VIMS | William & Mary
Virginia Institute of Marine Science

OYSTER GARDENING RESOURCES

PERMITTING • HUMAN HEALTH • SHELLFISH HEALTH • SOURCING SEED

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www.vims.edu/map/aquaculture

REGULATIONS & PERMITTING

AGENCY CONTACTS & LINKS

There are two main agencies in Virginia that manage shellfish aquaculture and they are listed below. Virginia is fortunate to have a collaborative environment between and among agency partners, shellfish farmers, and the aquaculture research community.

VIRGINIA MARINE RESOURCES COMMISSION (VMRC)

Leases shellfish grounds, issues harvest licenses, patrols condemned waters and regulates the catch of shellfish to ensure sustainable populations.

Shellfish Aquaculture web page

Maps and GIS data– searchable GIS map of permitted oyster gardening sites, leased areas, public ground, growing area condemnations, and more. Use the map layers on the left-hand side to turn on and off the information of interest.

Shellfish Management Division - management of the shellfish resources and shellfish harvest that occurs in Virginia's tidal waters. This includes the public oyster and clam grounds and private grounds leased for the propagation of shellfish. They also issue all necessary permits related to commercial shellfish aquaculture activities.

For questions about the oyster gardening permit contact:
Savannah Longest, VMRC Shellfish Aquaculture Specialist 757-247-2262
savannah.longest@mrc.virginia.gov

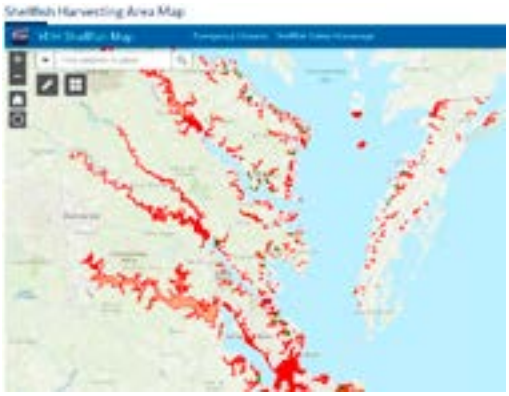
VIRGINIA DEPARTMENT OF HEALTH DIVISION OF SHELLFISH SAFETY & WATERBORNE HAZARDS (VDH/DSS)

Determines which shelfish growing waters are safe for harvest and regulates post harvest processing and handling.

Shellfish Safety Homepage

Shellfish Harvesting Area Map - to search for growing area classification

For specific questions related to your growing area status or water sampling contact:
Growing Area Manager: Adam Wood
Adam.Wood@vdh.virginia.gov



HUMAN HEALTH - SAFE SHELLFISH HARVEST

CLASSIFICATION OF WATERS APPROVED FOR HARVEST

HOW SHELLFISH GROWING AREAS ARE CLASSIFIED

The **Virginia Department of Health's Division of Shellfish Safety (VDH DSS)** keeps a close watch on water quality in areas where oysters are grown. These waters—called "growing areas"—are tidal saltwater zones that can support shellfish. This is done under the guidance of a National program. There are just over 100 of these areas across Virginia, and DSS checks them every year. Based on their testing for potential sources of pollution and bacteria, areas are classified as either approved (open for harvest) or condemned (closed for harvest). If you're growing oysters, it's your responsibility to know the status of your area and follow any harvest rules that apply.

WHY CLEAN WATER MATTERS FOR SAFE SHELLFISH

Bivalve shellfish—like oysters—feed and breathe by pumping water through their gills, filtering out tiny food particles like algae. But if the water contains harmful stuff like bacteria, viruses, heavy metals, or other toxins, those get filtered too. These hazards don't hurt the shellfish, but they can build up in their tissues and make people sick if the shellfish are eaten. That's why shellfish growing waters are carefully tested and only the cleanest areas are approved for harvest—to help keep everyone safe.

