

VIMS | WILLIAM
& MARY

VIRGINIA INSTITUTE OF MARINE SCIENCE



AQUACULTURE GUIDE

A COMPREHENSIVE GUIDE FOR SHELLFISH AQUACULTURE PROFESSIONALS

REGULATIONS & PERMITTING • HUMAN & SHELLFISH HEALTH • BUYING SHELLFISH

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VIMS SHELLFISH AQUACULTURE RESOURCES:

2012 Cultchless (Single seed) Oyster Crop Budgets for Virginia, VSG-12-13, VIMS Marine Resource Report No. 2012-10, November 2012. [Online Access](#)

A dynamic tool to help estimate costs and returns of producing single oysters in off-bottom cages (costs can be modified to fit the user's farm plan). The manual includes links to Microsoft Excel budget spreadsheets for small and moderate- scale production.

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REGULATIONS & PERMITTING

REGULATORY AGENCY CONTACTS & LINKS



VIRGINIA MARINE RESOURCES COMMISSION (VMRC)

Shellfish Leases, Gear Restrictions, Harvest Reporting, Boater Safety Regulations, Bag Limits, Vessel Sanitation

Shellfish Aquaculture webpage: http://www.mrc.state.va.us/Shellfish_Aquaculture.shtm

Desktop Map of Condemnation Zones – searchable GIS map of leased areas, public ground (and more) with an overlay of shellfish condemnation zones (areas that are not approved for shellfish harvest).

https://webapps.mrc.virginia.gov/public/maps/chesapeakebay_map.php

VMRC Shellfish Management Division: <https://www.mrc.virginia.gov/smoverview.shtm>

Contacts:

Chief of Shellfish Management: Adam Kenyon (757) 247-8068, adam.kenyon@mrc.virginia.gov

Deputy Chief of Shellfish Management: Andrew Button (757) 247-2121, andrew.button@mrc.virginia.gov



VIRGINIA DEPARTMENT OF HEALTH DIVISION OF SHELLFISH SAFETY & WATERBORNE HAZARDS (VDH/DSS)

Growing Area Classification & Monitoring, Shellfish Handling (Vibrio Control Plan), Processing Plant Sanitation, Vessel Certification

Webpage: <https://www.vdh.virginia.gov/environmental-health/environmental-health-services/shellfish-safety/>

Growing area classification:

<https://www.vdh.virginia.gov/environmental-health/classification-of-shellfish-growing-areas/>

Condemnation maps: <https://www.vdh.virginia.gov/environmental-health/shellfish-harvesting-area-map/>

Contacts:

Central Office (CO): 804-864-7480

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Plant Program Manager: Sarah Good - sarah.good@vdh.virginia.gov

Growing Area Manager: Adam Wood, MS - Adam.Wood@vdh.virginia.gov

Shellfish Field Offices

Accomac Field Office (ACFO): 757-787-5864

Field Director: Daniel Miller - daniel.miller@vdh.virginia.gov

Kilmarnock Field Office (KFO): 804-577-4007

Field Director: Jill Fleiger - jill.fleiger@vdh.virginia.gov

Norfolk Field Office (NFO): 757-683-8461

Field Director: Jonathan D. Dickerson - Jon.Dickerson@vdh.virginia.gov

REGULATIONS & PERMITTING

VMRC SHELLFISH AQUACULTURE PERMIT CHECKLIST

This quick reference guide is to assist Virginia's shellfish aquaculture growers in keeping track of the required VMRC permits for the most common shellfish culture situations. This guide will support improved regulatory compliance.

HABITAT PERMITS

If your gear sits more than 12 inches off the bottom, is marked at the surface with buoys, or is floating at the surface, you will need one of the following:

■ **General Permit #4** - If you have a regular oyster ground lease from the state and wish to grow shellfish in cages or containers greater than 12-inches above the bottomlands and/or to be marked on the surface with buoys.

- Obtain from MRC Habitat Management Division: <https://mrc.virginia.gov/regulations/fr1130.shtm>

■ **Joint Permit Application** - If you wish to grow shellfish for sale in floating gear on the surface above state-owned subaqueous bottomlands, whether you have an oyster ground lease or not. This applies to floating upweller systems (FLUPSYs). OR If you wish to place cage structures upon state-owned subaqueous bottomlands, without an oyster ground lease.

- Submit the JPA with a detailed plan of the operation to MRC Habitat Management Division.
 - JPA fillable form can be found online here: [Corps JPA Link](#). Or via [VMRC Form Index](#) - Click on "Habitat Management" <http://www.mrc.virginia.gov/forms/index.shtm>

Permit costs vary depending on the situation & the process can take several months, so give plenty of lead time.
JPA cost structure and the specific regulation: <http://www.mrc.virginia.gov/regulations/hm-permits.shtm>

HARVEST PERMITS - STEP 1:

1. Complete the Mandatory Shellfish Harvester Training. *Training is valid for 5 years.* Completion of this training is required prior to purchasing VMRC shellfish licenses and permits.

- If you have a VMRC ID number, go directly to the [Online link](#). If not, see instructions on the [VMRC shellfish aquaculture webpage](#) (scroll down to the bottom of the page).
If you need assistance, contact Jamie Hogge at MRC 757-247-2120

2. Pay the Annual Oyster Aquaculture User Fee. *(Private Ground = \$50.00) Pay each year.*

The annual fee revenue is used for oyster replenishment program which benefits the health of the entire oyster industry. More details can be found here: https://mrc.virginia.gov/CRD/Oyster-Resource-User-Fees_2017-04.shtm

- Pay at one of the agency's licensing agents found here: <https://mrc.virginia.gov/mrcagents.shtm> or by mail to MRC. User fees cannot be paid at the Marine Police Operations Center in Newport News.

