

## Memorandum

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Subject **Town of Orleans, MA**  
**Water Quality and Wastewater Planning**  
**Task Number 8.1.2 – NT Demonstration Projects**  
**Final Technical Memorandum on Planning for Enhanced Aquaculture in Pleasant Bay and Town Cove**

Project Number 60476644

From Thomas Parece, P.E., AECOM Project Manager

Date 10/10/16

### 1. Background

The AECOM Technical Memorandum on Shellfish Cultivation - Preliminary Engineering Design and Work Plan for Preferred Sites dated May 4, 2016 presented initial designs for four different shellfish demonstration projects in Orleans. The sites included in this Technical Memorandum were based on the findings of the AECOM Technical Memorandum on Final Site Characterization and Evaluation for Shellfish Aquaculture/Shellfish Propagation dated March 13, 2016. The sites presented in the Final Site Characterization Technical Memorandum were identified by reviewing the sites identified as part of the Orleans Consensus Plan endorsed by the Orleans Water Quality Advisory Committee and presented at the Orleans Shellfish Forum on June 2, 2015, as well as internal assessments by the AECOM Shellfish Technical Team and consultation with outside experts and the Town of Orleans Shellfish Working Group (SWG). The SWG consists of the Shellfish Constable/Harbormaster, representatives from the Shellfish and Waterways Advisory Committee, Orleans Marine and Freshwater Quality Task Force, Orleans Pond Coalition, Citizens Peer Review Committee, and Orleans Water Alliance. After a detailed review of sites, four demonstration projects were selected for preliminary engineering:

- Propagation of oysters in Kescayo Gansett (Lonnie's) Pond;
- Increased production of quahogs in Town Cove through additional seed planting;
- Formation of an oyster bed in the outer Quanset Pond Area (Quanset); and
- Enhancing oyster aquaculture in Pleasant Bay and Town Cove by working with existing growers to increase production and/or through the Town offering additional lease areas.

Prior to the AECOM project, a Technical Memorandum (Tech Memo) entitled *Orleans Shellfish Operations and Program Expansion Plan* (June 2015) was prepared to identify trends in the use of shellfish grants in Pleasant Bay and Town Cove and to determine whether impacts to water quality can be correlated to historic shellfish aquaculture activity.

The first section of this Tech Memo involved:

- Building a database of commercial shellfish grant activity in Pleasant Bay and Town Cove using annual Shellfish Grant Reports; and
- Reviewing historic water quality data from Pleasant Bay for potential impacts from historic shellfish activity.

The database of historic shellfish grant activity was built by inputting information provided in the Shellfish Grant Report forms that growers must submit annually to the Harbormaster's Office (paper records). Forms from 1994, 1998, 2001, and 2007 through 2014 were entered into an Excel spreadsheet and analyzed. Shellfish Grant records are not available for 1999, or 2002 through 2006.

The following information was included in the database:

- Locations and area of all shellfish grants in Orleans;
- Longevity of grant-holders, based on Shellfish Grant Reports filed with the Town;
- Method and species grown; and
- Annual growth and harvest numbers.

This database was then used to estimate the nitrogen-removal from annual harvests based on Barnstable County Cooperative Extension's published values for nitrogen content in soft tissue and shell for harvest-size oysters (*Crassostrea virginica*) and quahogs (*Mercenaria mercenaria*) and document the timing of shifts from one species to another (for example: quahogs to oysters).

The second section of the Tech Memo included:

- Review of the Conceptual Plan for Shellfish developed as part of the Orleans Water Quality Advisory Panel stakeholder process; and
- Planning and holding a Shellfish Forum.

A Conceptual Plan for Shellfish was developed as part of the Orleans Water Quality Advisory Panel stakeholder process and included general recommendations for potential shellfish aquaculture and coastal habitat restoration projects. This Plan was reviewed with shellfish/aquaculture expert(s) both during individual interviews and as part of the Shellfish Forum held on June 8, 2015. The purpose of the Forum was to provide a mechanism for experts from across Cape Cod to review the Conceptual Plan for Shellfish in a collaborative and interactive session, and help Orleans optimize the opportunity to successfully demonstrate the use of shellfish in water quality management.

