



[rssbp.org](http://rssbp.org)

# REGIONAL SHELLFISH SEED BIOSECURITY PROGRAM (RSSBP) **HATCHERY COMPLIANCE PROGRAM GUIDE**

A collaboration of Industry, Scientists, Regulators and Extension - using the best available science to minimize risks associated with interstate seed transfers of bivalve shellfish

## AUTHORS

Karen Hudson, Virginia Institute of Marine Science, Marine Advisory Program  
Dave Bushek (Project Lead), Haskin Shellfish Research Lab, Rutgers University,  
Lisa Calvo, (Retired) Haskin Shellfish Research Lab, Rutgers University & NJ Sea Grant  
Ryan Carnegie, Virginia Institute of Marine Science  
Lori Gustafson, Animal & Plant Health Inspection Service (APHIS), USDA  
Bob Rheault, East Coast Shellfish Growers Association

CONTACT [info@rssbp.org](mailto:info@rssbp.org)



**NOAA FISHERIES**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

## TABLE OF CONTENTS

RATIONALE .....	1
REGIONAL SHELLFISH SEED BIOSECURITY PROGRAM .....	1
RSSBP CORE ELEMENTS:	
Regional Shellfish Health Advisory Council .....	1
Regional Network of Shellfish Pathologists .....	1
Interactive Shellfish Disease Database Mapping Tool .....	2
Hatchery Compliance Program .....	2
RSSBP HATCHERY COMPLIANCE PROGRAM .....	2
FACILITY ELIGIBILITY .....	2
PRODUCT ELIGIBILITY .....	3
PROGRAM BENEFITS .....	4
ADMINISTRATION .....	4
HATCHERY PARTICIPATION STEPS .....	4
Step 1. Enrolled Facility .....	4
Step 2: BMP-compliant facility .....	5
Step 3: Biosecure Product .....	5
APPLICATION & AUDITING TIMEFRAME .....	5
FACILITY AUDIT PROTOCOL .....	5
PRODUCT AUDIT PROTOCOL .....	6
RSSBP BEST MANAGEMENT PRACTICES (BMPs) .....	6
DEFINITIONS .....	8
TABLE 1. PROJECT TEAM MEMBERS .....	8
TABLE 2. SHELLFISH HEALTH ADVISORY COUNCIL MEMBERS .....	9
TABLE 3. PATHOGENS OF CONCERN (POCs) .....	9
FREQUENTLY ASKED QUESTIONS (FAQs) .....	10
APPENDIX 1. <a href="#">INDEPENDENT PATHOLOGY LABORATORIES</a> .....	
APPENDIX 2. <a href="#">HATCHERY APPLICATION</a> .....	
APPENDIX 3. <a href="#">FACILITY AUDITORS</a> .....	
APPENDIX 4. <a href="#">HATCHERY RENEWAL FORM</a> .....	
APPENDIX 5. FACILITY AUDIT FORM .....	
APPENDIX 6. <a href="#">RSSBP BEST MANAGEMENT PRACTICES GUIDE</a> .....	

## **RATIONALE**

Introduction and emergence of shellfish disease is a concern for shellfish farmers, commercial harvesters, and resource managers worldwide. History reveals abundant examples of devastating impacts of disease on shellfish populations and shellfish farms. Often, the spread of disease has been associated with the transfer of shellfish stocks. Hence, it is imperative that transfers of shellfish from one area to another are done only after careful consideration of disease transfer risks. It is important to understand the health status of the stock destined for transfer, as well as the relevant history and current status of disease within receiving and sending areas.

The growth of shellfish aquaculture on the East Coast of the U.S. has long relied on the hatchery production of seed. There are approximately 50 hatcheries along the East Coast serving well over 1,000 nurseries and farms making interstate transfers fundamental to regional commerce and production. Although less established, the same situation is developing along the Gulf Coast, with hatchery production limiting industry growth. Each state within these regions has policies or regulations regarding seed importations. Most require health evaluation and careful review of each shipment batch proposed for importation. This process is time consuming and costly. Research continues to demonstrate that there is little risk of disease transfer associated with young/small seed that has been maintained on treated water in the hatchery. Based on this evidence, a collective of shellfish pathologists, researchers, shellfish growers, hatchery operators, and government regulators have developed the Regional Shellfish Seed Biosecurity Program (RSSBP) to facilitate interstate commerce in hatchery seed. Incentivizing commerce in these typically disease-free products will foster enhanced biosecurity through the broader regional industry.

## **REGIONAL SHELLFISH SEED BIOSECURITY PROGRAM ([RSSBP](#))**

The RSSBP is a collaboration of industry, scientists, regulators and extension using the best available science to minimize risks associated with interstate seed transfers of bivalve shellfish. The project team (Table 1.) is leading the RSSBP which provide tools to: evaluate and reduce risks of transfers; inform decision making regarding interstate seed transfer; enhance biosecurity from hatchery to farm and facilitate commerce.

The RSSBP consists of four core elements:

### **Regional Shellfish Health Advisory Council (Table 2.)**

A team of molluscan scientists/pathologists, State regulators, extension personnel and industry members to support the RSSBP and relevant stakeholders by providing science-based advice on shellfish transfers and overseeing the hatchery certification/compliance process.

### **Regional Network of Shellfish Pathologists**

A team of experts to improve the perspective on disease distributions and risk, expand surveillance activities in areas where data are lacking, and ensure proficiency in diagnosis to support a growing aquaculture industry. Most shellfish pathologists currently work

with or are employed by state agencies to assist with shellfish management issues. The Regional Shellfish Health Advisory council invites all practicing shellfish pathologists to provide advice and guidance.

#### [Interactive Shellfish Disease Database Mapping Tool](https://rssbp.org/shellfish-data-map/)

Provides science-based information on the distribution and abundance of shellfish pathogens along the East Coast of the United States in a manner that allows informed decisions regarding the risks of spreading or exacerbating disease from shellfish transfers. This tool is available at <https://rssbp.org/shellfish-data-map/>

#### **Hatchery Compliance Program (HCP)** (described in detail in this document)

Hatchery products pose the lowest disease risk due to their young age, especially those only exposed to treated water. Starting here, the Program outlines a voluntary compliance process for hatcheries to improve and validate biosecurity, reducing the need for individual batch disease certifications. State participation may require changing laws, policies or other regulations before taking advantage of this Program.

### **HATCHERY COMPLIANCE PROGRAM**

The purpose of the RSSBP hatchery biosecurity compliance is to promote biosecurity practices in shellfish hatcheries and facilitate the process for permitting interstate commerce of biosecure bivalve shellfish seed and larvae being sold directly out of hatchery facilities. These transfers pose lower risk of disease transfer due to their young age and measures taken to prevent pathogen exposure through the hatchery rearing process. The RSSBP is designed to capitalize on this inherent higher level of biosecurity. **The Hatchery Compliance Program is voluntary and *does not* guarantee that all states or hatcheries will participate.** The Program consists of two components - a facility component and a product component, providing an opportunity for stepwise participation. The facility component ensures a satisfactory Best Management Practices (BMP) plan for minimizing disease risk is in place and is being implemented. The product component demonstrates the effectiveness of the BMP plan via product health history evaluations documenting the absence of disease and Pathogens of Concern (POCs) (Table 3.). Hatcheries can now participate in the Program as verified BMP-compliant facilities while building the required product health history. The further the hatchery is in the process, the higher the level of biosecurity reducing risk of disease transfer.