3. Purchase an annual Aquaculture Product Owners License. *(\$10.00) renew each year*

There are both oyster and clam product owner licenses so if you grow both - get both. If you are just starting out - wait to get this until you have product in the water because mandatory reporting is required (refer to harvest reporting section). You only need 1 license per company and it should be the person who will file the mandatory reporting, which is typically either the lease holder or business owner.

- Obtain from one of the [MRC License Agents](#) or Northern Area Field Office (call first 804-580-2901).

REGULATIONS & PERMITTING

VMRC SHELLFISH AQUACULTURE PERMIT CHECKLIST

4. Purchase Annual Harvester permits for your workers 1 of 2 ways:

a. Purchase an Aquaculture Harvester License for all workers involved in harvest. (\$5.00 each); renew each year. The Aquaculture Product Owner does not also need a harvester permit.

- Obtain from one of the **MRC License Agents** or Law Enforcement Field Office

b. Purchase an Oyster and/or Clam Aquaculture Vessel Permit. (No cost); renew each year.

Issued to Product Owner for vessel to transport harvesters who do not possess individual oyster or clam aquaculture harvest permits.

- Obtain from one of the **MRC License Agents** or Law Enforcement Field Office.
- Regulation link: <https://mrc.virginia.gov/regulations/FR610.shtm>

HARVEST PERMITS - STEP 2

■ **Tag shellfish** - BEFORE leaving lease OR before going to another harvest area (required year-round)

- Obtain from one of the **MRC License Agents**
- Regulation (copy and paste into browser): https://mrc.virginia.gov/regulations/MRC_Scanned_Regs/Shellfish_Mix/fr1250_05-31-12.pdf

■ **Have a marine sanitation device aboard shellfish harvesting vessels.** *This can be as simple as a labeled bucket ("human waste") with a lid.*

- Regulation (copy and paste into browser): https://mrc.virginia.gov/regulations/MRC_Scanned_Regs/Shellfish_Mix/fr1100_07-01-06.pdf

■ **Have a Dredge Permit if you harvest oysters with a dredge or hand scrape.** Required if a dredge or hand scrape is used to harvest oysters from private ground. Obtained from Marine Police Officer in the field or Law Enforcement Field Office. There is no fee for the permit.

HARVEST REPORTING

■ All Aquaculture Product Owners are required to report the total monthly harvest of their product by the 5th of the following month.

■ All harvest of oysters is required to be reported online. Individuals can request an account on-line at: <https://webapps.mrc.virginia.gov/harvest/>

■ If you have any questions about reporting or need assistance requesting an online account, contact the mandatory reporting staff at 757-247-2241

GENERAL LINKS

- Marine Resources Commission Regulation Index: <https://mrc.virginia.gov/regulations/regindex.shtm>
- Marine Resources Commission License Agents: <https://mrc.virginia.gov/mrcagents.shtm>
- MRC Shellfish Management Division: <https://mrc.virginia.gov/smoveview.shtm>
- MRC Shellfish Aquaculture: https://mrc.virginia.gov/Shellfish_Aquaculture.shtm

REGULATIONS & PERMITTING

VMRC SHELLFISH AQUACULTURE PERMIT CHECKLIST

CHECKLIST SPECIFIC TO WARM-WATER HARVEST

Warm weather harvest restrictions are in effect from May 1 through October 31. This is when naturally-occurring bacteria (*Vibrios*) that have the potential to make people ill are in higher numbers. We can't do anything to get rid of *vibrio* in the environment, but we can put controls in place to limit the growth of the bacteria in shellfish. It's all about time and temperature. **Harvest when it's coolest and keep shellfish cool.**

WARM WATER HARVEST CURFEWS (OYSTERS ONLY)



Regulation: https://mrc.virginia.gov/regulations/MRC_Scanned_Regs/Shellfish_Mix/FR1230_04-01-18.pdf

■ Cage Oyster Aquaculture Husbandry Permit

Required for cage culturists who want to handle oysters for husbandry purposes (not market harvest) after the designated harvesting times specified in the warm water harvest regulations. *Essentially everyone needs this.*

- Obtain application on-line at: <https://webapps.mrc.virginia.gov/public/fisheries/shellfishpermits.php>

■ Icing Permit

Required for the harvest of oysters using ice outside of the designated harvesting times specified in the warm water harvest regulations. Requires VDH-Div. of Shellfish Safety Vessel Refrigeration Approval Certificate PRIOR to issuance of VMRC icing permit.

- Obtain application on-line at: <https://webapps.mrc.virginia.gov/public/fisheries/shellfishpermits.php>

■ Bulk Seed Permit

Required for harvest of any natural (wild) seed oysters that include oysters greater than 2-1/2 inches.

- Obtain application on-line at: <https://webapps.mrc.virginia.gov/public/fisheries/shellfishpermits.php>

■ GPS Permit

Required for the harvest of oysters outside the designated harvesting times specified in the warm water harvest regulations (for those who work on the tidal cycle).

- Obtain application on-line at: <https://webapps.mrc.virginia.gov/public/fisheries/shellfishpermits.php>
- Tracking device shall be on board the harvest vessel or with the individual and must be in continuous operation during harvest and until the oysters harvested are offloaded from that vessel or onto the dock/shore and placed into trucks or other conveyances equipped with VDH-approved temperature-controlled storage.

