and requiring that delivery vehicles and equipment be cleaned, disinfected, and inspected prior to entry.

- Facility Siting and Design: Fish hatcheries should make wise: (1) siting decisions that help reduce the risk of AIS introduction and spread (such as siting away from floodplains), and (2) design choices in constructing their facilities (such as utilizing screening on outflow pipes) that do the same.

- Treatment of Intake and Discharge Waters: Fish hatcheries should adequately treat their intake and discharge waters so that non-native plants, animals, and pathogens are prevented from being introduced into the surrounding environment.

- Inspection and Certification Requirements: Shipments of fish, fish eggs, and fish gametes entering hatcheries should first be inspected for AIS, or, alternatively, be sourced from facilities that have been certified AIS-free.

- Isolation and Quarantine: Fish hatcheries should isolate and quarantine new shipments of fish, fish eggs, and fish gametes both to visually inspect them for signs of AIS and prevent them from spreading invasive plants, animals, and pathogens to the hatchery facilities or environment.

- Disinfection of Fish Eggs: Fish hatcheries should disinfect shipments of fish eggs entering their facilities in order to eliminate any undetected AIS.

- Decontamination of Trucks and Equipment: Fish hatcheries should disinfect all vehicles and equipment in order to reduce the risk of the unintentional movement and introduction of AIS. This can be done both to prevent the spread of invasives into a facility from outside sources and within a facility itself (such as between separate facility buildings or pieces of equipment).

- Staff Training: Hatchery personnel should be trained on AIS protocols, identification, and other related measures so that employees are informed and well prepared to help prevent the introduction and spread of AIS.

- Recordkeeping Requirements: Fish hatcheries should retain certain records (such as mortality records, health reports, and inspection reports) that are useful in recognizing and mitigating any AIS issues that may arise.

- Reporting Requirements: Hatchery personnel should report any detection of AIS in their facilities to appropriate federal or state authorities within a specific time frame in order to mitigate the problem as quickly and efficiently as possible.

IV. Comparative Analysis

The results of the NSGLC's analysis of state law for the above mentioned BMPs is detailed below. For each BMP, the NSGLC provides a brief overview of the practice and its importance to AIS prevention and control. The overview is followed by a discussion of the extent to which that BMP has been incorporated, if at all, into state law.

Hazard Identification / Risk Assessment

"Risk analysis" is a process that involves a flexible framework within which the risks of adverse consequences resulting from a course of action can be evaluated in a systematic, science-based

manner.[4] It permits a defendable decision to be made on whether a particular risk is acceptable or not, as well as the means to evaluate possible ways to reduce a risk from an unacceptable level to one that is acceptable.[5] In the context of fish hatcheries, the use of risk analysis can provide insights and assist in making decisions that help to prevent the introduction and spread of AIS and associated negative impacts, including disease outbreaks. The general framework for risk analysis consists of four major components:

- Hazard identification: The process of identifying hazards that could potentially produce consequences;

- Risk assessment: The process of evaluating the likelihood that a potential hazard will be realized and estimating the biological, social, and economic consequences of its realization;

- Risk management: The identification and implementation of measures to reduce either the likelihood or the consequences of it going wrong; and

- Risk communication: The process by which stakeholders are consulted, information and opinions gathered, and risk analysis results and management measures communicated.[6]

The NSGLC focused its research on the first two risk analysis components—hazard identification and risk assessment. The NSGLC found only one state – Kansas – that mentions such a process in state law. The Kansas Department of Agriculture's Food Safety and Lodging division requires that a hazard analysis be conducted to determine if a HACCP plan is required when an aquaculture facility must obtain a food processing license.[7] However, as most fish hatcheries are not currently raising fish directly for human consumption, this requirement is likely not applicable to most hatcheries. The NSGLC identified no state law or regulation expressly imposing a requirement that hatcheries engage in a targeted hazard identification or risk assessment process geared toward AIS.

The Fish and Wildlife Service (FWS), however, has published guidance for such a hazard identification/risk assessment process. This guidance was created in response to a number of historic instances of introduced pathogen damage to aquatic animals that led to significant ecological and economic impacts.[8] The guidance aligns with other federal policies—in particular, the joint FWS and National Marine Fisheries Service (NMFS) policy regarding controlled propagation of species listed under the Endangered Species Act, which notes that health risks

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[4] J. Richard Arthur, *General principles of the risk analysis process and its application to aquaculture*, in U.N. FOOD AND AGRICULTURE ORGANIZATION, CONTRIBUTED PAPERS ON UNDERSTANDING AND APPLYING RISK ANALYSIS IN AQUACULTURE, 3 (n.d.), *available at* http://www.fao.org/3/i0490e/i0490e01a.pdf.

[5] *Id.*

[6] *Id.*

[7] KANSAS DEP'T OF AGRICULTURE, AQUACULTURE, AQUAPONIC AND HYDROPONIC LICENSING GUIDE 1 (2018).

[8] FISH & WILDLIFE SERV., SPECIAL CASE AQUATIC ANIMAL MOVEMENTS AND CONTROLLED PROPAGATION PROGRAMS, 713 FW § 5.3 (2004).

should be addressed for any captive propagation program (CPP)[9] and further states that the controlled propagation of imperiled species should be "conducted in a manner that takes all known precautions to prohibit the potential introduction or spread of diseases and parasites into control environments or suitable habitat."[10] The FWS's guidance concerns the health risks associated with the movement of any such imperiled species into or from a FWS or other facility.[11] Generally, it establishes guidelines for FWS aquatic animal health officials to assess and document the risks associated with CPPs without unduly jeopardizing the animal population in question, the health of other animals on the associated FWS or other facilities, nor the ecosystem into which the subject population is moved at some later date.[12]

The FWS's specific recommended risk assessment procedures vary, but generally require Fish Health Center (FHC) Directors, with input from other members of a CPP team, to assign a risk classification (either high, moderate, or low) to both movement of a CPP species into a FWS or other facility and also to its later reintroduction into the wild.[13] There are certain guidelines specifically related to risk classification schemes, documentation, CPP species rearing procedures, and pathogen sampling to which the FHC Directors should also adhere.[14] Many of the rearing procedures in FWS's guidance involve quarantine and isolation, which, as discussed later in this report, can be an effective tool for ensuring that unexposed individuals at a hatchery do not become infected.

