Aquaculture Resource Guide

“Economy, Employment, Environment”

Don Webster1, Steve Schneider2 and Chris Judy2
1University of Maryland Extension
2Maryland Department of Natural Resources, Aquaculture Division
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Aquaculture Resource Guide

Don Webster¹, Steve Schneider² and Chris Judy²
¹University of Maryland Extension
²Maryland Department of Natural Resources Aquaculture Division

This guide is intended to provide shellfish growers with information about obtaining seed, equipment, assistance, financing and other aspects for developing a successful shellfish aquaculture business. Modern shellfish farming has advanced rapidly in many areas of the world, bringing with it a need for quality larvae, seed, equipment and supplies. We have brought many sources together in this guide for quick reference. The guide will be updated as additional sources are identified and more businesses begin to supply the growing shellfish culture industry. Please feel free to contact the authors about your experiences from using this guide as well as adding other sources that may not currently be included.

Information is divided into several sections:
- Hatcheries and Nurseries, Page 1
- Equipment and Supplies, Page 6
- Agencies, Institutions and Organizations, Page 11
- Definitions, Page 28

HATCHERIES AND NURSERIES

The development of the commercial shellfish aquaculture industry has seen the development of hatchery technology, along with processes such as remote setting. This method of seed production has allowed hatcheries to concentrate on production of larvae which can be shipped overnight to locations far away for setting. The development of “superlines” of oysters has led to traits such as enhanced resistance to disease or superior meat quality. Triploidy provides oysters that do not spawn, allowing high quality meats throughout the summer when native oysters have become poor after reproducing.

Nurseries provide both spat on shell and cultchless seed for growers. While some growers operate their own nursery systems prior to planting, others purchase seed at the size at which it can be immediately deployed for growout. Another option is to set your own seed and plant it immediately after set.

Dealing with hatcheries or nurseries

If you are considering obtaining larvae or seed from a hatchery you would be advised to visit the operation prior to the purchase. You should tour the business, meet the owner or operator and establish a business relationship. Ask for the names of prior customers and check out their experiences with the business. Word of mouth provides an excellent source of information. Most hatcheries and nurseries also require a non-refundable deposit for your order to ensure that you pick up your seed on time. This keeps their business operating smoothly as well as yours. If you decide to deal with more than one hatchery or nursery you
should also plan on keeping at least subsamples of the products separated so that you can carry out growth comparisons to see which grow best for your location.

Larvae and seed shipped within the Chesapeake Bay region will not usually have problems with permits since the same diseases are prevalent in both states. However, it should be recognized that these procedures are in place to safeguard all oyster resources in the state. Growers should adhere to the permit requirements since they are important to the health of our bays.

The list of hatcheries and nurseries was provided by an annual report from Rutgers Cooperative Extension of Ocean County (NJ) and from personal communication with the Department of Natural Resources. These businesses are provided for informational purposes only. The Maryland Department of Natural Resources and the University of Maryland do not endorse or recommend any person or company. The user of this information should be prudent in their business practices and exercise diligence before committing funds for any purchase.

Maryland state law requires an Import Permit for oyster or clam larvae, seed, spat and shell prior to being brought across state lines. Import permit applications are available at: [http://www.dnr.state.md.us/fisheries/oysters/industry/aquaculture](http://www.dnr.state.md.us/fisheries/oysters/industry/aquaculture) or by calling the DNR Aquaculture Division, Becky Thur at 410-260-8252. Applications must be submitted at least 30 days prior to when you are expecting to import.

**PRODUCT CODES**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC</td>
<td>Hard Clam</td>
</tr>
<tr>
<td>OY</td>
<td>Eastern Oyster</td>
</tr>
<tr>
<td>N</td>
<td>Nursery</td>
</tr>
<tr>
<td>BS</td>
<td>Bay Scallop</td>
</tr>
<tr>
<td>PH</td>
<td>Private Hatchery</td>
</tr>
</tbody>
</table>

**Maryland**

**Gordon’s Shellfish LLC**

Contact: Steve Gordon  
4248 Bayside Road  
Snow Hill MD 21863  
410-726-1202  
steve@seaclam.com  
[http://www.lowershore.net/gordonsshellfish/consumer.htm](http://www.lowershore.net/gordonsshellfish/consumer.htm)

*Fig. 1 Steve Gordon readies hard clam seed for shipment to a grower*
Hooper Island Oyster Company  OY, N
Contact: Johnny Shockley
2500 Old House Point Road
Fishing Creek MD 21634
443-521-1635
Johnny@cgoysters.com
http://www.cgoysters.com

Johnny Oysterseed Co.  OY, N
Contact: John Farrington
5223 Williams Wharf Road
St. Leonard MD 20685
410-610-1508
johnyoysterseed@gmail.com
http://johnyoysterseed.com

Oyster Recovery Partnership  OY
Contact: Sarah Walker
1805A Virginia Street
Annapolis, MD 21401
410-990-4970
seed@oysterrecovery.org

Piney Point Aquaculture Center  OY, N
Contact: Stan Tomaszewski
17996 Piney Point Road
P.O. Box 150
Piney Point MD 20674
301-994-0241
stomaszewski@dnr.state.md.us

University of Maryland Horn Point Hatchery  OY, N
Contact: Stephanie Alexander
UMCES Horn Point Lab
P.O. Box 775
Cambridge MD 21613
410-221-8310
tobash@umces.edu
http://www.hpl.umces.edu/hatchery/

Shore Thing Shellfish, LLC.  OY, N
Contact Kevin Boyle
P.O. Box 74
Tall Timbers, MD 20690
240-338-3841
shorethingshellfish@gmail.com

Fig. 2 Johnny Oysterseed air powered upweller nursery system
Virginia
Bagwell Enterprises    HC
Contact: Yvonne Bagwell
Smith Beach Road
P.O. Box 508
Eastville, VA 23347
757-678-5806
757-678-7329 (fax)
clammom@gmail.com

Bay Watch Oyster Seeds, LLC    OY, N
Contact: Keith Rodgers
P.O. Box 535
271 Bay Watch Lane
Reedville, VA 22539
804-453-4367
baywatchoysterseeds@nnwifi.com
www.baywatchoysterseeds.com

Broadwater Seafood    HC, OY
Contact Jimmy Kelly
P. O. Box 322
Nassawadox, VA 23413
757-710-0353
broadwaterseafood@yahoo.com

Cherrystone Aquafarms    HC, OY, PH
Contact: Tim Rapine
P.O. Box 347
Cheriton, VA 23316
757-331-1208
timr@littleneck.com
http://www.clamandoyster.com