SHELLFISH HARVESTER REGULATIONS FACT SHEET

HARVESTING AND HANDLING

HARVEST IN APPROVED AREAS

The **Virginia Department of Health Division of Shellfish Safety (VDH/DSS)** classifies and monitors shellfish harvest areas based on levels of pollution.

Approved areas are growing areas where harvest for direct marketing is allowed.

Condemned areas are areas where harvesting is either not allowed or allowed with certain restrictions.

CHECK CONDEMNATIONS

There are several options to check the status of harvesting areas:

Download VMRC MAPS from your smartphone app store. The free app from the **Virginia Marine Resources Commission (VMRC)** shows the user position relative to leases and condemnations.



VDH/DSS online map allows users to check the shellfish closure status for a specific lease location and shows the local seawater sampling station data.

VMRC Chesapeake Bay Map allows users to check the shellfish closure status of a specific lease.

TAG SHELLFISH

Harvested shellfish must be tagged with required information.

Shellstock tags provide the the **4W's: WHO** harvested the product, **WHEN** and **WHERE** it was harvested, and **WHAT** type of shellfish was harvested.

The information on this tag follows the shellfish from harvest to the final consumer.

SELL ONLY TO A CERTIFIED DEALER

All harvest must be sold to a certified shellfish dealer. No direct sales of shellfish are allowable for harvesters without a certification from VDH/DSS. The Interstate Certified Shellfish Shippers List shows **certified shellfish dealers**.

HARVESTING BY BOAT

The boat must be registered with the state; Be properly constructed; Have an available sanitation device; Provide shading to protect shellfish; and Have USCG approved equipment.

Don't discharge human waste overboard. Not only is it prohibited, it can lead to contamination of the shellfish in the harvest area resulting in closures.

Use proper culling techniques to assure shellfish are available to future harvesters.

WARM WATER HARVEST CURFEWS (OYSTERS ONLY)

MAY	JUN	JUL	AUG	SEPT	OCT
11:00 AM	10:00 AM			12:00 NOON	
NOV	DEC	JAN	FEB	MAR	APR
NO CURFEW - HARVEST IS SUNRISE TO SUNSET					

FOLLOW HARVEST AND SEASONAL TIME TABLES

Shellfish must be harvested, offloaded, and landed by the curfew times listed above in order to limit the growth of Vibrio bacteria. Pay attention to the **warm water harvest regulations** in effect May 1 - Oct 31. Harvest during these months will require shading and VDH-approved temperature control for land-based deliveries.

No harvest is allowed before sunrise from June 1 through August 31.

Harvest times can be extended from May through October as long as the harvester is using an approved method of harvest such as the use of ice or a GPS tracking device and a permit has been granted.

TRANSPORTATION

DELIVER DIRECTLY TO A CERTIFIED DEALER

Deliver shellfish to a certified dealer facility using mechanical refrigeration (at 45°F or less) or ice when transport times exceed 1 hour and provide shade to ensure the product is protected.

Do not expose shellfish to gasoline, garbage, animals, etc.

CONTACTS



VMRC SHELLFISH MANAGEMENT DIVISION

Virginia Marine Resources Commission
(757) 247-2200

FOR HARVESTER ACTIVITIES RELATED TO:

Boater safety regulations; Catch limits; Seasons; Gear types; Vessel Sanitation

VDH VIRGINIA DEPARTMENT OF HEALTH DIVISION OF SHELLFISH SAFETY & WATERBORNE HAZARDS

Central Office: (804) 864-7480
Accomac Field Office: (757) 787-5864
Norfolk Field Office: (757) 683-8461
Kilmarnock Field Office: (804) 577-4007

FOR HARVESTER ACTIVITIES RELATED TO:

Water classification/monitoring; Plant processing inspection; Dealer certification; Vessel certification



REGULATIONS & PERMITTING

SHELLFISH DEALER REQUIREMENTS

WHO CAN A LICENSED HARVESTER SELL SHELLFISH DIRECT TO?

Licensed shellfish harvesters must sell product to a certified shellfish dealer in Virginia. You are considered a certified shellfish dealer if you hold a Certificate of Inspection from the Virginia Department of Health, Division of Shellfish Safety (VDH, DSS). DSS works under the National Shellfish Sanitation Program (NSSP). The types of certified dealers are listed below.

This factsheet covers the requirements for a Shellstock Shipper (SS) dealer certification. For more information on other certified shellfish dealer requirements, contact your local Division of Shellfish Safety (DSS) field office.

COMMON TYPES OF SHELLFISH DEALERS

CODE	CERTIFICATION	WHAT YOU CAN DO WITH THIS CERTIFICATION
SS	SHELLSTOCK SHIPPER	A person who grows, harvests, buys, or repacks and sells shellstock. They are not authorized to shuck shellfish nor to repack shucked shellfish. However, a SS may ship shucked shellfish.
RS	RESHIPPER	A person who purchases shucked shellfish or shellstock from other certified shippers and sells the product without repacking or relabeling to other certified shippers, wholesalers, or retailers.
RP	REPACKER	A person other than the original certified shucker-packer who repacks shucked shellfish into other containers. A repacker also may repack and ship shellstock. A repacker shall not shuck shellfish.
SP	SHUCKER-PACKER	A person who shucks and packs shellfish. A shucker-packer may act as a shellstock shipper or reshipper or may repack shellfish originating from other certified dealers.