The FWS also establishes federal policy to help prevent the spread of invasive and non-target species by requiring that its Fish and Aquatic Conservation (FAC) program engage in HACCP planning.[15] This policy intends to help the FAC better protect, secure, and maintain the ecological viability of the nation's fish and wildlife resources by reducing the movement of invasive and non-target species.[16] Generally, FWS's policy requires that relevant staff in FAC field stations and offices: (1) become familiar with the principles of HACCP as a quality control planning tool; (2) identify how they will apply HACCP planning to their operations, (3) implement and document HACCP planning as standard operating procedure; and (4) review and update their HACCP plans.[17] To assist in the implementation of these requirements, the FWS included an appendix to

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[9] Captive propagation programs deliberately breed wild animals in captivity in order to increase their numbers. Aquatic animals raised in hatchery CPPs are eventually reintroduced into the wild once individuals reach maturity. CPPs are often utilized for fish such as native salmonids, which have declined in numbers in some waterways in recent years.

[10] FISH & WILDLIFE SERV., SPECIAL CASE AQUATIC ANIMAL MOVEMENTS AND CONTROLLED PROPAGATION PROGRAMS, 713 FW § 5.2 (2004).

[11] *Id.*

[12] *Id.*

[13] *Id.* § 5.4.

[14] *Id.* § 5.4 and § 5.6.

[15] The FAC is a subsidiary of FWS that is responsible for the National Fish Hatchery System (NFHS)—a federal program that works collaboratively with tribes, states, landowners, partners, and stakeholders to promote and maintain healthy, self-sustaining populations of fish and other aquatic species. The NFHS consists of 70 National Fish Hatcheries, one historic National Fish Hatchery, eight Fish Health Centers, seven Fish Technology Centers, and the Aquatic Animal Drug Approval Partnership Program. *Fish and Aquatic Conservation, U.S. Fish & Wildlife Serv.*, https://www.fws.gov/fisheries/fac_program.html.

[16] FISH & WILDLIFE SERV., MANAGING INVASIVE SPECIES PATHWAYS, 750 FW § 1.2 (2009).

[17] *Id*. § 1.5.

its policy that provides a five-step template to follow when writing HACCP plans and also gives advice about what to include in each section.[18] HACCP plans should be reviewed and revised at least annually as well as: (1) when new employees are hired who will perform relevant activities, (2) when a new species is discovered, and (3) when new control technologies are developed.[19] Public hatcheries run by the FWS are therefore required to develop and implement HACCP plans according to the FWS's specifications.

Biosecurity Plan

In the agricultural and aquaculture context, "biosecurity" generally refers to the measures taken to keep diseases, and the pathogens that carry them, away from livestock, people, other animals, and property.[20] Considered more broadly, however, biosecurity can also refer to measures taken to prevent the introduction and spread of AIS. There are two types of biosecurity: (1) structural and (2) operational.[21] Structural biosecurity refers to measures used in the physical construction and maintenance of facilities, such as ponds, raceways, and buildings.[22] Operational biosecurity refers to the practices, procedures, and policies that are consistently followed by people working at and visiting the facility.[23] Biosecurity plans address both structural and operational concerns in order to best prevent the unintentional spread of invasive species and pathogens from facilities to other facilities or into the environment.

In the course of its research, the NSGLC found no express provision in state law that requires hatcheries to develop a comprehensive biosecurity plan prior to stocking and operation. While the development of more specific plans, such as HACCP plans, is a form of biosecurity planning, the term "biosecurity plan" as discussed in the literature is somewhat broader in scope. HACCP planning is a standardized, five-step process that results in a plan aimed at reducing risk in a number of defined ways. The approach to and topically coverage of biosecurity plans is more variable.

New Zealand, for example, requires that hatcheries (including all commercial and non-commercial aquaculture facilities) develop a biosecurity plan.[24] New Zealand notes that, overall, biosecurity practices should be practical and fit-for-purpose as well as simple and as low cost as possible while achieving the desired outcomes.[25] To that end, the country's guidance lists a number of biosecurity management objectives and recommended practices. These objectives and management practices

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[18] *Id.* APPENDIX §1. (Noting that the HACCP planning process should include the following five steps: (1) describe the activity; (2) identify potential hazards; (3) diagram the sequential actions in step 1; (4) analyze the hazards identified in step 2 for each sequential action in step 3, and develop associated control measures; and (5) complete the HACCP plan.)
[19] *Id.* § 1.11.
[20] *See Biosecurity, U.S. Dep't of Agriculture Animal and Plant Health Inspection Service*, https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-disease-information/avian/defend-the-flock-program/dtf-biosecurity.
[21] *Id.*
[22] *Id.*
[23] *Id.*
[24] *See Aquaculture Biosecurity Handbook*, MINISTRY FOR PRIMARY INDUSTRIES, https://www.biosecurity.govt.nz/dmsdocument/13293/direct.
[25] *Id.* at 7.

are broadly meant to address: (1) stock health management (including animal welfare); (2) stock movements and containment; (3) water; (4) equipment, vehicles, and vessels; (5) people management; (6) feeds and feeding; (7) wildlife, scavengers, and vermin; (8) recordkeeping; (9) monitoring and surveillance; (10) waste (other than water); (11) auditing; and (12) contingency plans.[26]

Property Management

Aquatic invasive species can enter and escape from fish hatcheries through any number of ways. The installation of fences, gates, signage, or other measures that function to restrict access to hatchery personnel and approved visitors can help reduce the risk of invasive species introductions and escapes. A requirement that delivery vehicles be cleaned, disinfected, and inspected prior to entering hatchery premises, for example, can help ensure that outside sources are not bringing invasive pathogens or organisms onto hatchery grounds, where they could spread and proliferate.

Some states have implemented regulations addressing property management, though they vary in content applicability. South Dakota, for example, notes in its Fish Health Manual (FHM) that hatchery visitors should not be allowed to bring fishing equipment or gear onto hatchery grounds or into any fish rearing unit.[27] Furthermore, the FHM notes that hatchery visitors should be barred from sensitive fish health areas and also states that individuals who could potentially transmit fish pathogens, such as those that have recently been fishing or in contact with non-hatchery water sources, should not have access to any fish rearing areas.[28] These requirements help mitigate the risk that a visitor could transmit an undesirable, invasive pathogen into a hatchery, thus jeopardizing all the fish cultivated there. However, neither the FHM nor South Dakota statutes or regulations mentions specific property management measures (such as the installation of fences, gates, signage, or other measures) that must be taken to inform visitors and hatchery personnel of such limitations. Ostensibly, it is the responsibility of hatchery personnel to be aware of the limitations and inform any hatchery visitors of such—a legal gap that may limit the provisions' effectiveness.

Wyoming requires that vehicles used for the transportation of fish, fish eggs, or fish gametes to or from a hatchery be placarded with signage indicating that it is being used for such transportation.[29] This requirement helps communicate to hatchery personnel and others that placarded transportation vehicles may need to be subjected to additional scrutiny in order to prevent the introduction of AIS. No specific vehicle cleaning, disinfection, or inspection measures, however, are explicitly required prior to entry.