Chincoteague Shellfish Farms    HC
Contact: Mike McGee
P.O. Box 576
Chincoteague, VA 23336
757-336-1985
757-336-6900 (fax)
chincoteagueshellfishfarms@verizon.net

Fig. 4 Bottom cage grown triploid oyster seed
JC Walker Brothers   HC, OY, BS, PH
Contact: Tom & Wade Walker/Ann Gallivan
P.O. Box 10
Willis Wharf, VA 23486
757-442-6000
757-442-7059 (fax)
seasideclams@gmail.com
www.jcwalkerbrothersclams.com

KCB Oyster Holdings, LLC   OY, PH
Contact: A.J. Erskine/Liz Walker
755 Lake Landing Drive
Lottsburg, VA 22511
804-529-6654
804-529-7374 (fax)
ajerskine@bevansoyster.com

Oyster Seed Holdings, LLC   OY, PH
Contact: Michael Congrove
PO Box 397
Grimstead, VA 23064
804-725-3046
804-725-3047 (fax)
msc@oysterseedholdings.com
www.oysterseedholdings.com

Shooting Point Oyster Company   OY, N
Contact: Tom Gallivan
5456 Bayford Road
Franktown, VA 23354
757-693-1303 (boat)
757-414-0295 (fax)
tom@shootingpointoysters.com
www.shootingpointoysters.com

Tarkill Aquaculture Ventures, LLC   OY, N
Contact: Bob Boardman
PO Box 94
Onancock, VA 23417
757-894-2009
www.tarkillaquacultureventures.com

Toms Cove Aquafarms   HC, OY
Contact: Tommy Clark
PO Box 355, Chincoteague Island, VA
757-336-1945
http://www.tomscoive.net

Fig. 5 Paddlewheel floating upweller provides nutrient–rich water to oyster seed for efficient growth

Fig. 6 Downweller with microcultch for production of "cultchless" oyster seed
EQUIPMENT AND SUPPLIES
There are many methods of raising shellfish. Traditional production in Maryland was by bottom culture, but newer ideas have developed over the years to include various types of containment gear to protect the animals from predation. Aquaculture uses many of the same supplies as commercial fishing businesses while also relying on a variety of other gear to raise shellfish. These include downweller and upweller nursery equipment, bottom cages, surface floats, bag material for containing cultch and nets for protecting seed. A number of companies have begun to produce gear for the Chesapeake region.

Maryland
Atlantic Pressure Washers
Contact: Jeff Paulding
1708 Whitehead Road
Baltimore, MD 21207
410-944-5566
admin@atlanticpressurewashers.com
http://www.atlanticpressurewashers.com/home.php
Products: pressure washers; cleaning fluids

Captain Bruce’s Crabbing Supplies
Contact: Captain Bruce
22 Theresa Lane
North East, MD 21901
410-287-6315
Captainbruce53@aol.com
http://www.stackablecrabtraps.com/
Products: commercial fishing supplies

D.O. Baker
Contact: D.O. Baker
Brooms Island, MD 20615
410-591-0361
Products: oyster cages, long line spat cages

Fig. 7 Bottom cages hold shellfish during growout to provide protection and can be used with or without growout bags. They are available in a variety of sizes.
First State Packaging
Contact: Tim Campbell
P.O. Box 3037
511 Naylor Mill Road
Salisbury, MD 21801
410-546-1008
http://www.firststatepackaging.com/index.shtml
Products: boxes; packaging products; trucking; warehousing

Harrington Graphics and Screen
116 Broad Street
Berlin, MD 21811
410-641-1986
chris@hgands.com
http://hgands.com/hgands.html
Products: promotional materials; screen printed shirts

Hooper Island Oyster Company
Contact: Johnny Shockley
2500 Old House Point Road
Fishing Creek, MD 21634
443-521-1635
Johnny@cgoysters.com
http://www.cgoysters.com
Products: oyster cages; tools; cage materials; fabrication of upwellers and downwellers, oyster grader & sorters; custom building/modification of fiberglass boats for shellfish farming

Johnny Oyster Seed Co.
Contact: Jon Farrington
5223 Williams Wharf Road
St. Leonard, MD 20685
410-610-1508
johnnyoysterseed@gmail.com
http://johnnyoysterseed.com
Products: “Revolution” self-maintaining Buoyant Oyster Cultivation System (BOCS); oyster cages; barge service; consulting

Fig. 8 Hooper Island Oyster Company specialized aquaculture vessel fabrication services
Tenax Corporation
4800 East Monument Street
Baltimore, Maryland 21205
410-222-7000
800-356-8495
410-522-7015 (fax)
www.tenaxus.com
Products: plastic netting products; packaging; tubular nets; geotextiles; filtration material

Victory Packaging
Contact: Cheryl Schwabline
134900 Charwood Ct
Hanover, MD 21976
800-790-8457
http://www.victorypackaging.com
Products: packaging and shipping supplies

Virginia
Captain Tom's Oyster Floats
P.O. Box 367
Onancock, VA 23417
757-710-0279
http://www.oystergardening.com/
Products: oyster bags; small-scale oyster floats; lines; gloves; knives

Chesapeake Bay Oyster Company
Contact: Jon Quigley
P.O. Box 96
Wake, VA, 23176
804-338-6530
804-776-0703 (fax)
sales@bayoyster.com
http://www.bayoyster.com/
Products: wire, oyster cages, oyster bags, floats; tools; grader/sorter; conveyors, upwellers

Other States
Aquatic Eco-systems
2395 Apopka Blvd.
Apopka, FL 32703
877-347-4788
http://www.aquaticeco.com
Products: wide range of aquaculture supplies and equipment

Fig. 9 Plastic oyster bags come in a variety of mesh sizes. Oysters should be transferred to the largest mesh size that will hold them to maximize water flow and food supply to the shellfish.
Coastal Aquaculture Supply  
Contact: Brian Bowes  
100 Glen Road, PO Box 8066  
Cranston, RI 02920  
401-467-9370  
bbowes@plasticpipesupply.com  
www://coastalaquacultural.com  
Products: aquaculture growout equipment and supplies; pipe & accessories

Flexabar Corporation  
Contact: Andy Guglielmo  
1969 Rutgers University Boulevard  
Lakewood, NJ 08701  
Andy@flexabar.com  
http://www.flexabar-corporation.com/  
732-901-6500  
732-901-6504 (fax)  
Products: specialty marine coatings; water based antifouling

Hamilton Marine  
155 East Main Street  
Searsport ME 04974  
207-548-6302  
207-548-0481 (fax)  
800-639-2715 (order line)  
http://www.hamiltonmarine.com/  
Products: wide range of commercial fishing supplies; personal protective equipment