VDH DIVISION OF SHELLFISH SAFETY OFFICES

Accomac Field Office
757-787-5864

Kilmarnock Field Office
804-577-4007

Norfolk Field Office
757-683-8461

REGULATIONS & PERMITTING

SHELLFISH DEALER REQUIREMENTS

REQUIREMENTS FOR A CERTIFIED SHELLFISH SHIPPER (SS)

Inspection authority is given to the Virginia Department of Health, Division of Shellfish Safety. Requirements are outlined in the **National Shellfish Sanitation Program Model Ordinance (NSSP MO)** and **12VAC5-150**. Certification requires 1) an onsite inspection, 2) a HACCP plan and trained employees, and 3) ongoing compliance. After initial inspection, and each year following and if compliance is maintained, the dealer will receive their Certificate of Inspection (COI) and be listed on the Interstate Certified Shellfish Shippers List (**ICSSL**). Harvesters may only sell shellfish to, and retail stores and restaurants may only receive shellfish from, sources listed on the ICSSL. Certifications must be renewed every year, by September 30.

Note - Additional permits are required for wet storage, depuration, and post-harvest processing.

1) Onsite Inspection

Dealers interested in becoming certified or re-certified must complete an **application** and submit it to the appropriate Field Office. Once received, you will be assigned a reserve certification number; however, this number does not constitute certification. Instead, it is provided so that you can have dealer tags created. During the initial onsite inspection of your physical plant location, the inspector will briefly outline the HACCP implementation and sanitation requirements. As the dealer, it is your responsibility to be knowledgeable of the requirements in the most recent version of the NSSP MO. The inspector will provide you with a list of deficiencies to be corrected before being issued a Certificate of Inspection (COI). Following issuance of the COI, the inspector will make unannounced visits to your facility to review records and sanitation compliance.

2) HACCP plan and trained employees

A HACCP plan is a written food safety system that identifies key points in the process where controls must be applied and monitored. A HACCP plan can prevent hazards, thus protecting the consumer from a foodborne illness. During your initial onsite inspection, and after any changes, your inspector will provide you with a written HACCP plan and associated record templates. There must be one person associated with the business who is trained in seafood HACCP. The extent of training depends on the level of compliance. A dealer certified as a Shellstock Shipper (SS) must complete at least the one-day HACCP course. This course is offered a couple times per year and is instructed by VDH DSS staff in collaboration with the **Marine Advisory Program at VIMS**.

All employees must be trained in proper food handling and personal hygiene practices as they pertain to their assigned job duties. Documentation of employee training must be kept. VDH DSS has created a two-page dealer training information sheet, available in both **English** and **Spanish**. This can be obtained upon request, but dealers are encouraged to pursue other training opportunities as needed.

3) Required Shellfish Dealer Educational Training

The NSSP MO requires VDH DSS conduct at least semiannual inspections of Shellstock Shippers. The dealer's compliance with the MO is evaluated during each inspection. Findings are reported to the dealer in writing. Each inspection should show compliance with any deficiencies noted in the previous inspection. A Certificate of Inspection is only issued to dealers who demonstrate limited deficiencies as outlined in Section II Chapter 1@.02B in the NSSP MO.

This fact sheet covers the training for shellfish dealers only. For harvester training, please read the Shellfish Harvester Requirements: VMRC Required Permits & Training and complete the online training through the VMRC website: <https://webapps.mrc.virginia.gov/public/training/register.php>

REGULATIONS & PERMITTING

INTERSTATE TRANSPORT OF SHELLFISH (FOR GROWOUT)

Protect Virginia from the unwanted spread of shellfish disease by following the rules!

BRINGING IN SHELLFISH FROM OUT OF STATE

Importing shellfish to Virginia waters from outside the state is regulated by the Virginia Marine Resources Commission (VMRC). These regulations are in place to protect the industry from the spread of shellfish diseases. You are responsible for **(1) obtaining an importation permit from VMRC which, in most cases, requires (2) a pathology evaluation by an approved laboratory indicating that the shellfish does not pose an unacceptable disease risk.**

1) IMPORTATION PERMIT DETAILS

You will need to advise VMRC on the shellfish species, size, number you want to import into Virginia, and when you want the importation to happen. You'll also need to provide specifics about the source location and the local destination. Not every transfer makes biological sense and there are specific geographic and genetic stock restrictions included in the regulation.

VMRC import regulation:

<http://mrc.virginia.gov/regulations/fr754.shtm>

2) PATHOLOGY EVALUATIONS:

A pathology evaluation is a thorough health examination of a sample from the same batch that you are looking to transfer. To get the certification, services are offered at the **VIMS Shellfish Pathology Laboratory** under the direction of Dr. Ryan Carnegie.

The harder part is obtaining the required clean bill of health. Shellfish out in the natural environment are going to accumulate what's out there – and in Virginia's case, that's mainly Dermo disease. **Stick to products coming directly out of the hatchery – these have the best chance of being "clean"** because they've spent the least amount of time in unfiltered water. Otherwise, choosing environments with a similar disease profile and avoiding areas with pathogens we don't have in Virginia is the better route. For advice, please call or email Ryan Carnegie.

CONSIDERATIONS:

- Pathology certifications are not free – growers are asked to cover a small portion of the total cost (supplies).
- Check whether or not your transfer makes good biological sense before moving ahead.
- Check with the laboratory in advance to confirm cost & schedule.
- Larger animals are more expensive. Larvae and small seed (<10 mm) are the most economical to screen.
- Sample size for testing is 60 animals, but samples of 200 are requested for small seed.
- Certification process takes ~10 days from the receipt of the samples. If the transfer is approved, the window for the transfer is 30 days.