GROWING AREA CLASSIFICATIONS

Areas are grouped in the following general categories:

- Approved: open for year-round harvest
- Conditionally approved: open for harvest unless a 'condition' has been met in which case the area is closed for a set period of time.
  * *Predictable pollution (marinas, sewage treatment plants)*
  * *Rainfall-based*
- Restricted: closed to the harvest 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.

CONTACTS:

VDH SHELLFISH SAFETY:

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Adam.Wood@vdh.virginia.gov

Daniel Powell
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HUMAN HEALTH - SAFE SHELLFISH HARVEST

PUBLIC HEALTH THREATS AND MANAGEMENT

POLLUTION RISKS AND WHY THEY MATTER TO OYSTER GROWERS

Pollution from things like failing septic systems, animal waste, and stormwater runoff can put harmful germs—like fecal bacteria, Norovirus, and Hepatitis A—into the water. When this happens, shellfish can take in these germs as they filter water, and the hazards can build up in their tissues faster than they're released. That's why eating raw or undercooked shellfish from polluted water can make people seriously sick.

To reduce that risk, the **Virginia Department of Health's Division of Shellfish Safety (VDH DSS)** classifies growing areas based on water quality. Places with known risks—like near marinas or wastewater treatment plants—are often closed to harvesting, either seasonally or all year. The classification of your oyster garden depends on water monitoring data, so it's really important to stay updated on the status of your area and any changes nearby. VDH Shellfish Safety also works to track down land-based pollution sources that could impact shellfish-growing waters.

NATURALLY OCCURRING THREATS AND HOW THEY ARE MANAGED

Not all threats to seafood safety come from pollution—some are naturally occurring. For example, Vibrio bacteria are found naturally in coastal waters and can make people sick. This can happen either by eating undercooked seafood or by getting seawater with Vibrio into an open wound.

To reduce the risk of illness, there are strict rules in place for how seafood is harvested and handled, especially during warmer months when bacteria grow faster. These rules focus on limiting the time seafood is exposed to warm temperatures and keeping it cool after harvest. In Virginia, VDH DSS has a Vibrio Control Plan that commercial harvesters must follow.

If you're harvesting shellfish for personal use—like oyster gardening—you can also reduce your risk by following best practices for safe handling and consumption. (Check out "Best Practices for Handling and Harvesting" for tips.)

Another natural threat is Harmful Algal Blooms (HABs). While most algae in the water are harmless, some species can produce toxins under certain conditions. These toxins can affect people in different ways—through skin contact, breathing in the air near blooms, or eating contaminated seafood.

The good news is that Virginia hasn't had any cases of human illness from eating seafood affected by HABs, unlike some other parts of the country. Still, VDH DSS takes this seriously and has a Biotoxin Control Plan in place. This includes regular monitoring of shellfish growing areas to make sure everything stays safe.

HUMAN HEALTH - SAFE SHELLFISH HARVEST

CHECKING IF YOUR OYSTER GARDEN IS IN A SAFE HARVEST AREA

Figure 1.

WHAT'S MY GROWING AREA CLASSIFICATION?

1. Go to the "**Shellfish Harvesting Area Map**" from the Virgina Department of Health, Shellfish Safety Homepage

2. Enter your address in the box located in the upper left corner of the map (denoted in yellow highlight on Figure 1)

3. Adjust the map as needed by zooming in or out using your mouse or by using the + and - buttons located in the upper left of the map.

4. Click the mouse on your garden location to access the classification information which will come up as a text box entitled `Shellfish Harvesting Areas' (Figure 2.)

- The arrows point to the info needed for your VMRC permit application.
- The red box outlines the classification type.

Note: If you continue to Zoom in, you will see blue dots with a yellow outline. These represent VDH water sampling locations. Click on the circle for more information.

Figure 2.

EXAMPLES OF THE CLASSIFICATION TYPES YOU MAY ENCOUNTER

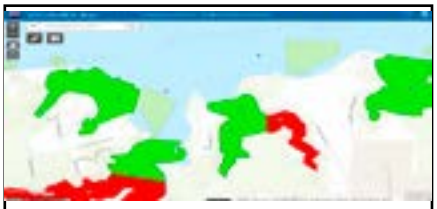
Open / Approved (blue)

The green area denotes an oyster lease.