If hatcheries choose not to participate, or for some reason compliance is not achieved, the hatchery may simply continue by independently complying with the legal authority requirements for the recipient location which may include batch health exams, zero tolerance for pathogen detection, or outright bans. Similarly, if a state does not accept compliance under this program, it may impose additional requirements or restrictions.

### **FACILITY ELIGIBILITY**

Basic facility participation requires the pursuit of RSSBP **Best Management Practices (BMPs)** within the facility to minimize disease risk. Facilities undergo an initial review of application paperwork documenting compliance to BMPs and are then audited onsite by independent

experts in the field of shellfish aquaculture production to verify BMP compliance. ***Hatcheries working with exotic broodstock species (non-native) are not eligible under the RSSBP.*** Once a hatchery is compliant under the RSSBP, the hatchery must continue to follow RSSBP BMPs, maintain annual disease surveillance of products, submit annual renewal forms, and pass an annual on-site audit to verify compliance. In addition, the facility manager must notify the RSSBP team (info@RSSBP.org) and regulators in states where seed has been transferred under this Program of any issues that may affect compliance (e.g., a system failure, change in BMP protocols, positive disease detection). Compliance may be downgraded to maintain biosecurity which does not prohibit seed transfers but may require a return to batch testing. Reinstatement may occur pending Advisory Council review of the situation and any corrective actions implemented.

## PRODUCT ELIGIBILITY

Only specific shellfish products from a BMP-Compliant Facility may be considered compliant under this Program. The Program ensures that a facility has a satisfactory BMP plan and has implemented that plan. The product component is the next layer of biosecurity to ensure products meet biosecurity standards and **demonstrate the minimal disease risk of the facility.** Eligible products must be produced and maintained on 1um filtered water or another demonstrated mechanism (e.g. pasteurization, use of well water, artificial seawater, etc.) to minimize the risk of disease introductions from the source water. ***Products reared in untreated/ambient water, such as, flow-through nurseries or brown water culture are not eligible under the RSSBP at this time.*** These two actions together imply a good level of biosecurity that should adequately protect transfers among areas with similar disease profiles even if prevalence's differ among source and recipient waters. In other situations, such as the transfer of seed from an area containing a pathogen not present in recipient waters, it may be necessary to ensure that the Pathogens of Concern (POCs) (Table 3.) are routinely absent to demonstrate the effectiveness of the BMP.

Additional product eligibility requirements include:

- Records of health evaluations from an independent pathology laboratory (Appendix 1). Ideally, this should cover the previous three years with a minimum of two sampling events per species, per year during the production season (6 samples over the 3-year period) demonstrating no detections of POCs. The sole exception is an acceptable level of *Perkinsus marinus* (Dermo disease) where it is ubiquitously distributed and persistent.
- The health evaluations must be performed on the largest size seed the hatchery desires to be certified for transfer under the RSSBP. Smaller seed (or larvae) will be automatically approved given that disease transfer risks are lower for smaller and younger animals and those certified passed through those smaller younger stages without carrying pathogens forward. Seed larger than that meeting health history standards will continue to require any and all testing requirements of the permitting authority for the recipient waters.

BMP-compliant facilities successful in certifying specific products will be able to label those products as RSSBP Biosecure, and all records will be available to participating regulatory



agencies. This process is intended to obviate the need for shipment-by-shipment health evaluations for participating states. For products to maintain RSSBP Biosecure status the facility must continue to be BMP-Compliant and maintain annual disease surveillance on the specific products which will be verified by an annual audit of health evaluation records.

## **PROGRAM BENEFITS**

Compliance under the RSSBP will maintain a higher level of biosecurity than individual batch health evaluations by providing a consistent standard for biosecurity, a record of biosecurity performance, and opportunities for improving biosecurity. The Program's prescribed and structured annual health surveillance will cost less than batch by batch sampling for facilities routinely transferring products outside their local waters. This will reduce the demand on the limited resources and capacity of pathology laboratories. State regulatory importation permit processes will benefit from science-based decision-making tools that allow for streamlining permit reviews, facilitating timely commerce and reducing costs to State agencies. Streamlining will be enhanced through the RSSBP's Interactive Shellfish Disease Database Mapping Tool, developed alongside this Program effort. The database will serve as the central repository for disease monitoring data and Program paperwork. Importantly, the Program will foster confidence of both State regulators and shellfish farmers that importations occurring under the program pose minimal risks of disease transfer. **Central to the RSSBP is the belief that compliance with importation regulations will be enhanced if the process for approval is streamlined and the costs are reduced.**

## **ADMINISTRATION**

The Program is currently administered by the grant project team (Table 1.) with oversight of an Advisory Council (Table 2.). The Council is comprised of molluscan scientists/pathologists, regulators, extension personnel and industry members along the East Coast of the United States with recent additions of Gulf Coast members as the Program is expanding into the Gulf Coast. The Council's role is to thoroughly vet the RSSBP elements, including eligibility, BMPs, and the verification process, and ensure that the RSSBP provides a reasonable and effective effort to reduce risk and improve biosecurity of shellfish seed transfers. The Project team and Advisory Council makes the final decision of approving Facility BMP-compliance and Biosecure product compliance.

## **HATCHERY PARTICIPATION STEPS**

**Step 1. Enrolled Facility - Hatchery facilities apply and pass facility documentation review to be enrolled (the first step towards BMP-Compliant facility status)**

To become a BMP-Compliant facility, the hatchery must submit an application (Appendix 2.) providing adequate documentation that the facility description and practices are compliant with the RSSBP Best Management Practices for Minimizing Disease Risks. The documentation is reviewed by the project team and compared with the RSSBP BMPs. Facility application documentation that meets the biosecurity standards are listed as enrolled on the 'Participating Hatcheries' document posted on [rssbp.org](http://rssbp.org), indicating they have developed an

acceptable biosecurity plan for their facility. Incomplete or unclear Facility application documentation will be returned for revision.

## **Step 2. BMP-Compliant Facility - Pass an annual facility audit to become a verified BMP-Compliant Facility**

Enrolled facilities will be scheduled for a BMP compliance verification via an in-person facility audit. Audits are conducted by independent experts in the field (Appendix 3.) and are valid for one year, unless a breach occurs (e.g., unexpected disease is detected in a health exam). If the audit is passed, the facility status is listed as BMP-Compliant Facility. If the audit result is conditional or failed, the facility remains in the enrolled status until an audit is passed. To remain a BMP-compliant facility, a renewal form (Appendix 4.) must be submitted and an annual audit passed.

## **Step 3. Biosecure Product(s) - Apply and pass a health history records audit**

Shellfish products, specific to species and size, produced from a BMP-Compliant Facility may be certified under this Program. This ensures products meet biosecurity standards and **demonstrate the minimal disease risk of the products specified**. Products must be held on water treated to eliminate pathogens (e.g., 1µm filtered water, pasteurized water, etc.). Products held in untreated water, such as, ambient water nurseries are not eligible under the RSSBP at this time (see Eligibility section for more details). Application for Biosecure product status will undergo an audit of health evaluation history records. Products must have health evaluations for three concurrent years with at least 2 health evaluations per year during the production season when pathogens are most likely. BMP-compliant facilities successful in certifying specific products will be able to label those products as RSSBP Biosecure, which obviates the need for shipment-by-shipment health evaluations in participating states. For products to maintain RSSBP Biosecure status the facility must continue to be BMP-Compliant and maintain annual disease surveillance on the specific products.