Ketcham Traps  
Contact: Myron Horzesky  
111 Myrtle Street  
New Bedford, MA 02740  
(508) 997-4787  
www.Lobstering.com  
Products: trap fabrication; construction materials

Memphis Net and Twine  
P.O. Box 80331  
2481 Matthews Avenue  
Memphis, TN 38108  
888-674-7638  
fishinfo@memphisnet.net  
http://www.memphisnet.net/  
Products: commercial fishing supplies; aquaculture supplies; tools; knives; personal protection gear

Fig. 10 Floats come in a variety of sizes and shapes. They may contain mesh baskets for seed containers or have bags fastened across the flotation collar.
New Bedford Ship Supply Co., Inc.
108 Front Street
New Bedford MA 02740
508-994-2961
Products: commercial fishing supplies; personal protection gear; knives

New River Nets
140 Charles Creek Road
Sneads Ferry, NC 28460
910-327-1231
910-327-3136 (fax)
sales@newrivernets.com
http://www.newrivernets.com/
Products: commercial fishing supplies; personal protection gear; knives

Nylon Net Company
PO Box 592
1340 Farmville Road
Memphis, TN 38122
800-238-7529
901-526-6538 (fax)
nylonnet@nylonnet.com
http://www.nylonnet.com/
Products: commercial fishing supplies; aquaculture supplies; tools; knives; personal protection gear

Sea Gear Marine Supply
Contact: Charles Barto
Route 109 and 4th Ave
Cape May, NJ 08204
609-884-2711
609-884-8467 (fax)
425-3511 (cell)
info@seagearmarine.com
http://www.seagearmarine.com
Products: commercial fishing supplies; personal protection gear

Figure 11 Remote setting systems require pumps and aeration for proper operation.

Figure 12 Plastic mesh shell bags are a standard for oyster seed production.
AGENCIES, INSTITUTIONS AND ORGANIZATIONS
Many state and federal agencies and organizations can assist you with your shellfish aquaculture business. Some are involved in permitting while others provide various types of assistance for industry development. We list them in this section by alphabetical headings with a statement of what they do and contact information by the following groupings:

- Advisory Groups
- Business Assistance
- Education and Training
- Federal Agencies
- Financing
- Grants, Research and Development
- Industry Associations
- Non-Governmental Organizations
- Permitting
- Protection and Enforcement
- Regulatory
Advisory Groups

Aquaculture Review Board
The Aquaculture Review Board (ARB) is comprised of state and federal agency representatives who are charged with responsibility for aquaculture permitting or compliance oversight. The ARB meets monthly to review and track applications to ensure that they continue to progress and that the applicant is fully informed during the process (Code Natural Resources Article, sec. 4-11A-03.1).

Another important feature of the ARB is the pre-application hearing. Individuals may schedule attendance at an ARB meeting to present concepts and ideas about aquaculture plans they are developing and discuss these with Board members. Potential conflicts or problems can be identified and rectified prior to the application being submitted. The goal is to provide the applicant with an easy path through the permitting process.

The ARB is chaired by the Department of Natural Resources Aquaculture Division Director and includes one representative each from the Department of Agriculture; the Department of the Environment; the Department of Health and Mental Hygiene; and the Department of Natural Resources. The National Marine Fisheries Service and the US Army Corps of Engineers may each have a representative on the Board. On matters involving navigation (i.e. lease marking, etc.) the US Coast Guard may also be represented. Current members of the ARB include:

- **Department of Natural Resources**: Karl Roscher, Chair
- **Department of Agriculture**: vacancy
- **Department of the Environment**: Kathy L. Brohawn
- **Department of Health & Mental Hygiene**: Erin Butler
- **National Marine Fisheries Service**: John Nichols
- **U.S. Army Corps of Engineers Baltimore District**: Woody Francis

Information: Karl Roscher, DNR; phone: 410-260-8313; email: KRoscher@dnr.state.md.us

Aquaculture Coordinating Council
The Council (ACC) was created in 2005 by the General Assembly to provide guidance and leadership for advancing all types and species of Maryland aquaculture (Annotated Code of Maryland 4-11A-03.2). Specific responsibilities include fee structures, policy initiatives, market tests, pilot projects and Best Management Practices. The Council was consulted on changes to the state leasing program during its revision in 2009 and is charged with periodically reviewing and recommending changes to all laws and regulations affecting aquaculture. The Council often uses workgroups to investigate and report on issues. These incorporate the expertise of the members as well as outside experts. The ACC produces an annual report for the Governor and legislature on recommendations industry improvement.

The Council meets bi-monthly (January, March, May, July, September and November) on the second Thursday at 6:30 pm at the Department of Natural Resources in Annapolis. Guests are encouraged to attend and time is allotted on the agenda for public input.
Membership of the Council is designated by law. Current members are:

- **University of Maryland Extension**, Donald Webster, Chair
- **Tidal Fish License**, Andrew Buck, Vice-chairman
- **Tidal Fish License**, Craig Mask
- **Tidal Fish License**, Johnny Shockley
- **Aquaculture Industry**, Don Flax
- **Aquaculture Industry**, Jon Farrington
- **Aquaculture Industry**, Terry Witt
- **Maryland Senate**: Katherine Klausmeier
- **Maryland House of Delegates**: Anthony O'Donnell
- **Department of Agriculture**: Joanna Kille
- **Department of Business & Economic Development**: Stacy Kubofcik
- **Department of the Environment**: Kathy Brohawn
- **Department of Health & Mental Hygiene**: Erin Butler
- **Natural Resources Police**: Charles Vernon
- **Department of Natural Resources**: Karl Roscher, Coordinator
- **University of Maryland, College Park**: Reginal Harrell, Ph.D.
- **University of Maryland Center for Environmental Science**: Andrew Lazur, Ph.D.