CONTACTS:

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HUMAN HEALTH

SAFE SHELLFISH HARVEST: GROWING AREA CLASSIFICATION

WHERE ARE SAFE SHELLFISH HARVEST AREAS?

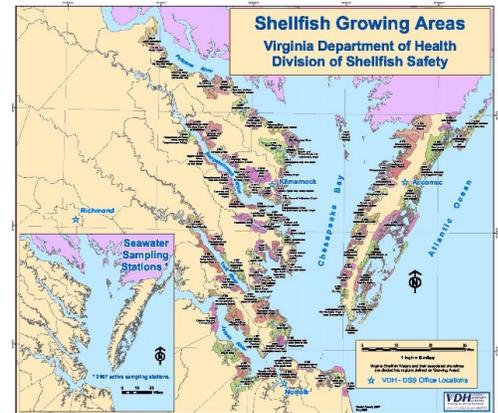
The Virginia Department of Health, Division of Shellfish Safety (DSS) actively monitors water quality criteria in Virginia shellfish harvesting waters. Waters are grouped into what the Division calls 'growing areas', defined as tidal salt waters capable of growing shellfish. There are just over 100 growing areas stretching from Dahlgren to Virginia Beach to Assateague. DSS classifies growing areas as either approved (open) for shellfish harvest or condemned (closed) for harvest based on extensive water sampling and monitoring for indications of fecal bacteria and pollution. All harvesters, commercial and non-commercial (for personal consumption), are responsible for knowing the status of their growing area and to abide by harvest restrictions.

WHY ARE GROWING AREA CLASSIFICATIONS IMPORTANT?

Bivalve shellfish breathe and feed on microscopic food particles (algae) by pumping water through their gills. If hazards are present in the water, such as bacteria, viruses, heavy metals, or toxic substances, they are also filtered. While these hazards don't harm the shellfish, they can accumulate in the tissues faster than they are excreted and cause illness when shellfish are consumed raw or undercooked. Shellfish growing waters are classified based on extensive water sampling and harvest for consumption is only approved in the cleanest of waters in order to protect public health.

POLLUTION THREATS AND HOW THEY ARE MANAGED

Pollution sources, such as septic systems, animal feces, and storm water runoff can introduce human pathogens such as, fecal coliform bacteria and viruses (Norovirus, Hepatitis A, etc.) into the water. These hazards can accumulate in the shellfish tissues faster than they are excreted and cause illness when shellfish are consumed raw or undercooked. Risk is managed by the classification of growing areas by VDH Shellfish Safety. Areas of known higher risk, such as marinas and waste water treatment outflows are managed with precautionary harvest area closures, which can be seasonal or full time. Other growing areas classifications are reflective of the water monitoring, so it's important to understand the classification of your farm location and surrounding areas and to keep up to date as it changes. There are additional efforts by VDH Shellfish Safety to identify land-based sources of pollution which impact water quality.



CONTACTS:

VDH SHELLFISH SAFETY:

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GIS Analyst & Classification Asst.

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- Link to VDH DSS: <https://www.vdh.virginia.gov/environmental-health/classification-of-shellfish-growing-areas/>

HUMAN HEALTH

SAFE SHELLFISH HARVEST: GROWING AREA CLASSIFICATION

NATURALLY OCCURRING THREATS AND HOW THEY ARE MANAGED

There are also naturally occurring threats **NOT associated with pollution**. *Vibrio* bacteria are naturally occurring and can be pathogenic, or cause human illness, through either eating undercooked seafood or an exposure of a wound to seawater. Consumption risk is managed by **harvest and handling controls** that focus on time and temperature – limiting harvest and handling times in warmer months and keeping harvested shellfish cool to limit the growth of bacteria. VDH DSS implements a **Vibrio control plan** for commercial harvest and harvesters must adhere to strict warm water harvest regulations (refer to the Virginia Aquaculture Tool, VMRC **Regulations**) Non-commercial harvesters (including oyster gardeners) can limit personal risk by following best management practices (refer to Best Practices for consuming oysters from the garden).

Another naturally occurring threat includes some species of algae known as Harmful Algae Blooms, or HABs. While most of the algal species in the water are harmless, these particular algal species have the ability to produce biotoxins under certain conditions. HABs have the ability to be harmful to harvesters through inhalation and skin contact as well as to consumers through consumption of fish or shellfish that have accumulated the toxin. It's important to note that Virginia has NOT had any human illness related to HABs from consumption to date, unlike other areas of the country. VDH Shellfish Safety has a **Biotoxin Control Plan** in place that includes extensive monitoring of shellfish growing areas.

- **VDH Factsheet for Watermen - Water Illness and Injury Prevention**
- **VDH Harmful Algal Bloom Website**
- **VIMS Harmful Algal Bloom Website**

GROWING AREA CLASSIFICATIONS

Areas are classified as follows:

- Approved: open for harvest
- Conditionally approved: open for harvest unless a 'condition' has been met. If that condition is met, the area will be converted to closed (restricted) for a set duration of time.
 - Some areas normally open to harvest are temporarily placed in closed status due to a predictable pollution trigger which could be seasonal, in the case of marinas.
 - Rainfall-based conditionally approved waters are in the CLOSED status for 10 days if rainfall exceeds a rainfall threshold.
- Restricted: closed to the harvest of shellfish. However, commercial harvest may be allowed by special VMRC relay permit. Relaying is a process where shellfish from areas with only moderate levels of pollution can be moved to an approved area where they will purge the contaminants.
 - **Link to VMRC Regulation: Pertaining to the Relaying of Shellfish**
- Prohibited: areas with more significant pollution, such as heavy metals or toxins, that the relay process is not sufficient to purge. There is NO harvest of market shellfish, period.