## **APPLICATION AND AUDITING TIMEFRAME**

Interested hatchery facility managers should apply by submitting a completed application form (available at [rssbp.org](http://rssbp.org)) to the project team via [info@rssbp.org](mailto:info@rssbp.org). The timeframe for new application and renewal submissions is August to October. The new facility audit timeframe is November to March. Initial facility audits will be conducted in the off-season to allow ample time to observe and discuss systems and record keeping without impacting production schedules. Subsequent annual audits will be scheduled during early production to observe the active implementation of BMPs and workflow. Follow-up audits are conducted as needed if a compliance issue arises.

## **FACILITY AUDIT PROTOCOL**

Upon receipt of hatchery applications, the Project Team will coordinate with the facility and auditors (Appendix 3.) to find a mutually agreed upon date and time for an on-site



verification of the implementation of RSSBP BMPs. The auditors are independent of the RSSBP and its stakeholders; selected to maintain consistency across facilities and remove any perceived bias. Initial audits will be conducted by at least two auditors and ideally with facilitation by a member of the project team to provide a comprehensive review of the implementation of the facility biosecurity BMPs. Annual audits in subsequent years may be conducted by an individual auditor, with or without facilitation by the project team. Auditors are provided with the pertinent facility application, product health history summary reports for any relevant products, and a facility source water report generated by the shellfish disease database tool which identifies known pathogens of concern (POCs) for their use in completing a facility audit form (Appendix 5), which details comments related to each of the BMPs. The audit consists of a detailed walkthrough of the facility with the hatchery manager. Audits typically 'follow the water' starting where the source water enters the hatchery, is treated, and how it's distributed to the other production areas. An initial audit takes close to two hours, depending on the size and complexity of the hatchery systems, with auditors asking questions and taking notes. The job of the auditor is to verify the operational practices described in the application and ensure that hatchery practices comply with Program BMPs. Auditors are asked to submit their completed report to the project team within a week of the audit and provide a recommendation to approve, deny or conditionally approve (pending a corrective action) RSSBP facility BMP compliance. Questions or concerns with compliance are resolved through consultation with the Advisory Council and other expertise as needed. In the case of conditional approval, a brief follow-up audit visit by the facilitator and/or auditor is required to ensure the correction was made. The final decision is made by the project team with approval by the Advisory Council. If RSSBP compliance is approved, a letter of Facility BMP compliance is sent to the hatchery along with the audit report. The hatchery should provide this letter to state regulators where they wish to ship seed with a request that this designation be considered in the decision-making process.

## **PRODUCT AUDIT PROTOCOL**

Upon receipt of applications, the Project Team collects shellfish health evaluation records directly from the independent pathology laboratories listed on the application. These records are reviewed with respect to each product requested for certification for the current prior three-year period.

## **RSSBP HATCHERY BEST MANAGEMENT PRACTICES (SEE APPENDIX 6. FOR DETAILS)**

1. Adult animals, i.e., broodstock, should be segregated from algal, larval, and post-set culture systems within the hatchery.
2. Algal, larval and post set systems should be adequately separated from areas with animals or equipment previously exposed to untreated water to avoid splashing and cross contamination.
3. Water treatment to prevent pathogen exposure during early life stage cultivation should

employ a series of filters to get to 1 µm filtration, or demonstrate another means to minimize the risk of pathogen exposure from source water (e.g., pasteurization, well water, etc.).

4. Cleaning of water filters or other water treatment apparatus should be conducted in an area separate from treatment areas and any areas containing treated water to avoid cross contamination.

5. Records should be kept indicating maintenance of systems to eliminate POCs from source water (e.g., filter change regimes, relative “age” of all active filters). Labels on equipment indicating maintenance are strongly recommended to alert all staff of needs.

6. Workflow and operational plans should be designed to prevent the introduction of raw water and contaminants from entering areas where cultivated life stages are in treated water.

7. Equipment should be assigned to specific operational areas (e.g., containers used to transport adult animals, should be used only for such tasks) or effectively sanitized between uses when shared.

8. Health examinations should be conducted on animals experiencing unexplained, atypical mortality and records kept. This maintains the Program’s ability to stay alert to possible emerging pathogens as well as POCs. The Shellfish Health Advisory Council must be notified of any disease issues that come up during Program participation including any actions taken to rectify the situation.

9. Broodstock records must be maintained and document source location (source water), genetic background, and collection date.

10. Spawning records must be maintained that document specific broodstock used based on the broodstock records, spawn code/name, and date spawned in order to accommodate any trace back from health certification results.

11. If applicable, quarantine practices must be demonstrated and documented for all non-local endemic species of broodstock.

12. All state permitting requirements, such as hatchery facility permits must be followed. Non-compliance with State requirements will result in removal of the hatchery from the RSSBP.

## DEFINITIONS

**Biosecurity**—A set of measures designed to reduce the risk of introduction, establishment and spread of pathogenic agents to, from, or within a farm. Biosecurity is maintained in part through good farm management, avoiding overcrowding and keeping stress on animals low. An important additional means is to ensure transferred seed does not carry exotic pathogens or levels of established pathogens, like *Perkinsus marinus* (the causative agent of dermo), so high that it will worsen disease locally.

**Exotic broodstock**—Broodstock of a species not endemic or naturalized to the region, e.g., from outside the East Coast or country.

**Health Evaluation**—A thorough examination of a shellfish sample by an independent pathologist (Appendix 1.) using standard methods such as histopathology, Ray's fluid thioglycollate method (RFTM) for *Perkinsus marinus* detection, and molecular diagnostics.

**Non-local broodstock**—Endemic species of broodstock from regions or areas with different pathogen profiles. This includes in-state and out-of-state endemic species. Non-local broodstock should be held in quarantine and follow all applicable state regulations.

Table 1. RSSBP PROJECT TEAM

Name	Affiliation	Email
Dave Bushek	Haskin Shellfish Research Laboratory, Rutgers University	<a href="mailto:bushek@hsrl.rutgers.edu">bushek@hsrl.rutgers.edu</a>
Ryan Carnegie	Virginia Institute Marine Science	<a href="mailto:carnegie@vims.edu">carnegie@vims.edu</a>
Lori Gustafson	USDA APHIS VS	<a href="mailto:Lori.L.Gustafson@aphis.usda.gov">Lori.L.Gustafson@aphis.usda.gov</a>
Karen Hudson	Virginia Institute Marine Science	<a href="mailto:khudson@vims.edu">khudson@vims.edu</a>
Jerome La Peyre	Louisiana State University	<a href="mailto:JlaPeyre@agcenter.lsu.edu">JlaPeyre@agcenter.lsu.edu</a>
Lucas Marxen	Rutgers University	<a href="mailto:ljmarxen@njaes.rutgers.edu">ljmarxen@njaes.rutgers.edu</a>
Jennifer Pollack	Texas A&M University-Corpus Christi	<a href="mailto:Jennifer.Pollack@tamucc.edu">Jennifer.Pollack@tamucc.edu</a>
Bob Rheault	East Coast Shellfish Growers Association	<a href="mailto:bob@ecsga.org">bob@ecsga.org</a>
Leslie Sturmer	University of Florida, Institute of Food and Agriculture Services	<a href="mailto:Inst@ufl.edu">Inst@ufl.edu</a>
William Walton	Virginia Institute of Marine Science	<a href="mailto:walton@vims.edu">walton@vims.edu</a>

**TABLE 2. SHELLFISH HEALTH ADVISORY COUNCIL**

The RSSBP is coordinated under the guidance of the Shellfish Health Advisory Council. The Council serves to support state regulators by providing science-based advice on shellfish transfers as well as overseeing the hatchery compliance process and best management practices.