South Dakota, it its FHM, states that all hatchery equipment and stocking trucks should be disinfected using established or best-available methods after any contact with non-hatchery source water.[30] Ideally, this requirement prevents the possibility that any invasive species or pathogens from non-hatchery source waters enter the hatchery itself. Similarly, North Dakota requires that

[26] *Id.*
[27] SOUTH DAKOTA GAME, FISH AND PARKS, FISH HEALTH MANUAL 6 (2016).
[28] *Id.*
[29] 40-51 WYO. CODE R. § 8.
[30] SOUTH DAKOTA GAME, FISH AND PARKS, *supra* note 27.

equipment transporting fish to and from a private fish hatchery be free of aquatic vegetation and invasive species, further noting that all equipment is subject to periodic inspection to ensure such.[31] However, neither state requires that hatcheries install signage or other mechanisms that physically restrict facility access until such disinfection or inspection measures are taken.

Facility Siting and Design

Facility siting and design can play an important role in preventing invasives from entering hatchery operations. For example, aquaculture facilities sited in floodplains that are not prepared for severe flooding events can lose their yield to rising floodwaters if the crest rises over the highest point of a farm's ponds, tanks, or raceways. Siting requirements prohibiting building hatcheries in floodplains[32] can help reduce the risk that fish escape during such periods of high water and enter surrounding waterways as the flood recedes. Design requirements, too, can prove integral in reducing the escape or entry of AIS. For example, requirements that demand adequate screening over the water outflow pipes used in recirculating aquaculture systems can help reduce the risk that non-native fish eggs or fry are released into surrounding native waterways. Additionally, requirements that open ponds or raceways be covered with netting minimize the risk of unwanted animals, such as predatory birds, carrying off cultured fish and releasing them into nearby water bodies.

There are some facility siting and design requirements in federal law, although they are not specific to AIS. In the Environmental Protection Agency's (EPA) compliance guidance for Concentrated Aquatic Animal Production (CAAP) facilities (discussed in greater detail in the following section), the agency notes that facility water treatment processes (such as biofilters or aeration columns) should be designed to provide the expected water quality exiting a culture tank within a culture system in order to help ensure the design will provide safe water quality for fish when they are reared at maximum carrying capacity.[33] Though this design requirement is helpful in maintaining overall fish health when large numbers of fish are being reared together, it is not as meaningful in terms of AIS management.

Several states included in the NSGLC's review have legal requirements related to hatchery siting and design. Some of these requirements are fairly general in nature. For example, South Dakota's regulations note that a private fish hatchery license will not be issued unless the applicant can prove that no fish, exclusive of those held by the hatchery, can access the proposed facility or water.[34] Additionally, the state notes in its FHM that wild animal entry into fish rearing ponds and raceways should be restricted as much as possible.[35] Although these provisions have the general intent of preventing the accidental release of AIS from hatcheries, as well as the entry of unwanted

[31] ND ADMIN. CODE 30-03-02-12.
[32] Floodplains are typically dry or semi-dry areas around rivers, lakes, and coasts where water can overflow or pool for extended periods of time as a result of seasonal rainfalls.
[33] ENVIRONMENTAL PROTECTION AGENCY, COMPLIANCE GUIDE FOR THE CONCENTRATED AQUATIC ANIMAL PRODUCTION POINT SOURCE CATEGORY 9-3 (2006), *available at* https://www.epa.gov/sites/production/files/2015-11/documents/caap-aquaculture_compliance-guide_2006.pdf.
[34] S.D. ADMIN. R. 41:09:07:03:02.
[35] SOUTH DAKOTA GAME, FISH AND PARKS, *supra* note 27.

animals, the state leaves it up to hatcheries themselves to decide exactly how they will design their facilities in order to be permitted to operate.

In contrast, other states' provisions related to siting and design are very specific. For example, Utah states that public and private aquaculture facilities cannot be developed on natural lakes, natural flowing streams, or reservoirs constructed on natural stream channels (though offstream reservoirs and excavated ponds or raceways may be considered for siting).[36] The state goes on to note that during the Certificate of Registration (COR)[37] application process, the Division of Wildlife Resources must coordinate with the Department of Agriculture and Food to determine the suitability of a proposed site.[38] These provisions specifically eliminate certain siting options so that prospective hatchery operators are cognizant of their unavailability beforehand instead of having a siting decision declined by the state during the COR application process. Such specificity can also apply to design requirements. Utah also notes in its regulations, for example, that screens or other devices that are designed to prevent the movement of aquatic animals into or out of an aquaculture facility must be placed at the inflow and outflow of drainage pipes.[39] The state goes on to make the presence of adequate screening a precondition to the issuance or renewal of CORs as well as a precondition to delivery of aquatic animals to private fish ponds from health approved sources, such as certain hatcheries.[40]

Treatment of Intake and Discharge Waters

Just as physical design requirements such as the screening of drainage pipes can help prevent the introduction of invasive fish eggs and fry into nearby waterways, provisions that regulate the treatment of that water can mitigate invasive introduction risks at hatcheries. Adequately treated water not only helps prevent the risk that unwanted species or pathogens are introduced to a hatchery with new shipments of fish eggs, fry, or adults, but also assists in ensuring that effluent does not introduce invasive organisms from hatcheries into nearby waterways.

At the federal level, such water treatment is largely regulated by the EPA under authority given to it by Congress under the Clean Water Act's (CWA) National Pollutant Discharge Elimination System (NPDES) permit program. The NPDES permit program is meant to address water pollution by regulating point sources that discharge pollutants into waters of the United States.[41] In regards to aquaculture, the EPA promulgated regulations under the CWA in June 2004 that established Effluent Limitations Guidelines (ELGs) and New Source Performance Standards for the CAAP

[36] UTAH ADMIN. CODE r. 58-17-6.
[37] A Certificate of Registration is an official document that registers aquaculture facilities with Utah's Department of Agriculture and Food Fish Health Program. Aquaculture facilities must have a valid COR in order to operate in Utah.
[38] UTAH ADMIN. CODE r. 58-17-6.
[39] UTAH ADMIN. CODE r. 58-17-7.
[40] *Id.*
[41] Under the CWA, the term "point source" means any discernable, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. (33 U.S.C. § 1362(14)). The term "pollutant" includes solid waste, sewage, garbage, biological materials, and agricultural waste discharged into water, among other things. (*See* 33. U.S.C. § 1362(6)).

point source category.[42] ELGs exist in addition to NPDES permit requirements, and serve as national standards for wastewater discharges to surface waters and publicly owned treatment works (municipal sewage treatment plants). These regulations contain requirements for wastewater discharges that must be met by new and existing CAAP facilities discharging directly into waters of the United States. CAAP ELGs apply to both existing and new CAAP facilities with the following three characteristics: (1) facilities that use flow-through, recirculating, or net pen systems; (2) directly discharge wastewater; and (3) that produce at least 100,000 pounds of fish, mollusks, or crustaceans per year.[43] Farms and hatcheries producing less than 100,000 pounds of aquatic animals per year as well as other aquaculture systems such as land-based ponds are not subject to CAAP facility ELGs (unless specifically noted otherwise by the EPA), but still require valid NPDES permits for discharging wastewater if meeting the general definition of a CAAP facility. CAAP facilities subject to ELGs must abide by certain management practices as well as maintain a BMP plan describing exactly how they will achieve the ELG requirements. Consequently, federal CAAP facility ELGs relate to management practices requirements and record-keeping activities rather than numerical "discharge limits."