All shellfish growing areas are evaluated annually for possible condemnation changes.

*** New leases cannot be obtained in Restricted or Prohibited waters (waters labeled as Condemned).*

SHELLFISH HEALTH

SHELLFISH HEALTH & BIOSECURITY

Good health is essential to the growth, survival, and superior condition at market of your shellfish stocks. Virginia waters are inhabited by a number of organisms that cause shellfish disease, known as shellfish pathogens. Ensuring good health means managing these pathogens with good husbandry practices and preventing the introduction of new, exotic diseases.

WHAT IS BIOSECURITY?

Think of biosecurity as a set of measures designed to reduce the risk of introduction, establishment, and spread of disease agents to, from, or within a farm. **We maximize biosecurity through good farm management, avoiding overcrowding, and keeping stress on animals low.** Also important is the **screening of imported seed to be sure it does not carry exotic pathogens or levels of established pathogens, like Dermo, so high that it will worsen disease locally.**

TIPS FOR GOOD HEALTH AND BIOSECURITY ON THE FARM

Be mindful that shellfish are stressed by rapid changes in the environment (temperature, salinity) and from handling (tumbling or power washing). Growers can't control Mother Nature, but can limit other shellfish stressors that can result in poor health and condition. Problems usually occur when there are multiple stressors involved, so it's important to keep records and use these records to evaluate issues of poor health or mortality to make informed management decisions.

- Keep densities at level that promotes optimal growth. Good growth = good health.
- **Don't overcrowd - stress weakens shellfish providing opportunity for the spread of disease.**
- **Use the best performing stocks and/or disease tolerant stocks for your area.**
- **Maintain good husbandry practices, such as keeping nets/bags/cages clean to ensure adequate water flow and limiting exposure and handling during extreme temperatures.**
- If purchasing seed from out-of-state, follow importation regulations and get a health certification (see Interstate Transport of Shellfish (For Growout)).
- Keep records. Use them to evaluate unusual mortality events and weak or poor meat quality. *Records should include: stocks on the farm, year class, general growth and survival info, environmental events like heat waves and cold snaps, heavy rainfall, runoff, any abnormal water conditions or colors (algal blooms).*
- Report unusual mortality to VIMS [when you first see it](#) and consider submitting a sample for disease analysis. While disease isn't always to blame, it's good to rule out local or exotic pathogens.

WHAT TO DO IF YOU HAVE A SUSPECTED DISEASE EVENT

Shellfish growers are a key partner in the biosecurity management of Virginia shellfish aquaculture populations. Report any unusual mortality at any time of year. Unusual mortality is anything above expected mortality for a given crop and location, as this could indicate an emerging problem. The VIMS Shellfish Pathology Laboratory routinely investigates such reports [at no charge](#). Report it early and when it is ongoing so shellfish and water samples can be evaluated in real time. Waiting until the die-off is over limits the ability to investigate. For more information, visit the [VIMS MAP Response webpage](#).

MOST COMMON SHELLFISH DISEASE THREATS IN VIRGINIA

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SHELLFISH HEALTH

SHELLFISH HEALTH & BIOSECURITY

In Virginia, the primary local oyster disease threat is **Dermo disease**, but **MSX disease** also causes a modest level of mortality in some years. QPX disease causes occasional mortality in clams, and SSO disease in Seaside oysters. All of these are caused by protozoan parasites that infect only shellfish—not humans. **These diseases can all be managed by good farm practices, such as not overcrowding shellfish and choosing the best performing stocks or genetic stocks for the area.**