Name	Affiliation	State	Area
Tal Ben-Horin	North Carolina State	NC	Extension
Debbie Bouchard	University Maine	ME	Pathology
Carolina Borque	Louisiana Department Fish & Wildlife	LA	Regulatory
*Dave Bushek	Rutgers University	NJ	Pathology
Lisa Calvo	Sweet Amalia Oyster Farm	NJ	Industry
*Ryan Carnegie	Virginia Institute Marine Science	VA	Pathology
Mike Congrove	Oyster Seed Holdings	VA	Industry
Julie Davis	Lady's Island Oysters	SC	Industry
Lori Gustafson	USDA APHIS VS	Federal	Regulatory
Karen Hudson	Virginia Institute Marine Science	VA	Extension
Marcy Nelson	Kennebec River Biosciences	ME	Pathology
Bob Rheault	East Coast Shellfish Growers	RI	Industry
Rebecca Thur	MD Department Natural Resources	MD	Regulatory

\*Council Co-Chairs

**TABLE 3. PATHOGENS OF CONCERN (POCs)**

POCs are defined as pathogens known to be harmful to health and survival of aquacultured shellfish on the East Coast of the U.S.

Pathogen	Host(s)	RSSBP Compliance
<a href="#">MSX</a>	Oysters	No detection
<a href="#">Dermo</a>	Oysters	Light infection, < 5% prevalence
<a href="#">SSO</a>	Oysters	No detection
<a href="#">ROD</a>	Oysters	No detection
<i>Bonamia ostreae</i>	Oysters	No detection
<a href="#">Bonamia exitiosa</a>	Oysters	No detection
<i>Perkinsus chesapeaki</i>	Clams, Oysters	No detection
<a href="#">QPX</a>	Hard clams	No detection
Neoplasia, gonadal & disseminated	Clams	No detection
<a href="#">Marteilia refringens</a>	Flat oysters, Mussels	No detection
<i>Merocystis kathae</i>	Sea Scallops	No detection
* <a href="#">OsHV-1</a>	Oysters	No detection

\* Ostreid herpesvirus-1 (OsHV-1) is a contagious viral disease of molluscan shellfish that has impacted some regions of the West Coast of the US, and other countries, however has not been reported along the East and Gulf coasts of the US.

## FREQUENTLY ASKED QUESTIONS (FAQs)

- **What products are eligible under the process?**

Shellfish products from a BMP - Compliant Facility that are maintained solely on water treated to remove pathogens (no exposure to untreated/ambient water) and meet the qualifications of the 3-year health evaluation history. Note: testing is recommended on the largest size product for commerce because that will cover all earlier life stages/sizes.

- **What products are not eligible under this process?**

Any shellfish product that has been deployed in an untreated/ambient water environment. For example, broodstock from a field location or seed oysters from an ambient water nursery system are not eligible. Gametes are not eligible as transmissible stages of pathogens have been found associated with gametes from infected broodstock, however, these are typically washed away in the hatchery following the first water change of larvae. Gametes may be batch certified for use or used following appropriate quarantine protocols to ensure no pathogens are transferred to receiving waters.

- **What if my hatchery doesn't have a health history evaluation record for 3 consecutive years?**

Your facility can participate in the RSSBP while building product health history. Initiate composite testing in your hatchery of the largest life stage (per species) you intend to sell and continue to batch test. Submit an application for facility BMP compliance and continue to maintain facility BMP compliance while building product health history. Include a biosecure product request when your hatchery has 3 consecutive years of reports that meet qualifications.

- **What if my hatchery wants to sell 2 mm seed but my health evaluation history is on 1 mm seed?**

The largest size health evaluation applies for all products of smaller size so in this case all products smaller than 1 mm are covered by the current health history. If no health history records exist on a larger size, in this case 2 mm, begin seasonal health evaluations of the larger seed to get the required health history. Batch evaluations would be required for the larger sizes only until the 3-year record criteria is met.

- **What are the possible outcomes of the facility audit?**

The auditors provide a *recommendation* to approve, deny or conditionally approve (pending a corrective action) facility BMP compliance.

- **When will I know the results of the facility and product audit?**

Results of the audit will be provided via a letter approximately 2 weeks after the audit in most cases, unless further consultation is needed. The facility manager will also receive a copy of the audit report.

- **What happens if my hatchery is operating under the RSSBP and a disease issue comes up during the season?**

Under the program, any disease issue must be immediately reported to the RSSBP team ([info@RSSBP.org](mailto:info@RSSBP.org)) and regulators in states where seed was transferred under this program. In this case, compliance may be temporarily suspended and batch health evaluation testing of products for commerce will be utilized. Regaining approved status will be decided on a case-by-case basis with consultation from the Advisory Council.

- **What if my hatchery doesn't pass the facility audit – does this count against me?**

No. This program is not intended to negatively impact industry commerce. Not all hatchery facilities will have the ability to comply with the BMPs and in those cases, facilities simply continue the batch health evaluations of products for commerce when needed. The audit process should be seen as an opportunity for dialog and finding ways to improve the biosecurity process even further.





## INDEPENDENT MOLLUSCAN SHELLFISH PATHOLOGY LABORATORIES

The following lists State, Research, and Commercial laboratories that conduct molluscan shellfish product health evaluations required under the RSSBP.

Connecticut Department of Agriculture, [Bureau of Aquaculture & Laboratory Services](#)  
190 Rogers Avenue, Milford, **CONNECTICUT** 06460  
Lydia Bienlien / 203.874.0696 x120, [Lydia.Bienlien@ct.gov](mailto:Lydia.Bienlien@ct.gov)

Harbor Branch Oceanographic Institute at Florida Atlantic University  
[Aquatic Animal Health Laboratory](#)  
5600 US 1 North, Fort Pierce, **FLORIDA** 34946  
Susan Laramore / [slaramo1@fau.edu](mailto:slaramo1@fau.edu) / 772.242.2525

[Kennebec River Biosciences](#) [Commercial]  
41 Main Street, Richmond, **MAINE** 04357  
Marcy Nelson / [mnelson@kennebecbio.com](mailto:mnelson@kennebecbio.com) / 207.542.9472

Maryland Department of Natural Resources  
[Cooperative Oxford Laboratory](#) / [Shellfish Health Project](#)  
904 South Morris Street, Oxford, **MARYLAND** 21654  
Brian Preziosi / [brian.preziosi@maryland.gov](mailto:brian.preziosi@maryland.gov) / 410. 226.5193

North Carolina State University  
[Center for Marine Sciences and Technology](#)  
303 College Circle, Morehead City, **NORTH CAROLINA** 28557  
Tal Ben-Horin / [tbenhor@ncsu.edu](mailto:tbenhor@ncsu.edu) / 252.222.6312

Roger Williams University  
[Aquatic Diagnostic Laboratory](#)  
One Old Ferry Road Bristol, **RHODE ISLAND** 02809  
Galit Sharon / [gsharon@rwu.edu](mailto:gsharon@rwu.edu) and Abbey Scro / [ascro@rwu.edu](mailto:ascro@rwu.edu)

Rutgers University, Haskin Shellfish Research Laboratory  
[Shellfish Pathology Services](#)  
6959 Miller Ave, Port Norris, **NEW JERSEY** 08349  
David Bushek / [bushek@hsrl.rutgers.edu](mailto:bushek@hsrl.rutgers.edu) and Emily McGurk / [emily.mcgurk@rutgers.edu](mailto:emily.mcgurk@rutgers.edu) / 856.785.0074

Virginia Institute of Marine Science  
[Shellfish Pathology Laboratory](#)  
Rt 1208 Great Rd, Gloucester Point, **VIRGINIA** 23062  
Ryan Carnegie / [Carnegie@vims.edu](mailto:Carnegie@vims.edu) / 804.684.7713

**HATCHERY APPLICATION (revised Nov. 2022)**

Send completed applications as an attachment to [info@rssbp.org](mailto:info@rssbp.org)

Contact [info@rssbp.org](mailto:info@rssbp.org) with any questions on the application or Program.