Several states that the NSGLC surveyed have incorporated the EPA's CAAP effluent guidelines into their own state laws implementing the federal NPDES permitting program. Some states do this by simply referring to the federal regulations promulgated by the EPA. For example, North Dakota states in its regulation pertaining to the North Dakota Pollutant Discharge Elimination System that the entirety of the federal code section related to CAAPs is incorporated into state law by reference.[44] However, some states qualify their acceptance of the federal CAAP framework. For example, Kansas incorporates into state law the federal provisions addressing effluent limitations for CAAPs for the most part, but specifically excludes three subsections: (1) 40 C.F.R. § 412.31 (relating to effluent limitations attainable by the application of the best conventional pollutant control technology), (2) 40 C.F.R. § 412.44 (identical section again relating to effluent limitations attainable by the application of the best conventional pollutant control technology), and (3) 40 C.F.R. § 412.46 (relating to new source performance standards).[45]

Under NPDES, states are free to set forth requirements that are more stringent than or in addition to those promulgated by the EPA. The NSGLC's research, however, did not identify any examples of such strengthened or additional provisions in state law specifically related to NPDES CAAP requirements.

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[42] A CAAP facility is defined as a hatchery, fish farm, or other facility that either: (1) raises cold water fish species or other cold water aquatic animals in ponds, raceways, or other similar structures that discharge at least 30 days per year (not including facilities producing less than 20,000 pounds of aquatic animals per year or facilities feeding less than 5,000 pounds of food during the calendar month of maximum feeding); or (2) raises warm water fish species or other warm water aquatic animals in ponds, raceways, or other similar structures which discharge at least 30 days per year (not including closed ponds that discharge only during periods of excess runoff or facilities producing less than 100,000 pounds of aquatic animals per year). (40 C.F.R. § 122.24(b)). CAAP facilities can also be explicitly designated by the EPA as such on a case-by-case basis.

[43] *See generally,* EPA, *supra* note 33, at 3-1.

[44] N.D. ADMIN. CODE 33-16-01-01.1.

[45] KAN. ADMIN. REGS. § 28-18-11(d).

Although the EPA's CAAP regulations may be helpful in reducing the introduction and spread of AIS in hatcheries, that result was not the agency's main goal when it promulgated the final CAAP rule. The EPA noted that its proposed rule initially included a requirement to implement escape prevention practices at facilities where non-native species are being produced; however, that language was scrapped after the EPA received critical public comments.[46] This criticism argued against the inclusion of AIS controls in the EPA's CAAP regulation due to the complexities of determining what is a non-native species and when such species may become "invasive."[47] The critics pointed to public aquaculture facilities as evidence for their argument, noting that, while some species raised at federal and state facilities may not be "native," they would generally not impose a threat in the event of an escape.[48] The EPA agreed with this argument, and chose not to include any requirements specifically addressing the release of non-native species in its final rule. However, the rule does include a requirement for aquaculture facilities to develop and implement BMPs to ensure their production and wastewater treatment systems are regularly inspected and maintained.[49] Additionally, CAAP facilities are required to conduct routine inspections and perform repairs to ensure proper functioning of the structures.[50] Though these requirements are not specifically tailored to AIS management in hatcheries, they can indirectly aid in preventing the release of other materials, including AIS contaminants carried in intake and discharge waters.

Inspection and Certification Requirements

Inspection and certification requirements help mitigate the risk that invasive pathogens or species enter hatcheries with the movement of eggs and fish. Importantly, state provisions concerning stock inspections and facility certification oftentimes use the terms "inspection" and "certification" interchangeably, necessitating that the content of the regulations be given more weight than the utilization of certain keywords.

On the federal level, the NSGLC found no requirements that fish coming into hatcheries either be inspected for AIS or be sourced from facilities certified as AIS-free. The closest provision stipulates that aquatic animal health officials complete facility inspections on behalf of the Fish and Wildlife Service wherein sampling is conducted on a lot-by-lot basis in order to verify the absence of certain listed pathogens.[51] However, as noted above, the NSGLC's research concerned provisions related to the inspection of stock being brought into hatcheries, not provisions requiring inspections of hatcheries themselves.

Despite the absence of applicable federal laws, the NSGLC found that states address inspection and certification requirements in their statutes and regulations more so than any other BMP. In fact, only one state—Kansas—fails to put forth any statutory or regulatory provisions related to inspection and certification. In regards to inspection, applicable state statues and regulations vary widely in content and stringency. Certain states' requirements are more generalized, such as those enforced in Montana. Montana states that fish import permittees must agree that the state can

[46] 40 C.F.R. § 451 (2004).
[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] *Id.*
[51] FISH & WILDLIFE SERV., AQUATIC ANIMAL HEALTH OPERATIONS, 713 FW § 2.2 (2004).

inspect shipments of imported fish or eggs at unspecified, mutually convenient times after entering the state and prior to release or placement of the fish or eggs in a hatchery or other aquaculture facility.[52] If offending or illegal shipments are found during the course of such inspections, the state can order those shipments removed from the state or destroyed in a manner that will not contaminate waters of the state when: (1) designated pathogens are found in the shipment, (2) fish in the shipments have visible symptoms of infectious diseases, (3) the shipment is not authorized by permit or proper certification does not accompany the shipment, or (4) false information was provided on the permit application or required certifications.[53]

Some states' requirements are much more specific. For example, Nebraska tailors its inspection-related provisions to certain diseases and fish species. In particular, all shipments of live fish imported for commercial put-and-take fishery purposes[54] must be inspected and found free of Viral Hemorrhagic Septicemia (VHS) and Spring Viremia of Carp (SVCV) prior to release.[55] Additionally, shipments of largemouth bass must be inspected and found free of Largemouth Bass Virus, and live yellow perch must have been inspected and found free of Heterosporis prior to release. Such specified provisions tailor inspection efforts to certain diseases or species of interest in order to make inspections as efficient as possible.