Oysters can be gardened and harvested year-round.

Prohibited (orange)

Keep out - No oysters can be cultured or harvested here.



Conditionally Approved (green)

Harvest is allowable unless a 'condition' is met. When a condition is met, the area is closed for harvest.

Conditions are seasonal or rainfall-based. Details will be provided in the classification description.

Stay up to date on rainfall closures here: **VDH Conditional Harvest Area Website**

Restricted (dark red)

Harvest is not allowed, however oyster gardens can be permitted in these areas.

Seasonally restricted (Lt.red)

Harvest is not allowed for specific months (typically Apr-Oct) and allowed for other months.

HUMAN HEALTH - SAFE SHELLFISH HARVEST

BEST PRACTICES FOR HANDLING & HARVESTING

HANDLING INJURIES

There are natural bacteria in the water that can cause serious infections through cuts or scrapes.

- Have an open wounds? Stay out fo the water
- Wear gloves when handling oysters or gear
- Get a cut? Wash it right away, apply antibiotic ointment and keep an eye out for signs of infections
- Learn more: **VDH Vibrio and Water Safety**

EATING YOUR OYSTERS

- Only eat oysters from approved waters. Check the **VDH Shellfish Map**
- Cooking them doesn't always kill bacteria or viruses. Don't assume heat makes them safe.
- If you have a weakened immune system, avoid raw or undercooked oysters - Vibrio vulnificus can be deadly.
- More info: **CDC on Vibriosis**

HARVESTING TIPS

- Keep oysters cold from harvest to table - especially in warm months.
- Don't harvest after heavy rain. Wait a few days for oysters to purge runoff pollution
- Toss any craked or gaping oysters - they're likely sick or dead

Remember:

*Keep us **COLD** - store on ice or in fridge*

*Let us **DRAIN** - don't let oysters sit in melted ice water*

*Let us **BREATHE** - don't seal oysters in an airtight container*

SHELLFISH HEALTH & BIOSECURITY

BIOSECURITY BASICS

HOW TO PREVENT INTRODUCING SHELLFISH DISEASE

Keeping your oysters healthy starts with preventing disease. That means:

- **Buy local seed** – only source from within the Chesapeake Bay to avoid bringing in outside pathogens.
- **Don't redeploy store-bought oysters** – oysters purchased for consuming should never go back in the water.
- **Cure shells before reuse** – let used shells dry in the sun for up to a year to kill off any leftover meat or fouling organisms. This helps stop potential disease introduction and improves water quality too.

TIPS FOR A HEALTHY, BIOSECURE OYSTER GARDEN

Oysters can get stressed from sudden environmental changes or too much handling. While we can't control the weather, we can reduce stress and support good health with smart practices:

- Don't overcrowd. Give oysters space to grow—less stress means fewer chances for disease.
- Choose the right stock. Use well-performing or disease-tolerant seed suited to your area.
- Keep gear clean. Clean nets, bags, and cages regularly to maintain good water flow.
- Handle with care. Avoid moving oysters during extreme heat or cold.
- Track what's happening. Keep simple records of seed source, growth, survival, and unusual events like heat waves, heavy rain, or strange water conditions.
- Speak up. If you notice a lot of oysters dying, report it to VIMS early. It might not be disease,but it's worth checking.

SHELLFISH HEALTH & BIOSECURITY

SHELLFISH DISEASES - WHAT OYSTER GARDENERS NEED TO KNOW

SHELLFISH DISEASES IN VIRGINIA

Some shellfish diseases are common in Virginia, like Dermo and MSX in oysters, and QPX in clams. These are caused by parasites that only affect shellfish—not people. You can manage them with good practices like avoiding overcrowding and using disease-tolerant seed.