Information on Council activities including upcoming meetings and summaries of prior meetings (after approval at the following meeting) may be obtained at: [http://www.dnr.state.md.us/fisheries/management/?com=acc](http://www.dnr.state.md.us/fisheries/management/?com=acc)

**Information:** Karl Roscher: phone: 410-260-8313; email: kroscher@dnr.state.md.us

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Figure 14 Aquaculture Coordinating Council members, January 2013 (L to R) Don Webster, Chair, Karl Roscher, Sen. Kathy Klausmeier, Del. Tony O'Donnell, Jon Farrington, Don Flax, Andy Lazur, Erin Butler, Craig Mask, Kathy Brohawn, Johnny Shockley, Andy Buck, Vice-chair, Mindie Burgoyne, Joanna Kille, Terry Witt (not shown Charles Vernon, Reggie Harrell)
Oyster Advisory Commission
The Oyster Advisory Commission was authorized by legislation in 2007 to advise the Department of Natural Resources on matters related to oysters in the Chesapeake and coastal bays. It comments on strategies for rebuilding and managing oyster populations under the Chesapeake Bay Oyster Management Plan including strategies for rebuilding and managing oyster populations. One of the first tasks of the Commission was to review findings of the Environmental Impact Statement on native and non-native oysters as alternatives to restoration. Twenty-one commissioners were first appointed by the Secretary of DNR in September 2007 with the current OAC including twenty-three. These included scientists, businesspersons, anglers, commercial harvesters, economists, environmental advocates and elected officials. (ACM Natural Resources Articles 1-102, 1-105, 1-104)

The Commission meets three times annually (February, June and October) at a variety of locations. All meetings are open with times provided for public comment.

Current members of the OAC include:
- Tony Chatwin, National Fish and Wildlife Foundation, Chair
- Don Boesch, University of Maryland Center for Environmental Science
- Mark Bryer, The Nature Conservancy
- Kelton Clark, Morgan State University Estuarine Research Center
- Senator Richard Colburn, Maryland Senate
- Kelley Cox, Phillips Wharf Environmental Center
- Bill Goldsborough, Chesapeake Bay Foundation
- Douglas Legum, Real Estate Developer
- Ken Lewis, Maryland Coastal Conservation Association
- Doug Lipton, University of Maryland Sea Grant Program
- Donald Meritt, UM Center for Environmental Science, HPL
- Honorable Tony O'Donnell, Maryland House of Delegates
- Claire O'Neill, U.S. Army Corps of Engineers
- Ben Parks, Maryland Watermen's Association
- Bill Richkus, Versar Inc.
- Peyton Robertson, National Oceanic and Atmospheric Administration
- Shane Robinson, Maryland House of Delegates
- Eric Schott, UM Center for Environmental Science, IMET
- Evan Thalenberg, Chesapeake Bay Savers
- Don Webster, University of Maryland Extension
- Bill Windley, Maryland Saltwater Sportfishermen's Association
- Walter (Robbie) Witt, Commercial Waterman
- Len Zuza, Southern Maryland Oyster Cultivation Society

Commission information including agenda for the upcoming meeting and summaries of past meetings may be obtained at: http://www.dnr.state.md.us/fisheries/management/?com=oac

Information: Eric Weissberger: phone: 410-260-8344; email: eweissberger@dnr.state.md.us
**Business Assistance**

**Maryland Department of Business and Economic Development (DBED)**

DBED provides a variety of support services for new and existing businesses. Employees are available for individual consultation and agency web topics include easy-to-navigate modules on writing business plans, obtaining assistance from their Small Business Development Centers, developing legal structures for a business, selecting a name and providing access to capital for financing.

Information listed under *Business Resources* includes product development assistance, and recruitment & training. Links to funding agencies are provided through the *Start a Business* link. These lead to pages such as Agriculture Loan Programs from state and federal sources. Aquaculture is considered agriculture by the US Department of Agriculture and other federal agencies that can help your business grow.

Small Business Development Centers (SBDC) offer counseling and training to solve organizational, financial, marketing, technical and regulatory problems. They are located at:

- **SBDC Headquarters, University of Maryland**
  301-403-8300 or 877-787-7232
- **Capital Region SBDC, University of Maryland**
  301-403-0501 or 877-787-7232
  Serving Prince George’s and Montgomery counties
- **Central Maryland SBDC, University of Baltimore**
  410-837-4928 or 877-421-0830
  Serving Baltimore City Baltimore, Anne Arundel and Howard counties
- **Eastern Region SBDC, Salisbury State University**
  410-548-4419 of 800-999-7232
  Serving the Eastern Shore from Kent to Worcester counties
- **Northern Region SBDC, Harford Community College**
  443-412-2237 or 866-836-6288
  Serving Harford, Carroll and Cecil counties
- **Southern Maryland SBDC**
  301-934-7583
  Serving St. Mary’s, Calvert and Charles counties

Regional offices are available throughout the state with employees who can meet with you to help develop a new business, help you become more profitable in existing ones or lead to expansion of current enterprises.

Website available: [http://www.choosemaryland.org/](http://www.choosemaryland.org/)

*Figure 15 New businesses build economic growth*
Education

University of Maryland Extension (UME)

Extension provides technical training and outreach services to the aquaculture industry through off-campus, non-credit, continuing education programs. UME is currently providing training through the Oyster Aquaculture Education & Training Program funded by NOAA and the Maryland DNR. The project provides regional workshops, gear demonstrations, individual assistance and statewide conferences for building the aquaculture industry. Print and electronic information supporting the educational mission is available on the UME website. For assistance or program information contact:

Faculty:
- Don Webster, Wye Research and Education Center, Queenstown; general aquaculture information and assistance; training program schedule and registration; 410-827-8056 (office); 410-310-7191 (cell); email: dwebster@umd.edu
- Don Meritt, Horn Point Oyster Hatchery, Cambridge; hatchery, nursery and growout operations; remote setting system design and management; 410-221-8475 (office); email: dmeritt@umces.edu
- Matt Parker, Anne Arundel County Extension Office, Gambrills; business development and management; finance assistance; 410-222-3906 (office); email: mparke11@umd.edu
- Shannon Dill, Talbot County Extension Office, Easton; business development and management; finance assistance; marketing; 410-822-1244 (office); email: sdill@umd.edu

Among the publications available from UM Extension as part of the Oyster Aquaculture Education & Training Program are:
- Production Systems – an explanation of the various types of culture gear that can be used to grow oysters
- Remote Setting Systems – how to design and operate a setting system for the production of seed oysters
- Setting System Economic Analysis – determining the cost of producing seed in setting systems
- Bottom Culture Cost and Return – determining profit and loss in developing a bottom culture operation using a Submerged Land Lease
- Stabilizing Oyster Bottom – methods of assessing bottom types and calculating cultch deposition for developing a Submerged Land Lease

Website: http://extension.umd.edu/aquaculture
UMCES Horn Point Lab (HPL)
The Horn Point Lab, located near Cambridge on the Eastern Shore, is the site of one of the largest oyster hatcheries on the East Coast. The hatchery staff is involved in large-scale restoration projects as well as support for development of the shellfish aquaculture industry. Many of the educational programs designed to rebuild the oyster resource and industry are organized and conducted jointly between HPL, UME and other agencies and organizations including the Oyster Recovery Partnership (ORP) and Maryland Department of Natural Resources. In recent years the HPL Hatchery has provided training facilities for the annual Oyster Hatchery Short Course conducted in June, as well as workshops on Remote Setting and lease management. The facilities make it ideal for such programs.