In contrast, state legal provisions related to facility certification are usually fairly general in nature—most often requiring that shipments of fish to a hatchery be accompanied by some sort of fish health certificate from the source facility. For example, Wyoming's applicable statute notes that an owner or operator of a fish hatchery used for the purpose of raising fish for resale can stock their facility with eggs or fish procured from any lawful source.[56] However, if the hatchery's source is a facility other than those operated by the state itself or the federal government, it must be inspected and certified by the Game and Fish Department prior to stocking.[57] Some state provisions are somewhat more specific, such as Montana's prohibition on importing live or dead salmonid fish or eggs into the state unless such importations are shipped direct and accompanied by a written certification that the source is free of all pathogens that pose a threat to existing fisheries.[58] This provision limits facility certification requirements to shipments of salmonids only, thereby negating the possibility that *all* hatcheries be required to obtain such certification, even though the state may also be concerned with the risks of importing other species.

Some states are extremely specific when it comes to facility certification, both in regards to covered species and procedures. For example, Utah requires that all imported shipments of live aquatic animals originate from sources that have been health-approved by the state.[59] The state then goes on to note exactly how and when that health approval must be conducted, promulgating

[52] MONT. ADMIN. R. 12.7.506.
[53] *Id.*
[54] Put-and take fishing releases hatchery-raised fish of a specific size into waters (such as areas of a stream, river, lake, or pond) where private fishermen can catch them for a payment or fee.
[55] 163 NEB. ADMIN. CODE § 2-001.
[56] WYO. STAT. ANN. § 23-4-102(a).
[57] *Id.*
[58] MONT. CODE ANN. § 87-3-221.
[59] UTAH ADMIN. CODE r. 58-17-13.

requirements related to basis for health approval, approval procedures, and prohibited and reportable pathogens, among other things.[60]

Isolation and Quarantine

Isolation and quarantine of fish, fish eggs, or fish gametes when they are first brought into the facility allow facility staff to: (1) observe stock to visually check for the presence of any invasive organisms, (2) observe stock to visually check for indicators of fish infected with invasive pathogens, and (3) isolate stock from the hatchery's other fish so as to best prevent contamination or infection.

Federally, the FWS notes that all gametes, fertilized eggs, or aquatic animals transferred to Service-operated primary broodstock facilities[61] from stocks or facilities not designated as "Class A" should be isolated from other production stocks until their pathogen status can be determined.[62] This policy applies to hatcheries or facilities shipping fish gametes inter-regionally, and known deviation from the policy must be evaluated on a case-by-case basis and approved by the Director of the FWS. Although this federal provision concerns only invasive pathogens and not invasive fish species, it does help mitigate the possibility that potentially detrimental illnesses could infect federal hatchery fish facilities, stocks, and geographic areas previously free of such pathogens.

A number of states require that fish or fish products be quarantined or isolated from general hatchery populations prior to introduction. However, it is important to note that the NSGLC found no provisions of state law that explicitly related to isolation and quarantine for the purpose of eliminating invasive species from entering with new stock. As is the trend with the other BMPs in this report, invasive pathogens seem to be at the forefront of states' concern.

Some states the NSGLC surveyed, such as South Dakota, do not have much detail in their provisions relating to quarantine and isolation. For example, South Dakota's administrative regulations note only that fish or fish reproductive products being imported into aquaculture facilities must have been previously quarantined from other fish or fish reproductive products and inspected independently if they were obtained from man-made or natural waters and brought into a facility prior to shipping.[63]

Utah, on the other hand, has created an entire section of its administrative rule related to aquaculture and aquatic animal health that specifically concerns the quarantine of aquatic animals and premises.[64] The section notes that, if evidence exists that the aquatic animals in any facility are infected with or have been exposed to certain state-listed pathogens, then either quarantine or revocation of the facility's health approval, depending on the pathogen, may be imposed.[65] The section details how quarantines can be lifted and additional measures than can be taken if

[60] UTAH ADMIN. CODE r. 58-17-15.
[61] Primary broodstock facilities are federal fish hatcheries that supply the entire National Fish Hatchery System, and, in many cases, non-Federal hatcheries.
[62] FISH & WILDLIFE SERV., AQUATIC ANIMAL HEALTH OPERATIONS, 713 FW § 2.6 (2004).
[63] S.D. ADMIN. R. 41:09:08:03:04.
[64] UTAH ADMIN. CODE r. 58-17-10.
[65] *Id.*

contagions persist, among other things.[66] Such detailed isolation and quarantine procedures even further mitigate the risk that invasive pathogens be permitted to enter and potentially harm otherwise healthy fish populations in a hatchery.

Disinfection of Fish Eggs

In aquaculture hatcheries, egg disinfection is commonly employed as a mortality mitigation and disease management tool.[67] In the context of invasive pathogens, effective egg disinfection methods are critically important to natural resource agencies that collect eggs from wild fish stocks and private aquaculture because the spread of a virus such as VHS to a fish hatchery could be devastating for the facility's entire stock.[68]

At the federal level, FWS personnel are required to disinfect all salmonid eggs with a listed germicide both during the water-hardening process and when eggs are first received at FWS facilities from outside sources.[69] Water-hardening is required when collected hatchery fish sperm (or "milt") is collected from a number of males and externally mixed with eggs collected from females in order to help ensure fertilization.[70] In the process, water is added to the collected milt and eggs to activate fish sperm and cause eggs to increase in size by approximately 20% by filling the space between the shell and the yoke.[71] Disinfection at this stage helps to ensure that the fish born from those eggs are not exposed to any external pathogens that were mixed in with the eggs and milt during the collection and hardening process. As noted above, FWS's requirement that eggs entering their facilities from outside sources first be disinfected helps mitigate the possibility that healthy stock are exposed to harmful invasive pathogens.

Two of the states that the NSGLC analyzed—South Dakota and Utah—have promulgated laws related to fish egg disinfection. Again, these provisions are relatively brief, with South Dakota, for example, merely noting in its state FHM that all fish eggs arriving into its three state-operated hatcheries should be disinfected using established or best-available methods prior to incubation.[72] Utah's relevant provision takes a relatively different approach, noting that aquaculture facilities unable to gain full state health approval due to the presence of a horizontally transmitted pathogen[73] may be approved to sell fish eggs provided that the eggs are free of all state-listed vertically transmitted pathogens[74] and are properly disinfected using state-approved methods prior

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[66] *Id.*

[67] Evelien De Swaef et al, *Disinfection of teleost eggs: a review*, 8 REV. IN AQUACULTURE 321 (2015), *available at* https://onlinelibrary.wiley.com/doi/abs/10.1111/raq.12096.