<b>DATE OF APPLICATION</b>	
<b>CONTACT INFORMATION</b>	
Facility Name	
Facility Physical Address	
Point of Contact	
Phone number	email
<b>RSSBP PARTICIPATION READINESS</b>	
<p><b>select one:</b></p> <p><input type="checkbox"/> <b><i>FACILITY BMP-COMPLIANCE ONLY</i></b>  <i>Annual Facility Audit Required. Appropriate for facilities who are building three-year health history on products for transfer or facilities whose business model doesn't necessitate product compliance. Hatchery Products section must be completed, regardless.</i></p> <p><input type="checkbox"/> <b><i>FACILITY BMP-COMPLIANCE AND BIOSECURE PRODUCT</i></b>  <i>Annual Facility Audit <u>and</u> Specific Product Audit Required. Appropriate for facilities who have the required three-year health history on a specific species and size product(s).</i></p>	
<b>FACILITY SOURCE WATER (list specific body of water)</b>	
Hatchery Source Water	
Nursery Source Water (if applicable)	
<b>GENERAL INFORMATION</b>	
Number of years in operation _____	
Briefly describe pre and post treatment of water for the <u>broodstock</u> system	

Briefly describe pre and post treatment of water for the algae system

Briefly describe pre and post treatment of water for the larvae system

Briefly describe pre and post treatment of water for the post-set system

**DESCRIPTION OF PROCEDURES/PRACTICES COMPLIANT WITH PROGRAM BEST MANAGEMENT PRACTICES** *Please provide a description under each BMP of facility compliance and include copies of standard operating procedures that minimize disease risk at the facility, as available.*

1) Adult animals, i.e., broodstock, should be segregated from algal, larval, and post-set culture systems with in the hatchery and nursery areas.

2) Algal, Larval and post set systems should be adequately separated from areas with use of unfiltered water and animals previously exposed to unfiltered water, to avoid splashing and cross contamination.

3) Water filtration for early life stage cultivation should employ a series of filters to get to 1µm filtration, or another means to minimize the risk of disease introductions from source water must be demonstrated (e.g., pasteurization, well water, etc.).

**4) Cleaning of water filters should be conducted in an area separate from areas where animals are held and cultivated to avoid cross contamination.**

**5) Records and/or labels should be kept to indicate maintenance of systems to eliminate POCs from source water (e.g., filter change regimes, relative “age” of all active filters).**

**6) Demonstrated workflow and operational plans should prevent the introduction of raw water and contaminants from entering areas where cultivated life stages are in filtered water.**

**7) Equipment should be assigned to specific operational areas (e.g., containers used to transport adult animals, should be used only for such tasks) or effectively sanitized between uses when shared.**

**8) Health examinations should be conducted on seed experiencing unexplained, atypical mortality and records kept.**

**9) Broodstock records must be maintained and document source location (source water), genetic background, and collection date.**

**10) Spawning records must be maintained that document broodstock used, spawn code/name, and date spawned in order to accommodate any trace back from health evaluation results.**

11) If applicable, quarantine practices must be demonstrated and documented for all non-local endemic species of broodstock.

12) All state permitting requirements, such as hatchery facility permits must be followed. Non-compliance with State requirements will result in removal of the hatchery from the RSSBP.

#### FACILITY BMP CERTIFICATION STATEMENT

I certify the biosecurity procedures and practices described are true and complete.

Signature \_\_\_\_\_ Date \_\_\_\_\_

#### HATCHERY PRODUCTS (this section must be completed)

**ALL SPECIES PRODUCED AND LIFESTAGES MARKETED** Please list all species that are produced in your facility whether you are interested in covering them under this program or not. For each species listed, include the lifestage(s)/size(s) marketed

Genus Species \_\_\_\_\_ lifestage/size marketed \_\_\_\_\_

Genus Species \_\_\_\_\_ lifestage/size marketed \_\_\_\_\_

Genus Species \_\_\_\_\_ lifestage/size marketed \_\_\_\_\_

Genus Species \_\_\_\_\_ lifestage/size marketed \_\_\_\_\_

Genus Species \_\_\_\_\_ lifestage/size marketed \_\_\_\_\_

**HEALTH HISTORY STATUS** select one:

\_\_\_\_\_ In the process of building health history      \_\_\_\_\_ 3-year health history is in place

**Comments** (include current frequency of health evaluations of products in the facility):

**PRODUCTS FOR BIOSECURITY CERTIFICATION** Please list the species and size you are requesting for coverage under the RSSBP either currently or in the future. Health evaluations will be audited to verify compliance.

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

**PATHOLOGIST** List the name(s) of the Pathologist / Businesses used for health evaluations

#### PRODUCT BIOSECURITY CERTIFICATION STATEMENT AND RELEASE

I hereby give permission for the RSSBP administrators to access all shellfish health history records for this facility.

Signature \_\_\_\_\_ Date \_\_\_\_\_





## REGIONAL SHELLFISH SEED BIOSECURITY PROGRAM



[rssbp.org](http://rssbp.org)

### AUDITOR BIOGRAPHIES

The RSSBP Hatchery Compliance Program is supported by a team of third-party experts in the field of shellfish production. These knowledgeable individuals conduct in-person facility audits to verify compliance with the RSSBP Best Management Practices. They have been instrumental in supporting improvements to the RSSBP Pilot.

*Note - Auditors in the pilot program are reimbursed for travel and provided a modest honorarium from grant funds. The Project Team is actively working to expand auditor capacity with a self-sustainable financial structure.*



improve commercial and recreational fisheries and aquaculture industry development.

**John Ewart** completed a 40-year career with the University of Delaware College of Earth, Ocean and Environment in 2018. He completed a Bachelor of Science degree in zoology from the University of Rhode Island and a Master of Science degree in Marine Studies from the University of Delaware. John's background includes aquaculture, commercial fisheries, oceanographic technology, field biology, applied research, and domestic/international consulting. As the aquaculture and fisheries specialist with Delaware Sea Grant program from 1986 to 2018, John collaborated with private and public sector individuals, groups, and other state extension programs in the northeast and nationally to support and

In cooperation with the Delaware Center for the Inland Bays, the University of Delaware and Delaware State University, John coordinated oyster and hard clam (quahog) field research and demonstration activities (1998-2013). That work provided technical information and supported passage of legislation in 2013 to authorize commercial leasing for shellfish aquaculture in Delaware's coastal (aka Inland) bays. The first commercial lease was activated in 2018.

Together with Sea Grant Seafood Technologist colleague Doris Hicks, John developed a multi-faceted regional and national seafood education program - Aquaculture and Fish Tech 101 - for extension, industry, restaurant staff, nutritionists and other health professionals. The regional program format included multi-day workshops, classroom sessions, tours, and hands on demonstrations. Major topics included: International and Domestic Seafood Supply: Situation and Outlook; Seafood Safety: Harvest, Processing and Distribution; Current Issues in Seafood Nutrition and Health; and Seafood Public Communication and Media Issues. We also provided specialized presentations at professional conferences on important seafood related trends and issues from source to table.