The hatchery produces billions of oyster larvae and sets many of them as spat on shell for planting on natural reefs, sanctuaries and commercial production areas. They offer a range of products for commercial aquaculture including larvae, cultchless seed and spat on shell. These may be purchased as native oysters, selected lines or triploids, depending upon the intended use. The ORP operates a field station at HPL that conducts the large-scale cultch handling required for production. HPL includes the hatchery as well as many setting tanks used in the operation.

The HPL Hatchery operates an excellent website with information about the life cycle of the oyster, hatchery facilities and operations, production figures, and many photos. Tours are available during the spawning season, which runs from March through September. Tour groups can see oysters spawn, oyster larvae, and view the working of this production facility. Tours are open to all ages and usually last 30-60 minutes. In addition to general HPL lab tours offered twice weekly during summer, group tours of the hatchery may be scheduled by advance appointment.

The Remote Setting Training (RST) program is conducted as a joint project with ORP. Setting tanks are located in many areas around the bay and are available to leaseholders in two-week periods from June until the end of August. Growers are responsible for obtaining clean, aged and containerized shell and carrying out the labor to move it and clean the system at the end of the setting period. Larvae and technical assistance is provided free as part of the RST program, as well as follow-up visits by staff to determine setting success.

Tour contact: Stephanie Alexander, tobash@hpl.umces.edu; phone 410-221-8310
Remote Setting information and scheduling contact: remotesetting@umces.edu; Steven Weschler, 301-704-0737 (cell); sweschler@umces.edu or Alan Roache, 410-713-2517 (cell); aroache@umces.edu

Website: http://www.hpl.umces.edu/hatchery/
Federal Agencies

National Oceanic and Atmospheric Administration (NOAA)
This federal agency provides a wide range of services including weather, fisheries management, coastal management and marine commerce. Two offices provide services to support shellfish aquaculture in the Chesapeake and coastal bays.

Aquaculture Office
This office fosters marine aquaculture that creates employment and business development in coastal communities leading to safe and sustainable seafood. The group recognizes that aquaculture is one of a range of technologies needed to meet increasing global demand for seafood, support commercial and recreational fisheries, and restore species and marine habitat.

The Aquaculture Office helps with permitting issues, especially though the complicated layers of federal regulations and complex application, review and approval processes. The goal is to develop shellfish aquaculture while conserving living marine resources. The Office also oversees grant programs in aquaculture which are announced periodically.

The principal Aquaculture Office is located at NOAA headquarters in Silver Spring, MD with their staff of nine. The Regional Coordinator is located at the Northeast Regional Office in Gloucester, MA. His contact information is:

Contact: Dave Alves, 978-281-9210 (office); email: David.Alves@noaa.gov

Website information is available at: http://www.nero.noaa.gov/ob/aquaculture/

Chesapeake Bay Office
The CBO is located in Annapolis and assigned the role of working to protect and restore coastal and marine habitat. The staff has been involved with restoration and commercial aquaculture for many years. The office has funded several projects leading to expansion of commercial shellfish aquaculture including partnering with state agencies and institutions as a member of the “Oyster Team” working to rebuild the oyster industry in Maryland and Virginia. A recent project is the development of an Oyster Data Tool that can aid in providing locations to develop leases for shellfish production.

The NOAA CBO has recently been charged with broad new goals to advance programs that will protect and restore the Bay. They will be focusing on four key areas: Fisheries; Habitats; Observations; and Education. The CBO is organized in three primary programs: Ecosystem Science, Coastal and Living Marine Resources, and Environmental Literacy.

Contact: Peter Bergstrom, 410-267-5665; email: Peter.Bergstrom@noaa.gov

Website is available at: http://chesapeakebay.noaa.gov/
Financing

Maryland Agriculture and Resource Based Industries Development Corporation
MARBIDCO is an agricultural lending agency that administers funds specifically dedicated to developing shellfish aquaculture. They have partnered with the Maryland Department of Natural Resources to provide affordable financing to watermen and others starting or expanding shellfish aquaculture businesses. University of Maryland Extension contributes to the programs by providing training and individual assistance in developing applications. The following loan programs operated by MARBIDCO are available to growers, although some require the applicant to hold a Tidal Fish License (TFL) due to the nature of the funds.

Maryland Shellfish Aquaculture Loan Program
Eligible Expenses: Items including substrate (e.g., shell), seed (or larvae) and capital equipment (equipment with a 15-year life expectancy. On-bottom and water column (i.e., cages or floats) projects are eligible for funding. Purchase of motor vehicles, including boats and trucks, are not eligible under this program.
Minimum/Maximum Loan Amounts: $5,000 to $100,000
Loan Terms: During the first 1 to 3 years quarterly interest-only payments of 3% APR are required; afterwards, regular amortizing payments are due with 40% of principal forgiven for borrowers in good standing for making their required interest payments. Borrowers not in good standing will be required to repay the entire amount of the original loan.
Loan Interest Rate: 5% APR maximum
Equity: At least 10% of loan amount (ownership of a commercial workboat may apply).
Credit history: Credit bureau score of at least 620; no bankruptcy within past seven years.
Requirements: 1) applicants must hold a current lease or have applied for one; 2) must demonstrate that production will begin in 2013. For loans that include seed (or larvae) at least one applicant must hold a TFL.

Maryland Remote Setting Shellfish Aquaculture Loan Program
Eligible Expenses: Items related to commercial remote setting projects, with approved business plans, to raise oysters or clams in Maryland including larvae, shell (culch), tanks, pumps, blowers, heaters and plumbing.
Minimum/Maximum Loan Amounts: $5,000 to $30,000
Loan Terms: $5,000 - $15,000 (5 years); and $15,001 - $30,000 (6 years) - first year interest-only
Loan Interest Rate: 5% APR
Loan Application Fee: None
Security: Cash Collateral of 15% is needed (and can be financed)
Requirements: At least one of the applicants must hold a TFL.

Contact: Steve McHenry; 410-267-6807 (office); email: smchenry@marbidco.org

Website is available at: http://www.marbidco.org/home.html
USDA Natural Resources Conservation Service
NRCS operates the **Oyster Bed Restoration and Management** program as part of their Environmental Quality Improvement Program (EQIP). They provide financial and technical assistance to applicants to restore oyster beds in approved restoration sites in the Maryland Chesapeake Bay Watershed. The program supports four conservation practice options for oyster habitat restoration and NRCS works with you to determine which best suits your objectives.