[68] *Fish Egg Disinfectant Shown to Prevent Transmission of Devastating Fish Disease: Viral Hemorrhagic Septicemia Virus Eliminated in Treated Eggs*, U.S. DEPARTMENT OF THE INTERIOR (Feb. 2, 2010, 2:15 PM), https://archive.usgs.gov/archive/sites/www.usgs.gov/newsroom/article.asp-ID=2402.html.

[69] FISH & WILDLIFE SERV., AQUATIC ANIMAL HEALTH OPERATIONS, 713 FW § 2.7 (2004).

[70] *Oncorhynchus mykiss*, FOOD AND AGRICULTURE ORGANIZATION OF THE U.N., http://www.fao.org/fishery/culturedspecies/Oncorhynchus_mykiss/en.

[71] *Id.*

[72] SOUTH DAKOTA GAME, FISH AND PARKS, *supra* note 27, at 5.

[73] Horizontal transmission is the transmission of pathogens between members of the same species that are not in a parent-child relationship.

[74] Vertical transmission is the transmission of pathogens from mother to child during the period immediately before and after birth.

to shipment.[75] This provision helps provide a pathway for hatcheries to continue to operate after pathogens are found on site while simultaneously helping prevent the possibility that pathogens pass to other facilities or waterways along with shipments of sold eggs.

Decontamination of Trucks and Equipment

As noted in the property management section above, requiring the decontamination of trucks and other equipment entering hatchery grounds is a best management practice that can help prevent the introduction of invasive species and pathogens. However, on a broader level, requirements and provisions regarding the disinfection of equipment can also have an impact on the transfer of AIS in other scenarios. For example, provisions that require equipment used in the course of hatchery operations to be disinfected prior to intra-facility transfer can help prevent the potential spread of invasives from one hatchery building or pond to another. Additionally, requiring the decontamination of vehicles leaving the facility, such as distribution and stocking trucks, can mitigate the risk that hatcheries spread AIS from the hatchery to other facilities or the environment.

The NSGLC did not find any provisions specifically requiring the decontamination of hatchery trucks and equipment. However, all states in the Mountain-Prairie Region have enacted some legal requirements relating to the inspection and decontamination of boats, trailers, and related equipment to address AIS risks from the movement of watercraft. These inspection and decontamination requirements would apply to hatchery operations to the extent the facilities are using watercraft and equipment in a manner covered by the law. In Wyoming, for example, it is unlawful to "Launch any conveyance into the waters of this state without first complying with aquatic invasive species prevention requirements."[76] Conveyance is defined as "motor vehicle, boat, watercraft, raft, vessel, trailer or any associated equipment or containers, including but not limited to live wells, ballast tanks, bilge areas and water hauling equipment that may contain or carry an aquatic invasive species."[77] Upon removal from the water, operators must remove all visible vegetation from the watercraft and trailer and drain all water.[78] Drain plugs must be removed and remain open while a watercraft is being transported by land.[79] Similar requirements are present in other states. While these provisions are helpful in preventing the introduction and spread of AIS, they are not designed specifically to address risks from fish hatcheries. Many hatchery operations may fall outside the scope of these watercraft inspection and decontamination requirements.

Staff Training

Requirements that hatchery personnel be trained on AIS protocols, identification, and other related topics can be instrumental in ensuring that invasives that do enter a hatchery are recognized and reported to the appropriate authorities. Having well informed and prepared employees can add an extra layer of protection at hatcheries that may prevent the introduction and spread of AIS in the event that other AIS-related policies fail to do so. The NSGLC found no provisions in state law

[75] UTAH ADMIN. CODE r. 58-17-15.
[76] WYO. STAT. ANN. § 23-4-202(a)(i).
[77] *Id.* § 23-4-201(a)(ii).
[78] WYO. RULES & REGS GAME FISH Ch. 62, § 3(a).
[79] *Id.* § 3(c).

that require hatchery staff training regarding AIS. Such protocols are likely implemented by hatcheries themselves in many instances but are not required by law. In fact, the promulgation of additional regulatory provisions related to staff training may not be desireable in terms of AIS management, because they could prove too prescriptive—preventing hatcheries from tailoring their staff training procedures to meet their specific facility requirements. Hatcheries also likely voluntarily rely on trainings offered by FWS and other organizations such as the Pacific States Marine Fisheries Commission to train personnel on AIS-related topics such as HACCP and watercraft inspection [80]

Recordkeeping Requirements

Accurate records can be instrumental in tracing back shipments of fish or reproductive products that are found later to have contained invasive organisms or pathogens. These records could include records of stock movement and mortality, health reports, inspection reports, or anything else a governmental body deems worthy of retention. Additionally, records such as health and inspection reports can help demonstrate to a governing body that hatcheries have been adequately engaging in operations that are meant to prevent the introduction of invasives, detect them in the event they are introduced, and rectify the issue when necessary.

Recordkeeping requirements are present in all states, although they vary in specificity and content. Utah requires that all aquaculture facilities, including hatcheries, maintain the following records for a period of up to five years and make them available for state inspection: (1) purchase, acquisition, distribution, and production histories of live aquatic animals; (2) certificates of registration and entry permits; and (3) valid identification of stocks, including origin of stocks.[81] As briefly noted above, records such as these can help trace back AIS-contaminated shipments to their source and help verify that they were initially brought into hatcheries legally. Recordkeeping can also prove beneficial in relation to activities that occur after fish are cultured and removed from a hatchery. For example, North Dakota requires hatchery operators to give a receipt to every fish purchaser that cites the number, length, and species of fish purchased.[82] The hatchery must then retain a copy of that receipt for permanent record at the hatchery.[83] If a purchase from a hatchery is thought to have resulted in the introduction of invasive organisms or pathogens to other water bodies (whether natural or man-made), these requirements can help state authorities determine what facility those infected fish likely came from, further inspect that facility to determine if the problem persists within, and perhaps prevent the issue from occurring again.

Reporting Requirements

Reporting requirements are important mechanisms for promoting the flow of information from hatchery personnel to appropriate federal and state authorities. Reporting helps bring emerging issue to the attention of managers so they can implement actions to mitigate harm, and imposes

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[80] *See, i.e., Hazard Analysis and Critical Control Point (HACCP)*, U.S. FISH AND WILDLIFE SERVICE, https://www.fws.gov/fisheries/ANS/ANS-HACCP.html; *Aquatic Invasive Species Prevention Program (AIS)*, PACIFIC STATES MARINE FISHERIES COMMISSION, https://www.psmfc.org/program/prog-4?pid=17.
[81] UTAH ADMIN. CODE r. 58-17-16(A).
[82] ND ADMIN. CODE 30-03-02-07.
[83] *Id.*

obligations on hatchery personnel to monitor and be aware of what species are present within the hatchery.