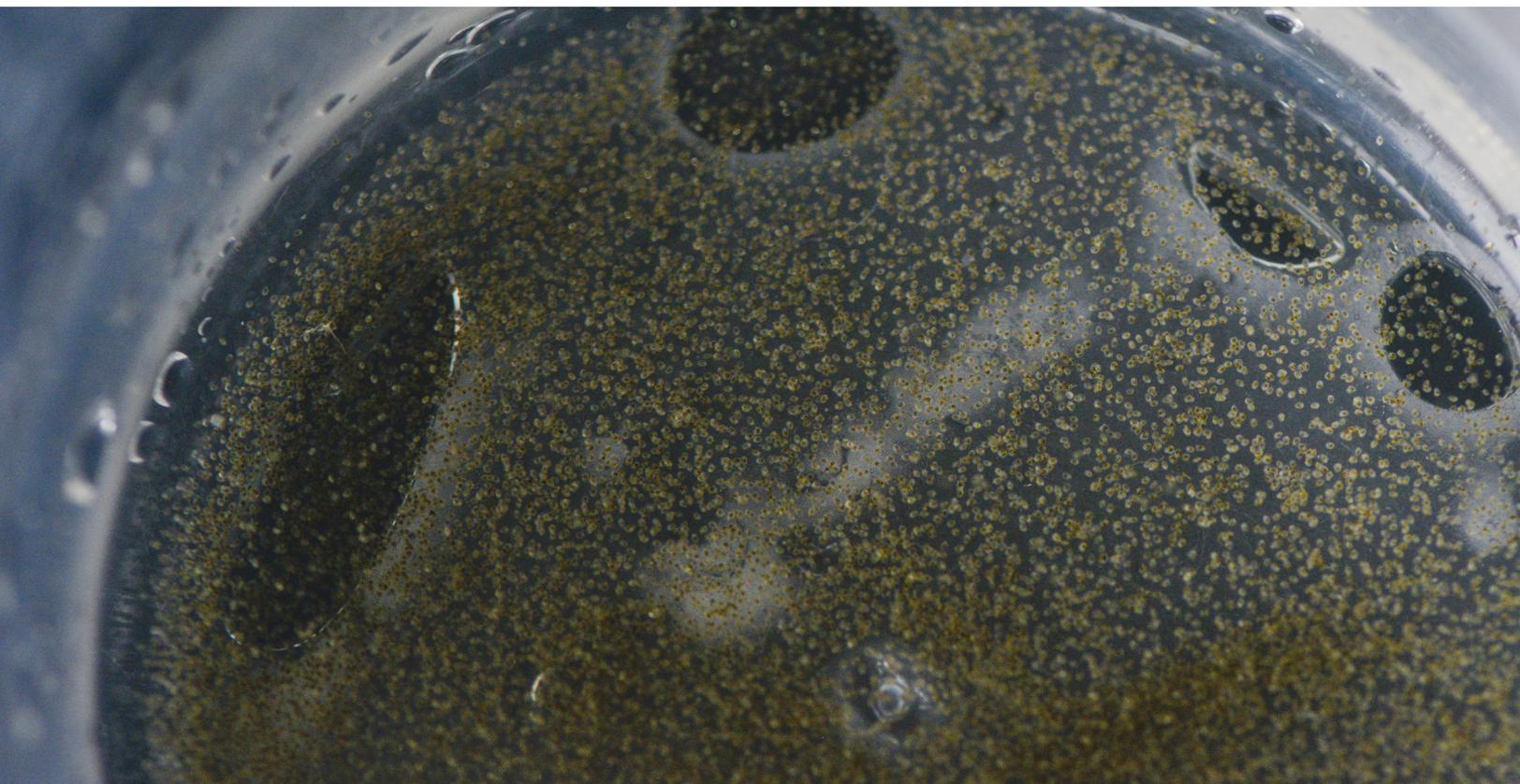
SHELLFISH DISEASE THREATS OUTSIDE OF VIRGINIA

Good biosecurity practices must be used to ensure we don't introduce diseases that Virginia shellfish don't have through shellfish transfers. Two known threats are:

- ROD (formerly JOD, or juvenile oyster disease, caused by a bacterium) that affects small hatchery seed in the Northeast
- Bonamia (protozoan parasite) which has been found to infect oysters on rare occasions in Massachusetts and North Carolina.

Seed imports from outside Virginia must be free of detection of these diseases. Refer to the Fact Sheet -“Interstate Transport of Shellfish (For Growout)” for details on the regulations.

Worldwide, concern is growing about other emerging infections caused by viruses, such as the oyster herpes virus (OsHV-1), and about other environmental bacteria as well. We have not detected these diseases in shellfish populations here in Virginia, but they remain the focus of VIMS surveillance and research attention.



BUYING OYSTER SEED

CONSIDERATIONS WHEN BUYING OYSTER SEED

PLOIDY - DIPLOID OR TRIPLOID?

Ploidy is the number of sets of chromosomes in a cell. Diploids have 2 sets (1 from the mother and 1 from the father), while triploids have 3 sets. A triploid oyster is considered "spawnless."

Which should you choose? What you choose depends on when you plan to market your oysters.

Triploids are most widely used on commercial farms in Virginia because they grow fast and are marketable year-round. Diploids reproduce, and therefore aren't marketable in the summer months due to poor meat quality and yield when oysters are spawning.

Keep in mind - cultured diploids have better growth and survival compared to wild oysters. Consider growing both and marketing at different times of the year - but keep them separate.

STOCK - KNOW WHAT YOU ARE BUYING

A stock (a.k.a. strain, or line) is a group of oysters selectively bred for improved performance, such as fast growth, survival in the face of diseases (MSX or Dermo), or survival in a specific salinity range (low or moderate). Ask your seed provider what they offer. There are a variety of stocks available in Virginia, thanks to the breeding work conducted at **VIMS' Aquaculture Genetics & Breeding Technology Center (ABC)**. Hatcheries have the option to produce seed using selected stocks from VIMS and/or produce their own local stocks. VIMS stocks have unique names like "Deby", "Lola", or "Henry". The hatcheries will name their crosses too - usually after the local waterbody.

So how do you know what to choose? The selected stocks generally have good performance overall, but it really depends on the conditions at your specific location. There's no clear-cut answer, but there are a few good common-sense suggestions:

- Ask around - what are other growers in your area using?
- Inform the seed seller of your location, salinity, and ask for recommendations.
- Consider trying two strains & comparing their performance but keep them separate.

Make informed choices and record seed performance

SIZE

There are a variety of sizes available for sale, but not all sellers offer all sizes. The larger the seed, the more it costs. Small seed (1 mm - 6 mm) requires the use of a nursery system such as an upweller. Less experienced growers would be better off purchasing larger seed (~7 - 13 mm or 1/4 - 1/2 inch) and perfecting the grow-out technique first before adding a nursery component.

Note - sieve size does not equal seed size (rule of thumb: stock in mesh 1 size smaller than the sieve size).

ORDERING

Seed is sold by the thousand. Orders should be placed in advance of the season (by Jan-Feb) and typically require a deposit. Triploids and/or disease resistant stocks are usually more expensive because there is a licensing fee charged to the hatcheries for use of the improved stocks.

Don't buy more seed than you have gear to maintain it as it grows!

THINKING OF BUYING FROM OUTSIDE VIRGINIA?

Seed import regulations need to be considered in order to protect the biosecurity of our local waters and oysters, as there are diseases in other regions that we do not have or want in Virginia.