**Gef Flimlin** is a Professor Emeritus having worked for 38 years at Rutgers University as Marine Extension Agent with Rutgers Cooperative Extension in Commercial Fisheries and Aquaculture. He has a BS in Biology from St Peter's College and a MS in Marine and Environmental Science from the CW Post Center of Long Island University. His focus was to serve as a liaison between the commercial fishing and aquaculture industry and the research community, state and federal agencies, equipment and material suppliers, and the academic world.

Over the years his work focused on satellite imagery for catching large pelagic fish, upgrading offshore weather forecasting, seafood handling, seafood processing, marketing, and leadership development for the industry. He worked in shellfish aquaculture including field experiments, disease tests, new species trials, production gear design and implementation, seafood handling, shellfish marketing and post-harvest processing, and using recirculating fish culture systems and aquaponics as a tool to teach responsibility for county jail inmates. He was involved with the clam farmers and hatchery operators in New Jersey and started an annual list of hatcheries and nurseries on the East Coast which was distributed to industry to purchase seed.

He served for many years on the USDA Northeastern Regional Aquaculture Center's Technical Advisory Council, finally as its Chair. Professor Flimlin served on the International Conference for the Exportation of the Seas Aquaculture Work Group meeting internationally. He has been intimately involved with the formation of a Hard Clam Farmers' Cooperative, and infusing seafood into Community Supported Agriculture (CSA) farms and starting CSFs (Community Supported Fisheries). He helped form the NJ Aquaculture Association, East Coast Shellfish Growers Association, sat on a number of national extension aquaculture committees, and served in several leadership positions of the National Shellfisheries Association, the World Aquaculture Society, and the US Aquaculture Society where he was the President. Most recently he oversaw the development of two free online courses in seaweed and micro-algae cultivation. When needed he performs insurance claims for the USDA Farm Services Administration.



**John Kraeuter** retired as the Associate Director of the Haskin Shellfish Research Laboratory of Rutgers University in 2012. He currently is a Visiting Scientist at Haskin Lab, and a Research Professor at the University of New England. He received his Bachelor's degree from Florida State University, Masters from William and Mary (Virginia Institute of Marine Science) and PhD from the University of Delaware. He then took Post-Doctoral position at the University of Georgia Marine Institute on Sapelo Island.

At Rutgers he was a major contributor to developing the Aquaculture Plan for the State of New Jersey and was a co-editor of a major compilation that brought together the disparate information on the Biology of the Hard Clam *Mercenaria*.

He helped to design, build and run a fish aquaculture facility to investigate the potential for the culture of Striped Bass utilizing the hot water effluent from a coal fired power plant. At Rutgers he was responsible for the basic design of and overseeing construction of the 20,000 sq ft. Aquaculture Innovation Center. He conducted research on estuarine ecology, focusing on benthic ecology and shellfish aquaculture – mostly the hard clam, *Mercenaria mercenaria* and Virginia oyster, *Crassostrea virginica*. While at the Virginia Institute of Marine Science he was instrumental in working with the developing clam aquaculture industry to evaluate systems that permitted economical field culture of the hard clam.

He has served as President of the Atlantic Estuarine Research Society and the National Shellfisheries Association, and has been awarded the David Wallace Award and the Honored Life Member of NSA. He has served on numerous state and federal committees including nearly 8 years on the Minerals Management Service of the Department of Interior Outer Continental Shelf Scientific Advisory Committee (Now Bureau of Ocean Energy) and several years on the USEPA Joint Subcommittee on Aquaculture – Aquaculture Effluents Task Force where he helped to write the section on effluents from molluscan hatcheries.



**Michael Oesterling** is currently the Executive Director of the Shellfish Growers of Virginia ([www.vashellfish.org](http://www.vashellfish.org)), a trade association of oyster and clam farmers. For 30-years prior to his current position, he served as the Virginia Sea Grant Marine Extension Program fisheries and aquaculture specialist at the Virginia Institute of Marine Science (VIMS), College of William & Mary. He worked primarily with nearshore commercial fisheries, with emphasis on molluscan shellfish and blue crabs, including the harvest of hard crabs and the production of soft-shell crabs. He has extensive experience in shellfish aquaculture, both commercial and non-commercial. During his time at VIMS, he successfully spawned and reared oysters, hard clams, soft-shell clams, and bay scallops. He also has experience with marine finfish aquaculture in recirculating systems, successfully raising cobia, spot, spadefish, and killifish.



## BMP-COMPLIANT HATCHERY FACILITY AND BIOSECURE PRODUCT RENEWAL FORM

Send completed form as an attachment to [info@rssbp.org](mailto:info@rssbp.org)

Contact [info@rssbp.org](mailto:info@rssbp.org) with any questions on the application or Program.

<b>DATE OF SUBMISSION</b>	
<b>CONTACT INFORMATION</b>	
Facility Name	
Facility Physical Address	
Point of Contact	
Phone number	email
<b>RSSBP RENEWAL REQUEST</b> select one:	
<p>_____ <b>FACILITY BMP-COMPLIANCE RENEWAL ONLY</b> <i>Annual Facility Audit Required. Hatchery Products section must be completed, regardless.</i></p> <p>_____ <b>FACILITY BMP-COMPLIANCE AND BIOSECURE PRODUCT RENEWAL</b> <i>Annual Facility Audit <u>and</u> Specific Product Audit Required.</i></p>	
<p><b>DESCRIBE ANY CHANGES TO BMP COMPLIANCE INFORMATION SUBMITTED IN THE APPLICATION.</b> Including changes in: facility operations, location, procedures, workflow, or training. Attach updated SOPs/protocols as available.</p>	
<p><b>FACILITY BMP CERTIFICATION STATEMENT</b></p> <p>I certify this facility continues to implement the biosecurity procedures and practices described, which are compliant with the RSSBP standard.</p> <p>Signature _____ Date _____</p>	

## HATCHERY PRODUCTS (this section must be completed)

**DESCRIBE ANY CHANGES TO SPECIES PRODUCED AND LIFESTAGES MARKETING** Please list any changes to the species or lifestages marketed from originally submitted documentation whether you are interested in covering them under this program or not.

**DESCRIBE ANY CHANGES IN HEALTH HISTORY STATUS** select one:

\_\_\_\_\_ In the process of building health history      \_\_\_\_\_ 3-year health history is in place

**Comments** (include current frequency of health evaluations of products in the facility and any suspected disease outbreaks):

**PRODUCTS FOR BIOSECURITY CERTIFICATION** Please list the species and size you are requesting for coverage under the RSSBP either currently or in the future. Health evaluations will be audited to verify compliance.

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

Genus Species \_\_\_\_\_ size \_\_\_\_\_

**PATHOLOGIST** List the name(s) of the Pathologist / Businesses used for health evaluations

## PRODUCT BIOSECURITY CERTIFICATION STATEMENT AND RELEASE

I certify compliance with product health history as required by RSSBP and hereby give permission for the RSSBP administrators to continue to access all shellfish health history records for my facility.