A number of states have promulgated such requirements. Some state laws are relatively generalized. Montana's applicable statute requires anyone, including the owner or custodian of a fish hatchery, who has reason to suspect the presence of specific pathogens at their facility to immediately give notice to the state.[84] In Wyoming, "a person who knows that an unreported aquatic invasive species is present at a specific location in this state shall immediately report that knowledge and all pertinent information to the commission or a peace officer."[85]

Other states, such as Utah, take a more specified approach—promulgating definite windows of time in which reporting must occur as well as delineated reporting procedures. Utah's applicable statute treats the reporting of escapes and detected pathogens differently, and, as such, addresses them in different code sections. Regarding escapes, fish pond owners and holders of aquaculture certificates of registration must report to the state all escapements of aquatic animals from their facilities within 72 hours.[86] Such reports must include the facility name, the date of loss, the estimated number of animals lost, the name of the public water into which the aquatic animals escaped into, remedial actions taken, and plans for future remedial actions.[87] These reporting requirements allow the state to know as much information about an escape event as soon as possible, so that the damage can be mitigated expeditiously in a fully informed manner.

Utah's statutory sections related to pathogen reporting first states that those involved in aquaculture who have knowledge of the existence of any of the diseases currently on the state's pathogen list must report it to the state.[88] The state will then follow the Procedures for the Timely Reporting of Pathogens and the Emergency Response Procedures that have been established by Utah's Aquaculture Board.[89] Utah then adds another layer of reporting in a separate code section that applies specifically to transporters. That section states that no person can move or cause to be moved aquatic animals from an aquaculture facility that is known to be exposed to or infected with any state-listed pathogens without first reporting it to the appropriate state agency and receiving written transport authorization.[90] These two separate code sections add layers of protection that help ensure the state knows about pathogens found at aquaculture facilities, regardless of when they are found and by whom. The state has even promulgated certain procedures for the timely reporting of pathogens in the event they are found during the course of an inspection. If a pathogen is found at an aquaculture facility that is included on Utah's lists of "emergency prohibited," "prohibited," or "reportable" pathogens, the state Aquaculture Board's Procedures for the Timely Reporting of Pathogens must be followed.[91] Although inspection for "reportable" pathogens is optional, positive findings of those pathogens must also be reported to the state.[92] Reporting of

[84] MONT. CODE ANN. § 87-3-226.
[85] WYO. STAT. ANN. § 23-4-203(b).
[86] UTAH ADMIN. CODE r. 58-17-7(D).
[87] *Id.*
[88] UTAH ADMIN. CODE r. 58-17-9.
[89] *Id.*
[90] UTAH ADMIN. CODE r. 58-17-14(C)(5).
[91] UTAH ADMIN. CODE r. 58-17-15(D)(5).
[92] *Id.*

unregulated pathogens, however, is not required.[93] Anytime there is a confirmed finding or unconfirmed evidence of an emergency prohibited or prohibited pathogen, the state must engage in the Aquaculture Board's Emergency Response Procedures to help mitigate the problem.[94] Each of these reporting requirements and resulting response requirements come together to form a fully fleshed out set of procedures that, if applied correctly and in a timely manner, can prove instrumental in preventing the spread of harmful pathogens from hatcheries to other aquaculture facilities or nearby natural waterways.

V. Conclusion

None of the states the NSGLC surveyed requires that hatcheries abide by all twelve of the biosecurity BMPs the Law Center identified. However, obligations related to many aspects of those BMPs can be found within existing law, though the exact content of such laws and regulations varies widely from place to place. While many hatcheries likely engage in the practices contained in the BMPs individually, the lack of statutes and regulations demanding mandatory compliance exemplifies the gaps present within the legal framework governing fish hatcheries. Addressing these gaps would help states in their efforts to prevent the introduction and spread of invasive plants, animals, and pathogens.

[93] *Id.*
[94] UTAH ADMIN. CODE r. 58-17-15(D)(6).

Appendix A

State Statutes and Regulations Related to Fish Hatchery Biosecurity

Colorado:

- Colorado Aquaculture Act (Colo. Rev. Stat. Title 35, Article 24.5)
    - Rules Pertaining to the Administration and Enforcement of Colorado Aquaculture Act (8 CCR 1201-21)

- Native and nonnative fish (Colo. Rev. Stat. § 33-6-114.5)
    - Colorado Parks and Wildlife Rules re: Aquatic Wildlife (2 CCR 406-0)

- Fish Health Board (Colo. Rev. Stat. §§ 33-5.5-101 and 102)

- NPDES Permit Requirements (Colo. Rev. Stat. § 25-8-501)
    - Colorado Discharge Permit System Regulations (5 CCR 1002-61)
        - Fish Hatchery provisions (5 CCR 1002-61:61.8)

- Colorado Parks and Wildlife Rules re: Lake Licenses (2 CCR 406-12)

Kansas:

- Aquaculture (Kan. St. Ch. 47, Art. 19)

- Hatchery Bonds (Kan. St. Ann. §§ 32-876 through 32-878)

- NPDES Permit Requirements
    - Concentrated Aquatic Animal Feeding Facilities (Kan. Admin. Reg. 28-18-11(c), cross-referencing 40 C.F.R. 122.24).

- Wildlife Importation Permits (Kan. Stat. Ann. § 32-956)
    - Importation and Possession of Certain Wildlife (Kan. Admin. Reg. 115-18-10)

- Private Water Fishing Impoundments, Stocking (Kan. St. Ann. §§ 32-975 and 32-976)

Montana:

- Statutory provisions re: fish hatcheries (Mont. Code Ann. Tit. 87, Ch. 3, Part 2. Fish)

- Importation, Introduction, and Transplantation of Wildlife (Mont. Code. Ann. Tit. 87, Chapter 5, Part 7)
    - MFWP regulations re: Exotic Wildlife (Mont. Admin. R. tit. 12, Ch. 6, Sub-chapter 22).