For all options, NRCS requires establishing an oyster or clam shell base (bed) of at least 2 inches thickness.

**Option 1:** Dredge existing shell with to reclaim shell and allow natural spat to set. This practice is limited to areas identified as having frequent natural sets. These include parts of the St. Mary’s River, Honga River, Fishing Bay, Manokin River, and the area between South Marsh Island and Smith Island.

**Option 2:** Dredge to establish 2 inch shell bed and plant with spat on cultch. These spat may be purchased or produced by remote setting.

**Option 3:** Dredge 1 inch of shell base and purchase an additional 1 inch to establish a minimum 2 inch thick bed which will then be seeded with spat on shell which may be purchased or produced by remote setting. This option provides flexibility where available shell available is limited. Clam shell may be substituted.

**Option 4:** On hard bottom 2 inches of shell can be placed to establish a bed. The shell bed is seeded with spat on cultch which may be purchased or produced by remote setting. Clam shell may be used for bottom placement.

Participants can perform their own dredging or select a dredge operator from the Oyster Recovery Partnership list of qualified operators. Where seeding oysters is required, NRCS requires a minimum of 70% of contracted areas be seeded with native oysters capable of reproduction (i.e. diploids). The remaining 30% of the area may be seeded with triploid native oysters. Individuals setting spat by remote setting must have had training or be able to demonstrate successful use of the technique.

**NRCS Offices in Oyster Producing Counties:**
- **NRCS MARYLAND STATE OFFICE,** Annapolis; 410-757-0861
- **CHARLES,** La Plata; 301-934-9588
- **ST. MARY’S,** Leonardtown; 301-475-8402
- **CALVERT,** Prince Frederick; 410-535-1521
- **ANNE ARUNDEL,** Annapolis; 410-571-6757
- **BALTIMORE,** Cockeysville; 410-527-1920
- **KENT,** Chestertown; 410-778-5353
- **QUEEN ANNE’S,** Centreville; 410-758-1671
- **TALBOT,** Easton; 410-822-1577
- **DORCHESTER,** Cambridge; 410-228-5640
- **WICOMICO,** Salisbury; 410-546-4777
- **SOMERSET,** Princess Anne; 410-651-0370
- **WORCESTER,** Snow Hill; 410-632-5439
US Small Business Administration
SBA was founded in 1953 to provide services to small businesses. It provides a range of assistance to those seeking to go into business. While there are a few loan programs, SBA does provide guarantees to local banks. They also offer a wide range of other assistance such as help in developing business plans and managing your operation. Offices offer accessible service at the local and regional level.

The Service Corps of Retired Executives (SCORE) provides experienced business professionals who provide services to those seeking to manage their operations better. SCORE has offices in many local areas. These can be accessed from the SBA website.

Contact: Stephen D. Umberger, District Director, Baltimore District Office, City Crescent Building, 6th Floor 10 South, Baltimore MD 21201; phone: 410-962-6195

Website information: http://www.sba.gov/

USDA Rural Development
US Department of Agriculture Rural Development improves the economy and quality of life in rural America through programs that support loans through banks, credit unions and community-managed lending pools. We offer technical assistance and information to agricultural producers and cooperatives to start and improve operational effectiveness.

USDA Rural Development administers loans, loan guarantees and grants through their programs by helping rural individuals, communities and businesses get the financial and technical assistance needed to address rural needs. Since most shellfish aquaculture businesses are located in areas deemed by USDA to be rural, this agency may provide means to obtain assistance in building new processing and other capacity to rebuild the industry and provide economic growth and additional employment in those locations.

Some programs operated by Rural Development include:
- Business Loans and Grants – partnering with private lenders and community-based organizations for financial assistance
- Cooperative Grants and Other Programs – for use of cooperatives in ag marketing and distributing ag products
- Community and Economic Development Programs – initiatives that promote self-sustaining, long-term economic and regional development in rural areas

Contact: Kathy Beisner, Acting State Director (Delaware/Maryland), Dover DE; phone: 302-857-3580

Website information at: www.rurdev.usda.gov/md
Grants, Research and Development

Maryland Industrial Partnerships (MIPS)
This program accelerates commercialization of technology by jointly funding Research and Development projects between companies and University System of Maryland faculty. MIPS funds are matched by participating companies for university-based research projects to develop new products. MIPS projects help companies find solutions to technical challenges, and develop products, processes or training materials. MIPS projects are conducted by university faculty and graduate students in conjunction with company researchers.

MIPS has a long history of involvement in aquaculture projects and some of our leading producers have benefitted from work carried out through these projects. These have included development of shellfish nursery systems and processes for value-added production practices for high quality oysters. MIPS projects are attractive because of the two-round funding cycle during the year. The maximum award for a single project is $100,000 per year for large and small companies and $90,000 for start-up firms.

Staff members suggest that you meet with them prior to developing your project to the proposal stage so that they can become familiar with your needs. They can advise you on proposal planning as well as assist you with submitting your application and identifying researchers for the project.

Staff:
- Dr. Martha Connolly, Director; phone: 301-405-3892; email: marthac@umd.edu
- Joseph Naft, Associate Director; phone: 301-405-3886; email: jnaft@umd.edu
- Ronnie Gist, Manager; phone: 301-405-3890; email: rgist@umd.edu
- Cherrie Hughes, Manager; phone: 301-405-6673; email: cherrie@umd.edu

General contact: Maryland Industrial Partnerships (MIPS), 2100 Potomac Building, University of Maryland, College Park MD 20742; phone: 301-405-3891

Website information is at: http://www.mtech.umd.edu/mips/index.php

Northeastern Regional Aquaculture Center (NRAC)
The Regional Aquaculture Center (RAC) program was established by Congress and is administered by the US Department of Agriculture. The Northeast RAC is located at the University of Maryland. The Center carries out research and education to enhance the region’s aquaculture industry. Research priorities are developed by a Technical and Industry Advisory Committee made up of representatives of the thirteen states in the region, who also provide service in reviewing proposals for project relevance and guiding the overall pathway for research and outreach through the Center activities.
NRAC has carried out many projects dealing with shellfish industry in the region and provides a range of technical publications on its website. These include information on many types of shellfish as well as annual reports and research documents.

Contact: Dr. Reginal Harrell; phone: 301-405-6511; email rharrell@umd.edu or Sharon Adams; phone: 301-405-6917; email ssadams@umd.edu

Website information is at: http://www.nrac.umd.edu/

Industry Associations

East Coast Shellfish Growers Association (ECSGA)
The ECSGA represents over 1,000 shellfish farmers from Maine to Florida. The Association informs policy makers and regulators about the needs of the shellfish community to protect businesses and a way of life for this environmentally helpful industry. The group especially provides input to federal issues that affect local shellfish farmers and organizes an annual “Walk on the Hill” to visit congressional offices in cooperation with other regional shellfish associations on the Pacific and Gulf coasts.