WHY BIOSECURITY MATTERS

Virginia doesn't have some of the more serious diseases found elsewhere, like:

- ROD (affects small oysters in the Northeast)
- Bonamia (seen in MA and NC)
- Oyster herpes virus (OsHV-1) and other emerging threats

To keep these out, it's important not to move shellfish from outside the region without proper checks.

- See Something Unusual? Report It Early - If you notice a die-off, report it right away to the VIMS Shellfish Pathology Lab. They'll investigate for free, but they need live samples to figure out what's going on.

Contact for advice and sample support: Karen Hudson, VIMS MAP. 804-684-7742

VIMS and VASG are partners is the* Regional Shellfish Seed Biosecurity Program*: rssbp.org

SHELLFISH HEALTH & BIOSECURITY

OYSTER GARDENERS: KEY PARTNERS IN DISEASE SURVEILLANCE

Oyster gardners play a critical role in protecting Virginia's shellfish populations. Because gardens are spread throughout tidal creeks along Virginia's coastline, they help create a natural network for spotting potential disease issues early. If you notice unusual mortality issues - report them.

WHAT'S "UNUSUAL" MORTALITY?

It's normal to lose a few oysters during grow-out. Sometimes, gear gets fouled or predators like blue crabs cause losses—that's unfortunate, but expected.

Unusual mortality is when you see a lot of dead or dying oysters and can't figure out why. That's when it's time to report it—it could be a sign of disease or a new environmental stressor.

HOW YOU CAN HELP

- Report unusual deaths as soon as you notice them.
- Share details about how your oysters are growing and surviving.
- Stay alert—your observations help us detect new threats early and protect the broader aquaculture community.

IMPORTANT OBSERVATIONS

- When did the problem occur, begin, or was noticed?
- What is the estimate percent mortality? (count live & dead in a sample of 100)
- What is known about the age(s) and stock(s)?
- When did you last handle them?
- Are there other stocks or sizes nearby that are NOT experiencing mortality?
- Did you notice algal blooms or rainfall events or anything else coinciding with mortality or growth reduction?

Contact for advice and sample support: Karen Hudson, VIMS MAP. 804-684-7742

Sample submissions: VIMS Shellfish Pathology Lab: Ryan Carnegie, 804-684-7713

SEED

CONSIDERATIONS WHEN BUYING OYSTER SEED FOR THE GARDEN

GETTING STARTED

Picking the right oyster seed doesn't have to be complicated. No matter what you choose, your oysters will help clean the water and create habitat for marine life. If you plan to eat your oysters, make sure your garden is in an approved harvest area. Refer to "Checking if your oyster garden is in a safe harvest area" fact sheet.

WHERE TO GET SEED

You might think to call a hatchery, but most don't sell small amounts. Instead, look for seed at oyster gardening events or local farmers markets from late spring through early fall. *Note - VIMS does not sell seed but rather operates a* **world-class oyster breeding program** *that supplies hatcheries with genetically improved stocks they can spawn to make seed.*

- Buy only what your garden can handle. Your permit allows up to 160 sq. ft. That tiny handful of seed will grow fast!

- Stay local - only buy seed from within the Chesapeake Bay to avoid introducing harmful diseases.

DIPLOID OR TRIPLOID?

Triploids are more common in Virginia because commercial farms use them. Diploids can be harder to find unless hatcheries are producing them in large quantities for other clients. Your best bet? Work with groups like the **Tidewater Oyster Gardeners Association** to get what you need.

- Diploids are the natural kind - they reproduce and are great for restoration
- Triploids don't reproduce so they have more energy to grow faster. They're ideal for eating, especially in the summer when diploids have poor meat quality.
- Can't decide? You can grow both!

STOCK: SELECTED VS. UNSELECTED

Oyster "stocks" (also called lines or strains) come from the native Chesapeake Bay oyster. Some have been selectively bred by **VIMS** for faster growth or better disease reseistance - these have names like Deby, Lola, or Henry. Others are unselected and come from local waterways, like "MB" Mobjack Bay.