        - Requirements for the Care and Housing of Exotic Wildlife Held in Captivity (Mont. Admin. R. 12-6-2203)
    - Montana Fish, Wildlife, and Parks regulations re: importation of fish (Mont. Code Ann. Tit. 12, Ch. 7, Sub-Chapter 5)
    - Authorization for Department and Commercial Fish Planting (Mont. Admin. R 12.7.701)
    - Sale of excess fish eggs (Mont. Admin. R 12.7.901 to 12.7.906)

- Fish Ponds, Seining, and Commercial Taking of Aquatic Fish Food Organisms (Mont. Code Ann 87-4-601 to 87-4-610)

- Unlawful relocation of fish (Mont. Code Ann. 87-6-219)

- NPDES Permit Requirements (Mont. Code Ann. 75-5-401):
    - Concentrated Aquatic Animal Production Facilities and Aquaculture (Mont. Admin. R. 17.30.1331)

Nebraska:

- Aquaculture (Neb. Rev. Stat. Art. 50)

- Special Permits and Licenses: Aquaculture Facilities and related provisions (Neb. Rev. Stat. §§ 37-465 to 37-471 and 37-475 to 37-476)
    - Nebraska Game and Parks Commission regulations re: Aquaculture (163 Neb. Admin. Code Ch 2, § 005)

- Aquatic Invasive Species (Neb. Rev. Stat. § 37-548)
    - Non-resident Fish Dealers and Exportation, Importation, and Possession Regulations (163 Neb. Admin. Code Ch 2, §002)
    - Aquatic Invasive Species Regulations (163 Neb. Admin. Code Ch. 2, § 012)

- Commercial Put and Take Fisheries Regulations (163 Neb. Admin. Code Ch. 2, § 001)

- NPDES Permit Requirements
    - Aquatic Animal Production Facility (119 Neb. Admin. Code Ch. 1, § 013)
    - Concentrated Aquatic Animal Production Facilities (119 Neb. Admin. Code Ch. 11)

North Dakota:

- Regulations governing private fish hatcheries (N.D. Cent. Code § 20.1-06-12)
    - Private Fish Hatcheries (N.D. Admin. Code Chapter 30-03-02)

- Aquatic Nuisance Species (N.D. Cent. Code § 20.1-17)

- Stocking (N.D. Admin. Code 30-03-01.1-11)

- NPDES Permit Requirements:
    - Concentrated aquatic animal production facility (N.D. Admin. Code 33-16-01-01.1, cross-referencing 40 C.F.R. part 122.24).

South Dakota:

- Rules for implementation of game, fish, and conservation laws (S.D. Codified Laws § 41-2-18)

- Management of fish hatcheries (S.D. Codified Laws § 41-3-10)

- Private fish hatchery license and related provisions (S.D. Codified Laws §§ 41-6-39 to 41-6-43)
    - Department of Game, Fish, and Parks regulations re: Private Fish Hatcheries (S.D. Admin. R. Ch. 41:09:07)

- Unauthorized importation of Salmonidae as misdemeanor (S.D. Codified Laws § 41-13-3.1)
    - Department of Game, Fish, and Parks regulations re: Importation of Fish (S.D. Admin. R. Ch. 41:09:08)

- List of Aquatic Invasive Species and AIS Restrictions (S.D. Admin. R. 41:10:04:01 and 41:10:04:02)

- Fish and bait transportation restrictions (S.D. Admin. R. 41:10:04:05)

- NPDES Permit Requirements
    - Concentrated Aquatic Animal Production Facilities (S.D. Admin. R. 74:52:02:31)

Utah:

- Aquaculture Act (Utah Code Ann. Tit. 4, Ch. 37)
    - Department of Agriculture and Food regulations re: Aquaculture and Aquatic Animal Health (Utah Admin. Code R58-17)
    - Compliance Procedures (Utah Admin. Code R58-19)

- Aquatic Wildlife provisions (Utah Code Ann. Tit. 23, Ch. 15)
    - Taking Fish and Crayfish: Prohibited Fish (Utah Admin. Code R657-13-13)
    - Commercial Harvesting of Brine Shrimp and Brine Shrimp Eggs (Utah Admin. Code R657-52)
    - Utah Division of Wildlife Resources regulations re: Private Fish Ponds (Utah Admin. Code R657-59)

- Collection, Importation, Transportation, and Possession of Animals (Utah Admin. Code R657-3)

- Amphibian and Reptile Collection, Importation, Transportation and Possession (Utah Admin. Code R657-53)

- Aquatic Invasive Species List (https://ag.utah.gov/documents/AquaticInvasiveSpeciesList.pdf)

- Utah Pollutant Discharge Elimination System (Utah Admin. Code R317-8)
    - Concentrated Aquatic Animal Production Facilities

Wyoming:

- Fish Hatcheries and Stocking (Wyo. Stat. tit. 23, Ch. 4, Art. 1)

- Prohibition on aquatic invasive species (Wyo. Stat. § 23-4-202)
    - Regulation for Aquatic Invasive Species: Definitions (Wyo. Rules and Regulations GAME FISH Ch. 62 s 2)

- Regulation for Importation, Possession, Confinement, Transportation, Sale and Disposition of Live Wildlife (Wyo. Rules and Regulations GAME POSS Ch. 10)

- Regulation Governing Private Fish Stocking (Wyo. Rules and Regulations GAME FISH Ch. 49)

- Regulation Governing Fish Hatcheries (Wyo. Rules and Regulations GAME FISH Ch. 51)

- Regulations Governing Landowner Fishing Lakes or Ponds (Wyo. Rules and Regulations GAME FISH Ch. 53)

- NPDES Permit Requirements:
    - Discharge requirements applicable to New and Existing Aquatic Animal Production Facilities (Wyo. Rules and Regulations ENV WQ Ch. 2 App. F)

Bibliography of Sources

Delabbio, J. et al. 2004. An assessment of biosecurity utilization in the recirculation sector of finfish aquaculture in the United States and Canada. Aquaculture 242:165-179.

Department of Agriculture and Water Resources. Commonwealth of Australia. 2017. Aquaculture Farm Biosecurity Plan: General Guidelines and Template.

Florida Department of Agriculture and Consumer Services. 2017. Biosecurity at Florida Aquaculture Facilities.

Georgiades, E. 2016. Options to Strengthen On-farm Biosecurity Management for Commercial and Non-commercial aquaculture. Technical Paper No. 2016/47 prepared for New Zealand Government.

Illinois Aquaculture Biosecurity Manual. 2010. Prepared by HDR Engineering, Inc. for Southern Illinois University Carbondale, Fisheries and Illinois Aquaculture Center.

Karreman, G. et al. 2015. Aquatic Animal Biosecurity: A Case Study of Bioexclusion of Viral Hemorrhagic Septicemia Virus in an Atlantic Salmon Hatchery. Journal of Applied Aquaculture, 27:299-317.

New Zealand Ministry for Primary Industries. 2016. Aquaculture Biosecurity Handbook: Assisting New Zealand's commercial and non-commercial aquaculture to minimize on-farm biosecurity risk.

Oidtmann, B.C. et al. 2011. International and national biosecurity strategies in aquatic animal health, Aquaculture 320:22-33.

Pruder, G. 2004. Biosecurity: application in aquaculture. Aquacultural Engineering 32:3 -10.

Summerfelt, S.T. 2009. Evaluation of partial water reuse systems used for Atlantic salmon smolt production at the White River National Fish Hatchery. Aquacultural Engineering 41:78-84.