There are many useful links on the ECSGA website that provide information on subjects of interest to those growing and marketing shellfish. The Association also provides an informative newsletter to members as well as a useful listserv providing timely information to the industry. They have recently completed a publication on Best Management Practices for East Coast Shellfish Farmers through NRAC funding. The project included meetings with growers in many states and thorough review prior to publication. Industry member dues are based on gross annual sales as well as other member classifications that are non-voting. The Board of Directors represents all states on the East Coast.

Contacts: Bob Rheault, Executive Director, phone: 401-783-3360; email: Bob@ecsga.org
Johnny Shockley, Maryland Director, phone: 443-521-1635; email: johnny@cgoysters.com

Maryland Farm Bureau
The Farm Bureau is a national organization that promotes agriculture and rural life. Individual county associations are part of the state which, in turn, is part of the national group. Members may bring up issues that are debated and voted on at state and national conventions. The Farm Bureau is effective at lobbying and provides members with information on issues affecting them. It also offers a range of benefits such as discounts on equipment, insurance, product and services.

Advisory groups at the national level provide the organization with the best possible input from those in the business. Maryland has previously been represented on Farm Bureau advisory boards by shellfish growers and the Bureau has been a supporter of aquaculture as another component of the agriculture industry. Member applications are provided through the state website.

Website: http://www.mdfarmbureau.com/index.asp
Southern Maryland Oyster Growers Association (SMOGA)
A recent organization that represents oyster growers in the Southern Maryland area, from Anne Arundel through Charles counties, has become active in supporting industry growth in that region. The group meets to discuss issues pertaining to shellfish culture in their area including leases, other permitting, protection and marketing. The Association regularly provides recommendations for outreach programs and statewide conferences.

Contact: Brian Russell, Chairman; phone: 240-538-1336; email: btr1286@verizon.net

Non-Governmental Organizations

Oyster Recovery Partnership (ORP)
ORP is a leading nonprofit organization dedicated to restoring oysters in Chesapeake Bay. Public and private sources fund projects for restoration and commercial production. ORP is a partner in the Remote Setting Training (RST) project with a field station at Horn Point Lab that carries out cultch processing and handling in conjunction for hatchery planting on projects. Funding agencies include NOAA, the US Army Corps of Engineers and Maryland Department of Natural Resources. ORP works with Horn Point for larvae and seed sales. Larvae can be picked up at the hatchery or shipped via FedEx. There is a minimum order of $500 by cash, check or credit card (3% service fee for card purchases). Orders should be made ahead of when they are needed and a 50% deposit is required for quantities exceeding 50,000 seed/spat or 5 million larvae. Large orders often involve custom spawning. If the order is cancelled, the deposit may be forfeited. Disease resistant lines and/or triploids require planning for the hatchery. Advance orders are necessary to ensure they can be fulfilled.

Current 2013 prices:

<table>
<thead>
<tr>
<th></th>
<th>Diploid Wild</th>
<th>Diploid (DR*)</th>
<th>Triploid (DR*)</th>
</tr>
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<tbody>
<tr>
<td>Eyed larvae (per million)</td>
<td>$210</td>
<td>$260</td>
<td>$295</td>
</tr>
<tr>
<td>Cultchless Oyster Seed (per thousand)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;5 mm</td>
<td>$ 8.00</td>
<td>$ 9.10</td>
<td>$10.75</td>
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<tr>
<td>5-10 mm</td>
<td>$11.50</td>
<td>$12.35</td>
<td>$15.10</td>
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<tr>
<td>11-15 mm</td>
<td>$15.50</td>
<td>$16.55</td>
<td>$20.25</td>
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<tr>
<td>&gt;15 mm</td>
<td>$17.50</td>
<td>$18.70</td>
<td>$23.45</td>
</tr>
<tr>
<td>Spat on Shell (per million)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up to 8 million</td>
<td>$ 4,800</td>
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<tr>
<td>9 million</td>
<td>$39,500</td>
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</tbody>
</table>

DR* = Disease Resistant; call for availability; sold under license
**Vessel delivery fees may apply to deliveries of spat on shell. Call for pricing to your lease.


Purchase contact: Sarah Walker; phone 410-990-4970; email: seed@oysterrecovery.org
Remote Setting Training program contact: remotesetting@umces.edu
Permitting

Maryland Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis MD 21401
Aquaculture Division
Karl Roscher, Division Director
410-260-8313
kroscher@dnr.state.md.us
Katie Busch, Deputy Division Director
410-260-8342
kbusch@dnr.state.md.us
Rebecca Thur, Lease Permit Reviewer
410-260-8252
rthur@dnr.state.md.us
Steve Schneider, Field Operations
410-260-8329
sschneider@dnr.state.md.us
Chris Judy, Marylanders Grow Oysters; Field Operations
410-260-8279
cjudy@dnr.state.md.us

DNR is responsible for aquaculture permitting through the Aquaculture Division. The division handles lease applications through a joint permit process with the US Army Corps of Engineers (ACOE). They also are in charge of:

- Shellfish Import Permits
- Shellfish Aquaculture Harvester Permits
- Shellfish Nursery Permits
- Processing Lease Transfers
- Collecting monthly harvest reports
- Compiling annual lease reports
- Billing and collecting lease fees
- Chairing the Aquaculture Review Board

Shellfish aquaculture information from the Division is available on-line at:
http://www.dnr.state.md.us/fisheries/oysters/industry/aquaculture/

On the right side of the screen you will find links to download lease applications and the instructions for completing them. There are also links to Lease Transfers, Shellfish Import Permits, Shellfish Nursery Permits, Monthly Aquaculture Harvest Reports, and Shellfish Aquaculture Harvester Permits. Other links provide information on financial assistance programs and the US Army Corps of Engineers Baltimore District aquaculture page.

A new Shellfish Aquaculture Siting Tool has been completed to provide prospective growers with a way to assess potential lease sites. This has been designed with multiple layers that will show you where you cannot obtain a lease. Considerations include:
- Public Shellfish Fishing Areas are reserved for public harvest (but can be petitioned for regulatory change if few shellfish exist)
- Submerged Aquatic Vegetation areas
- Near marinas and other areas where water quality would affect shellfish safety
- Within 150 feet of a federal navigation channel
- Locations with existing leases

Siting tool website: [http://dnrweb.dnr.state.md.us/fisheries/aquatool/aquatool.asp](http://dnrweb.dnr.state.md.us/fisheries/aquatool/aquatool.asp)

**U.S. Army Corps of Engineers, Baltimore District (ACOE)**
The Corps is responsible for activities in tidal waters and adjacent land areas. Authority for their regulation is from the River and Harbor Act of 1899 and Section 404 of the Clean Water Act involving a discharge of dredged or fill material into waters of the US. Corps authorization is required for the placement of structures or other work in navigable waters.