Signature \_\_\_\_\_ Date \_\_\_\_\_



## BMP-COMPLIANT FACILITY AUDIT FORM

Hatchery Code		Date of Audit
Business name:		
Business location:		
Owner or primary contact	Phone	Email
Auditors (name, affiliation)	Phone	Email
Others Present (name, affiliation)	Phone	Email

Activity Type: \_\_\_\_Initial \_\_\_\_Follow-up \_\_\_\_Annual

**Hatchery Production** – list all species in production whether or not a candidate for product certification:

\_\_\_\_ Eastern Oyster / *Crassostrea virginica*

\_\_\_\_ Hard Clam / *Mercenaria mercenaria*

\_\_\_\_ Softshell Clam / *Mya arenaria*

Other:

**General Facility Comments:**



## Comments on the Demonstration of RSSBP Best Management Practices

<p>1. Adult animals, i.e., broodstock, should be segregated from algal, larval, and post-set culture systems within the hatchery.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>2. Algal, larval and post set systems should be adequately separated from areas with animals or equipment previously exposed to untreated water to avoid splashing and cross contamination.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>3. Water treatment to prevent pathogen exposure during early life stage cultivation should employ a series of filters to get to 1µm filtration, or demonstrate another means to minimize the risk of pathogen exposure from source water (e.g., pasteurization, well water, etc.).</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>4. Cleaning of water filters or other water treatment apparatus should be conducted in an area separate from treatment areas or any areas containing treated water to avoid cross contamination.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>5. Records should be kept indicating maintenance of systems to eliminate POCs from source water (e.g., filter change regimes, relative “age” of all active filters). Labels on equipment indicating maintenance are strongly recommended to alert all staff of needs.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>6. Workflow and operational plans should be designed to prevent the introduction of raw water and contaminants from entering areas where cultivated life stages are in treated water.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>7. Equipment should be assigned to specific operational areas (e.g., containers used to transport adult animals, should be used only for such tasks) or effectively sanitized between uses when shared.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p> <p><input type="checkbox"/> Meets</p> <p><input type="checkbox"/> Corrective action required</p> <p><input type="checkbox"/> Does not meet</p>
<p>8. Health examinations are conducted on seed experiencing suspicious, atypical mortalities.</p> <p><i>Audit Comments</i></p>	<p><input type="checkbox"/> Exceeds</p>

	<input type="checkbox"/> Meets <input type="checkbox"/> Corrective action required <input type="checkbox"/> Does not meet
9. Broodstock records must be maintained and document source location (source water), genetic background, and collection date. <i>Audit Comments</i>	<input type="checkbox"/> Exceeds <input type="checkbox"/> Meets <input type="checkbox"/> Corrective action required <input type="checkbox"/> Does not meet
10. Spawning records must be maintained that document broodstock used, spawn code/name, and date spawned in order to accommodate any trace back from health certification results. <i>Audit Comments</i>	<input type="checkbox"/> Exceeds <input type="checkbox"/> Meets <input type="checkbox"/> Corrective action required <input type="checkbox"/> Does not meet
11. If applicable, quarantine practices must be demonstrated and documented for all non-local endemic species. Are Non-native (non-indigenous, exotic) species present in hatchery? <input type="checkbox"/> yes <input type="checkbox"/> no <i>Audit Comments</i>	<input type="checkbox"/> Exceeds <input type="checkbox"/> Meets <input type="checkbox"/> Corrective action required <input type="checkbox"/> Does not meet
12. All state permitting requirements, such as hatchery facility permits must be followed. Does the State require permits for hatchery facilities? <input type="checkbox"/> Yes <input type="checkbox"/> No <i>Audit Comments</i>	<input type="checkbox"/> Exceeds <input type="checkbox"/> Meets <input type="checkbox"/> Corrective action required <input type="checkbox"/> Does not meet

**Auditor Recommendation Based on the evaluation of the facility compliance to the RSSBP Best Management Practices:**

- ☐ Approve as a BMP-Compliant Facility under the RSSBP
- ☐ Conditionally Approve as a BMP-Compliant Facility under the RSSBP (please explain)
- ☐ Deny approval as a BMP-Compliant Facility under the RSSBP (please explain)

Signature auditor(s): \_\_\_\_\_

Date: \_\_\_\_\_



## GUIDE TO RSSBP BEST MANAGEMENT PRACTICES

### **1. Adult animals, i.e., broodstock, should be segregated from algal, larval, and post-set culture systems within the hatchery.**

Hatchery facilities are all different - size, floorplans, species, water treatment, etc. Some may be relatively new constructions but most evolve overtime to improve efficiency or expand production. Because of these differences, there is no 'one-size fits all' approach to broodstock segregation. The key for biosecurity is to contain untreated source water (a.k.a. raw water or ambient water), away from areas of treated water culture (algal, larval and post-set systems).

There are several common options to prevent mixing raw/untreated water with treated water. Some options might look nicer, but all of these methods are effective as demonstrated by health evaluations showing the products are routinely free of disease and Pathogens of Concern (POCs) are undetectable.

- a. Broodstock is held in a separate room or in a completely separate building. Untreated tank water drainage is contained/diverted in some manner (floor drains, etc.) to avoid spilling out on the floor where it could easily come in contact with clean equipment (hoses, buckets) or be tracked throughout the facility.
- b. Broodstock tanks (untreated water) are on one side of the hatchery with an adequate physical separation distance of several feet or more from treated water production areas to avoid contamination from splashing or aerosols. Untreated tank water drainage is contained/diverted in some manner (floor drains, etc.) to avoid spilling out on the floor where it could easily come in contact with clean equipment (hoses, buckets) or be tracked throughout the facility. In addition, a plan needs to be in place for moving broodstock in and out of the area without dripping untreated water on the floor where it could be tracked to the treated water production areas.
- c. In addition to b. and in cases where the physical distance is limiting, plastic curtains or similar can be hung between the areas as a physical barrier. The bottom and top of the curtain would need to be semi-secure to assure it doesn't move. The purpose of the barrier is to protect against aerosol contamination from untreated water to the treated water production area.
- d. All equipment used in the broodstock holding area is kept separate from or thoroughly cleaned before leaving the broodstock room (also covered in BMP #7).

Care is also required to maintain biosecurity when spawning broodstock. Biosecure practices include:

- Rinsing the broodstock in fresh water before moving it to the spawning area to remove POCs that may be on the shell.
- Rinsing eggs in treated seawater before and/or after fertilization as some POCs will be released during strip spawning and may be released during natural spawning
- Dedicated spawning equipment (cups, sieves, shucking knives, etc) that are disinfected and kept separate from the treated water production areas
- Properly disposing of used broodstock or shells outside the treated water production area.
- Special care should be made to isolate or decontaminate personal equipment such as gloves, boots (separate sets of gear, or a foot bath at the entrance/exit of the area, etc.).

**2. Algal, larval and post set systems should be adequately separated from areas with animals or equipment previously exposed to untreated water to avoid splashing and cross contamination.**

These practices reiterate the information above from the perspective of the clean products as they are produced. Once again, the key is avoiding the spray/splash/aerosol transfer or tracking of untreated source water (a.k.a. raw water or ambient water) into areas of treated water culture (algal, larval and post-set systems). The mechanisms described above to separate broodstock apply here with the focus on preventing untreated water from entering the areas of treated water cultivation.

There are several common options to prevent mixing raw/untreated water with treated water. Some options might look nicer, but all of these methods are effective as demonstrated by health evaluations showing the products are routinely free of disease and Pathogens of Concern (POCs) are undetectable.