BUYING OYSTER SEED

WHERE TO BUY OYSTER AND CLAM SEED

AVAILABILITY

Oyster and clam seed can be purchased directly from a privately owned hatchery or nursery operation. Keep in mind that the standard economic model for shellfish hatcheries in Virginia is vertical integration. In vertical integration, the primary customer for the hatchery is the parent grower company, or the hatchery itself. This situation limits, at times, the availability of products for other growers. So, a hatchery may be actively producing, but doesn't have seed to sell. Seed can also be purchased from nursery operations. Some advice:

- Develop relationships with your seed providers.
- Place orders early in the season- don't wait until you are ready to deploy.
- Be flexible and if placing a large order, consider splitting the order between multiple sellers.

Once seed is purchased, consider raising them in an upweller system. Upwelling provides optimal growth of seed by pumping, or force-feeding, food-rich water to the seed.

NURSERY LIST *(by region and in alphabetical order)*

EASTERN SHORE

Shooting Point Oyster Company - OYS

www.shootingpointoysters.com

Tom Gallivan
5456 Bayford Road,
Franktown, VA 23354
757-693-1303 (boat)
tom@shootingpointoysters.com

Tarkill Aquaculture Ventures, LLC - OYS

Bob Boardman
PO Box 94,
Onancock, VA 23417
757-894-2009

MIDDLE PENINSULA

Chesapeake Bay Oyster Company LLC - OYS

www.bayoyster.com

Doug McMinn
PO Box 96,
Wake, VA 23176
804-338-6530
doug@bayoyster.com or sales@bayoyster.com

Oyster Mamas Baybies - OYS

Judy Ambrose
Gwynn's Island, VA
804-725-8556
Oystermamasbaybies@yahoo.com

NORTHERN NECK

Bay Watch Oyster Seeds, LLC - OYS

www.baywatchoysterseeds.com

Keith Rodgers
P.O. Box 535, 271 Bay Watch Lane,
Reedville, VA 22539
804-453-4367
baywatchoysterseeds@nnwifi.com

HATCHERY LIST *(by region and in alphabetical order)*

EASTERN SHORE

Broadwater Seafood - OYS, HC

Jimmy Kelly
11183 Red Bank Road
Marionville, VA 23408
broadwaterseafood@yahoo.com

Cherrystone Aquafarms - HC, OYS

<http://www.clamandoyster.com>

Tim Rapine
P.O. Box 347
Cheriton, VA 23316
757-331-1208
timr@littleneck.com

HM Terry

<https://hmterry.com/about>
757-442-7006

Continued...

BUYING OYSTER SEED

WHERE TO BUY OYSTER AND CLAM SEED

HATCHERY LIST *(by region and in alphabetical order)*

JC Walker Brothers - HC, OYS, BS

www.jcwalkerbroscams.com

Tom & Wade Walker/Ann Gallivan

P.O. Box 10

Willis Wharf, VA 23486

757-442-6000

seasideclams@gmail.com

Toms Cove Aquafarms - OYS, HC

Tommy Clark

7466 Lighthouse Lane

Chincoteague, VA 23336

757-336-1945

toms.cove@verizon.net

MIDDLE PENINSULA

Oyster Seed Holdings, LLC - OYS

www.oysterseedholdings.com

Michael Congrove

PO Box 397

Grimstead, VA 23064

804-725-3046

misc@oysterseedholdings.com

Ward Oyster Company - OYS

John Vigliotta

6578 Jarvis Road

Gloucester, VA 23061

804-693-7597

Clamman47@hotmail.com

NORTHERN NECK

KCB Oyster Holdings, LLC - OYS

ajerskine@bevansoyster.com

A.J. Erskine/Liz Walker

755 Lake Landing Drive

Lottsburg, VA 22511

804-529-6654

CONTACTS:

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khudson@vims.edu

804-684-7742



BUYING OYSTER SEED

COUNTING SEED OYSTERS BY VOLUME

Counting by volume is a good method for large numbers of oysters because it can be done quickly and without special equipment. Beware – accuracy is compromised if attempting to count seed of mixed sizes.

DEFINITIONS

- **Sieve** - method for separating different size classes within a batch of oysters. A sieve is made of wire screen. Different size screens are used to sort each size class.
- **Size Class** - the different sizes of oysters separated by sieving.

MATERIALS NEEDED

- Plastic containers of various sizes: 100 mLs, 1/2 liter (500 mLs), 1 liter
- A large table for working space
- A raceway for sieving
- Sieves (sizes ¼", ½", ¾", 1")
- Water supply
- Baskets to hold seed

METHOD

Step 1. Sieve seed if it has a lot of size variation.

Step 2. Put a pile of the first size class of seed on a table.

Step 3. Scoop seed into the appropriate measuring container:

Seed/Sieve Size	Count Volume
1/4 inch	100 mLs
1/2 inch	500 mLs
3/4 inch & larger	1 liter

** Adjust the volume depending on the seed size to be accurate & efficient*

Step 4. Shake container gently so seed is level with the top.

Step 5. Dump "sample" out of container and count. Repeat 3 times and take an average.

Step 6. Calculate **number of seed per liter = average seed count x factor (count volume)**

100 mls = 10

200 mls = 5

500 mls = 2

Step 7. Using multiple beakers or measuring multiple times, measure the total volume of seed in that particular size class (i.e. number of liters).

Step 8. Calculate total number of oysters in size class = number of seed per liter x number of liters.

Step 9. Repeat steps 2-8 for each sieve size.



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