Aquaculture leases are now handled through a joint permit process with the State of Maryland. When submitting an application you should only submit it through DNR (see prior listing). Some shellfish activities are included in the Corps’ Nationwide Permit #48 which covers that issue across the United States. In addition, during 2011 the ACOE issued a Regional General Permit (RGP) to the State of Maryland designed to streamline the federal review process for leases within certain size ranges. This RGP is effective for:

- Submerged Land Leases of 50 acres or less
- Water Column Leases using bottom cages of 5 acres or less
- Water Column Leases using surface floats of 3 acres or less

Contact: Woody Francis; phone (410) 962-5689; email woody.francis@usace.army.mil

Website: [http://www.nab.usace.army.mil/Missions/Regulatory/Aquaculture.aspx](http://www.nab.usace.army.mil/Missions/Regulatory/Aquaculture.aspx)

**Protection and Enforcement**

**MD Natural Resources Police (NRP)**
The NRP has historical roots extending to the Oyster Wars of the 1800s. Today’s force patrols the state from natural resource protection to homeland security. If you find someone illegally harvesting your lease, damaging lease markers, tampering with gear or otherwise interfering with your rights as a leaseholder you should contact NRP immediately. It is also suggested that you become familiar with the officers in your area and familiarize them with your lease and operation as well as those who will be regularly managing and harvesting the grounds.

24 Hour Communications and Dispatch 410-260-8888
Report Suspicious Activity 800-628-9944 or VHF Channel 16

Website information: [http://www.dnr.state.md.us/nrp/](http://www.dnr.state.md.us/nrp/)
Regulatory

Shellfish Sanitation

*Maryland Department of the Environment*

Seafood depends on consumers’ confidence products are of the highest quality. MDE monitors the quality of shellfish harvesting waters to certify that these are safe for human consumption. Humans in a watershed increase the potential for adverse effects on shellfish water quality. These include sewage treatment facility discharges and bypasses from sewage pumping stations, failing septic systems and increased runoff from development and farming. Where sewage outfalls exist, closed safety zones surrounding these outfalls are mandated and necessary to protect human health.

MDE monitors 900 stations in state waters for potential contaminants and bacteria. They post information on their website in the form of:

- Fish and Shellfish Consumption Advisories
- Shellfish Harvesting Area Classifications
- Fish Kills

Contact: Kathy Brohawn; phone 410-537-3608; email: kbrohawn@mde.state.md.us

Shellfish Shippers / Plant Inspection

*Maryland Department of Health & Mental Hygiene (DHMH)*

Growers interested in selling their product direct to the consumer, rather than to a broker, are required to possess a Shellfish Shipper license and undergo training to obtain the necessary skills to assure delivery of a healthy and quality product. DHMH, in cooperation with University of Maryland Extension, holds periodic training in developing Hazard Analysis Critical Control Point (HACCP) plans so that the shipper understands the regulations and requirements of handling safe seafood.

Also, if you are interested in processing shellfish either by shucking or other removal techniques, the facility that you process that product in must be inspected and permitted by the DHMH. To operate as a new food processing plant, you must submit a plan. Once it has been approved, an inspection will be conducted. Upon approval, you receive and complete a license application. Existing food processing facilities must comply with Maryland health regulations.

Contact: Erin Butler, Office of Feed Protection and Consumer Health; phone 410-767-8404; email: erin.butler@maryland.gov
**Definitions**

**Cultch** - Shell or other material that oyster larvae attach to during metamorphosis. Aged, clean oyster shell is deemed to be best for most setting although many other substances have been tried.

**Cultchless oysters** - Seed attached to finely ground oyster shell or microculch intended for raising in protected containers. They are not actually ‘cultchless’ due to the fact that they set on small pieces but the cultch is usually not visible and allows the animals to grow as single oysters.

**Diploid** – Oysters having two sets of chromosomes as found naturally and that are capable of reproducing.

**Downweller** – A device that holds shellfish on a screen while water circulates down through the animals and is carried away. Frequently used with fine mesh for setting cultchless seed.

**FLUPSY** – Acronym for FLoating UPweller SYstem; a upweller that is designed as a raft to float at water level with a pumping device (propeller, paddlewheel, etc.) that displaces water from it. By displacing existing water, inflow of new water occurs, circulating food to the animals and carrying away waste products.

**Import Permit** – A Maryland permit required for bringing shell, larvae or seed across state lines to assure that only healthy animals are translocated. The permit must be applied for at least 30 days prior to transportation.

**Metamorphosis** – The process by which a larva transforms from a motile organism to a sedentary, or benthic, one. In oysters, the change is from free-swimming larvae to spat.

**Microculch** – finely ground shell (e.g. 300 microns) for setting “cultchless” seed to be raised principally for the raw bar or half-shell market.

**Nursery** - a facility that cares for juvenile shellfish until they are large enough for planting to growout grounds. Nurseries can provide various shellfish depending upon the salinity they are operating in. They can often provide either spat on shell or cultchless oyster seed.

**Pre-application Hearing** – A meeting held between a prospective lease applicant and the Aquaculture Review Board to discuss plans and determine any problems that may exist prior to application.

**Remote Setting** – The process of attaching larvae to cultch at a site away (i.e., “remote) from the actual hatchery.

**Shellfish hatchery** - a facility which conditions and spawns broodstock shellfish and cares for the resulting larvae until metamorphosis is imminent. Hatcheries may sell larvae or seed.

**Shellfish seed** – small shellfish ready for planting.
Spat - A juvenile oyster after metamorphosis.

Spat on shell - oysters that have attached to aged and clean oyster shell for traditional bottom planting and growout.

Superlines – Oysters that have been genetically selected through breeding programs to exhibit more tolerance of diseases found in the Chesapeake region.

Triploid – Oysters that are crosses between diploid (i.e., two sets of chromosomes) and tetraploid (i.e. four sets of chromosomes). These are sexually sterile and will not reproduce thereby providing a high meat quality throughout the year.

Upweller – A device that holds juvenile shellfish on a screen or mesh with water circulated up through the silo or cone, providing food to the animals and carrying away their waste.