- a. Hold Broodstock a separate room or in a completely separate building from treated culture systems. Contain/divert untreated tank water drainage in some manner (floor drains, etc.) to avoid spilling out on the floor where it could easily come in contact with clean equipment (hoses, buckets) or be tracked throughout the facility.
- b. Locate Broodstock tanks (untreated water) are on a separate side of the hatchery with an adequate physical separation distance of several feet or more from treated water production areas to avoid contamination from splashing or aerosols. Contain/divert untreated tank water drainage in some manner (floor drains, etc.) to avoid spilling out on the floor where it could easily come in contact with clean equipment (hoses, buckets) or be tracked throughout the facility. In addition, a plan needs to be in place for moving broodstock in and out of the area without dripping untreated water on the floor where it could be tracked to the treated water production areas.
- c. In addition to b. and in cases where the physical distance is limiting, plastic curtains or similar can be hung between the areas as a physical barrier. The bottom and top of the curtain would need to be semi-secure to assure it doesn't move. The purpose of the barrier is to protect against aerosol contamination from untreated water to the treated water production area.
- d. All equipment used in the broodstock holding area is kept separate from or thoroughly cleaned before leaving the broodstock room (also covered in BMP #7).

**3. Water treatment to prevent pathogen exposure during early life stage cultivation should employ a series of filters to get to 1µm filtration, or demonstrate another means to minimize the risk of pathogen exposure from source water (e.g., pasteurization, well water, etc.).**

Source water will differ among facilities in sediment, biological loads and other factors. Water quality also varies seasonally, and with events such as storms and algae blooms. This means water treatment requirements may also change over the course of a season. There are also physical considerations such as the distance source water travels to the facility and the volume of water being pumped that may impact treatment effectiveness or efficiency. Therefore, there is no 'one size fits all' approach to water treatment. While facilities will differ in how this is achieved, the **requirement** is to demonstrate that water used for larval and early post-set cultivation has been adequately filtered to 1 um or otherwise treated (e.g., pasteurized) or sourced (e.g., well water or artificial sea water) to minimize pathogen exposure.

Auditors will 'follow the water' – starting where it enters the facility and following the path as it moves through filtration or treatment and to the different production systems, looking for clear separation of treated and untreated water.

**4. Cleaning of water filters or other water treatment apparatus should be conducted in an area separate from treatment areas or any areas containing treated water to avoid cross contamination.**

There are a variety of filter types – string filters, cartridge filters, sock and bag filters. The number of uses or the frequency of cleaning will vary based on the quality of the source water. The hatchery should either have a protocol for cleaning to ensure filters do not become clogged or a warning system to alert operators that filters are not functioning properly. Cleaning should be conducted in an area that prevents waste water from contaminating treated water, including via spray, splash or aerosol. Many facilities designate a place outside for this activity. Workflow is an additional consideration to avoid risk of contamination from this activity – employees cleaning filters should not be going back into the treated water areas without changing aprons and cleaning shoes, arms, etc.

**5. Records should be kept indicating maintenance of systems to eliminate POCs from source water (e.g., filter change regimes, relative "age" of all active filters). Labels on equipment indicating maintenance are strongly recommended to alert all staff of needs.**

While maintenance needs will differ among facilities and across seasons, every facility should have a standard operating procedure in place that is specific to their needs and **record** individual equipment inspections to ensure equipment is functioning as desired. Standard operations should record details such as:

- The maximum number of days / passes before equipment is cleaned
- A number of cleanings before filters are replaced
- Backwashing schedules for the appropriate filtration systems and a schedule of when media are replaced.
- UV filtration should include monitoring and a bulb replacement schedule.
- Testing data where applicable

**6. Workflow and operational plans should be designed to prevent the introduction of raw water and contaminants from entering areas where cultivated life stages are in treated water.**

Workflow is critical. Each facility should have a plan in place that ensures POCs are not being transferred from staff working with untreated source water to the clean/treated production areas.

Transfers can be from staff hands, arms, clothes, aprons, shoes, or equipment that have come in contact with untreated source water.

Plans will depend on the size of the facility, number of staff, and general operations. Examples of elements that should be considered:

- Functional separation of workers – workers are assigned to perform tasks separately. For example, maintenance of broodstock (untreated source water) should be conducted separately from larval cultivation (treated production) without switching back and forth as every switch requires cleaning and decontamination increasing the risk of transfers. This could be on a full-time, or daily basis.
- Assigning tasks that involve working with untreated source water (field/nursery/broodstock) to the end of the day after staff have finished in the treated production areas. This may be more realistic for smaller operations with limited staff.
- Designating particular gear (aprons, boots, etc.) for staff working with untreated source water which will only be worn during these tasks and doesn't leave the untreated area.
- Implementing cleaning/disinfecting procedures for entering treated production areas such as washing hands/arms, using disinfectant shoe baths.
- Conducting staff training on the importance of separating untreated source water and treated water with the purpose of not introducing POC/disease. Training frequency depends on numbers of staff and turnover rates. Training could be informal – a seasonal staff meeting / review [rssbp.org](http://rssbp.org) - or be a more formal training program with a manual of printed Standard Operating Procedures (SOPs).
- Posting signs and/or restricting access to treated production areas to minimize traffic through these areas.

**7. Equipment should be assigned to specific operational areas (e.g., containers used to transport adult animals, should be used only for such tasks) or effectively sanitized between uses when shared.**

Use designations for equipment such as buckets, sieves, hoses, etc. should be readily identifiable - in a separate building/room or labeled for a specific task or production area. For shared equipment, a sanitation protocol should be implemented.

**8. Health examinations should be conducted on animals experiencing unexplained, atypical mortality and records kept. This maintains the Program's ability to stay alert to possible emerging pathogens as well as POCs. The Shellfish Health Advisory Council must be notified of any disease issues that come up during Program participation including any actions taken to rectify the situation.**

Facilities should develop a relationship with an RSSBP-approved shellfish pathologist. Larval mortality is complex and can be attributed to a number of factors that may or may not involve pathogens of concern (POCs). In cases where there is not an obvious reason for mortality (a pump failed, or not enough feed, etc.), a sample should be sent for testing to rule out a POC/disease issue. Sending samples doesn't count against operators, rather it demonstrates appropriate biosecurity measures are in place. Ruling out POCs/disease is critical to mitigate product loss and disease spread.



**9. Broodstock records must be maintained and document source location (source water), genetic background, and collection date.**

Records can be physical (paper) or digital. The importance is to help determine the source of problems when they occur. Participating facilities must demonstrate record retention and ensure frequency of record keeping. Records should be available and maintained for all broodstock batches that identify the number of individuals, the species, and source, which should indicate if it is wild or selected and the specific origin. That is, NJ or VA is not adequate, but Rutgers Cape Shore facility -Lower Delaware Bay or Virginia Institute of Marine Science- Yorktown, VA – Lower York River, is adequate.

**10. Spawning records must be maintained that document specific broodstock used based on the broodstock records, spawn code/name, and date spawned in order to accommodate any trace back from health certification results.**

Records can be manual (paper) or digital. The importance is to demonstrate record retention and ensure frequency of record keeping. This information will flow from BMP #9.

**11. If applicable, quarantine practices must be demonstrated and documented for all non-local endemic species of broodstock.**

A quarantine protocol should be on hand for any facility handling non-local broodstock.

**12. All state permitting requirements, such as hatchery facility permits must be followed. Non-compliance with State requirements will result in removal of the hatchery from the RSSBP.**

Not all states require hatcheries to have a facility permit. The hatchery operator is responsible for obtaining the required state permitting and by signing the application form, is acknowledging compliance. The Project team will cross check the application with the state regulatory guidance document.