- For restoration: Local, unselected stocks are preferred.
- Can't find them? No worries - any oyster you grow helps clean the water and support marine life.

SALINITY MATTERS

Try to match the salinity of your garden site with the seed's source - keep the difference under 8 ppt. Oysters are hardy but big salinity swings (especially with heat or handling) can stress or kill them.

SEED

HOW TO COUNT OYSTER SEED 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. If there is a mix of sizes - it's best to sieve the seed first.

Sieving seed is the process of using sieves (screens with specific mesh sizes) to separate and sort oyster seed (juvenile oysters that have recently attached to a surface) based on their size. This is an essential step in oyster aquaculture, particularly during the nursery phase before being planted in the field.

MATERIALS NEEDED

- Plastic cotainers of various sizes: 100 mls, 500 mls, 1 Liter
- Large table for working space

INSTRUCTIONS

- Put a pile of seed on a table.
- Scoop seed into the appropriate measuring container based on the size class (use chart below)
- Shake the container gently so seed is level with the top
- Dump the "sample" out of the container and count
- Repeat this 3 times, recording the count

Calculate the average seed count take an average of the 3 seed counts per measuring container volume (count 1 + count 2 + count 3) / 3 = average seed count

Calculate the number of seed per liter: multiply the average seed count by the count volume factor

Seed size-class	Measuring Container	Factor (count volume)
1/4 inch	100 mLs	10
1/2 inch	500 mLs	5
3/4 inch +	1,000 mLs or 1 L	1

Determine the total number of Liters of seed in the size class

* by measuring the total volume

Calculate the total number of oysters in that size class

* multiply the number of seed per Liter by the total number of liters

FREQUENTLY ASKED QUESTIONS

WHAT'S UP WITH THE "R" MONTH RULE?

The "R" month rule is a thing of the past - you can eat oysters year round thanks to aquaculture!

You might have heard advice to only eat oysters in months with an "R" (September - March). This was based on concerns over spoilage before there was adequate refrigeration and also because oysters spawn in the warmer summer months which leaves their flesh less desirable.

Oysters can be enjoyed year-round thanks to improved public health regulations but also oyster farming technology that offers a spawnless oyster, called a triploid, which maintains good flesh texture all-year round.

WHAT IS A TRIPLOID AND HOW ARE THEY PRODUCED FOR AQUACULTURE?

Let's start with the diploid- the natural state.

Diploids have two sets of chromosomes (one from each parent). We call diploid cells "2n" because they have two sets of chromosomes. During a special process called meiosis, gamete cells (sperm and egg) are created with half the chromosome number of the parent. So when the sperm and egg cell come together during fertilization, they create offspring with two sets of chromosomes again - 2n.

Triploid oysters have three sets of chromosomes ("3n") instead of the usual two. This is done by breeding a tetraploid male oyster (4n) with a diploid female oyster (2n).

- During meiosis, the male produces sperm with 2n chromosomes, and the female produces eggs with 1n.
- When they combine during fertilization, the result is a triploid oyster (3n).

Because triploids have an extra set of chromosomes, they don't reproduce well—they rarely produce gametes. This means they don't spend energy on spawning, so they can grow faster instead.

Tetraploid oysters have four sets of chromosomes ("4n"). There are a few different techniques but generally it involves two steps

- Find fertile triploid females - this is tricky because they are mostly sterile.
- Manipulate meiosis to stop the chromosome reduction in the egg by adding a chemical treatment
- Fertilize the egg (3n) with a normal diploid male

DO TRIPLOIDS TASTE DIFFERENT THAN DIPLOIDS?

Nope - the flavor profiles (referred to as "merrior") are influenced by the salinity and other aspects of the growing region. **Virginia aquaculture osyter regional flavor map.**

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With special thanks to all the partners who contributed to this educational content: VMRC, VDH Shellfish Safety, VIMS Shellfish Pathology Laboratory and the Aquaculture Genetics and Breeding Technology Center.

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