As part of the Forum, an Expert Panel consisting of professionals with substantial experience growing shellfish and implementing and monitoring projects for water quality and habitat restoration on Cape Cod was assembled. Several local aquaculture farmers who were not able to attend the Shellfish Forum were contacted and the specifics of the Consensus Plan were discussed. Input from these growers was sought specifically regarding the number of shellfish proposed and the demonstration sites under consideration. The Tech Memo lists all participants in the Shellfish Forum.

The role of the Expert Panel was to provide:

- Summaries and lessons learned from recent shellfish and aquaculture programs on Cape Cod;
- Other feedback on the Conceptual Plan for Shellfish; and
- Advice to Orleans that is specific to potential demonstration sites and growing techniques.

Key outcomes of this Forum included:

- Review and recommendations for specific criteria regarding selection of demonstration project sites;
- Initial review of locations and type of shellfish demonstrations;
- Enumeration of key considerations for planning and implementing demonstrations; and
- Identification of experts who can serve as advisors for the next steps of planning and implementation.

The concept of a shellfish demonstration project that involves working with growers to expand private aquaculture in Orleans builds on the findings of the *Orleans Shellfish Operations and Program Expansion Plan* by specifically addressing the role of the private sector to increase the shellfish population in both Pleasant Bay and Town Cove.

This Technical Memorandum describes in detail the enhanced aquaculture demonstration project.

## 2. Introduction

Enhanced aquaculture in Pleasant Bay and Town Cove may include:

- Increased production within existing Orleans aquaculture leases;
- Additional leases in Pleasant Bay; and
- Additional leases in Town Cove.

Orleans currently has twelve aquaculture leases in Pleasant Bay and one lease in Town Cove. Additionally, Eastham has approximately thirteen leases in Town Cove. In order to quantify the contribution that private aquaculture can make to meeting the numerical goals for nitrogen-removal from shellfish, a meaningful dialogue with growers is needed in order to fully understand their limitations (if any) in growing and harvesting more. Understanding the opinions and concerns of growers through direct discussions will help define the number of oysters that can be grown on different leases. Discussions with growers will also help define what is needed to increase oyster numbers from current levels. Additional leases may also be created to help with the town's numerical goals for nitrogen removal, but any additional leases should have achievable production goals in place.

The demonstration methodology proposed for Pleasant Bay involves working with the individual growers on the town's existing private shellfish leases. The 12 leases are an average size of 1.75 acres. Typically, on these leases, single oysters are raised from seed to harvest size in aquaculture gear including trays, bags and cages. Seed is purchased at a size large enough to install directly in gear. Smaller seed requires special handling in an upweller as part of the initial grow-out process. Currently, growers in Orleans do not have access to upwellers. In total, growers are harvesting approximately 1,000,000 oysters annually from these leases in Pleasant Bay. Harvesting occurs year-round. To avoid ice damage over the winter, shellfish are submerged to deeper depths or bottom-

planted. Working with individual growers can create opportunities to demonstrate the water quality benefits as well as identify implementation logistics and practical densities for oyster aquaculture in Orleans' embayments. Key goals for this demonstration are to:

- Learn site lease-specific factors that may limit shellfish densities; and
- Identify beneficial adjustments to specific farming practices on a given lease.

Successful farming requires local knowledge, and implementation techniques need to be tailored to a given site. Local growers have decades of field experience working in Pleasant Bay and Town Cove, and have learned how to manage and operate within the varying conditions of their location. They have evolved systems based on trial and error for anticipating weather and other events that impact shellfish survival. Growers also have a unique understanding of obstacles or challenges which may be limiting their production and often know what steps might help reduce those challenges on their specific leases. Some of these techniques may also be applicable to other lease areas. The expansion of private leases for oyster aquaculture in certain areas of Town Cove is also important to pursue. Oyster aquaculture in gear, off the bottom would currently be the most likely method of growing oysters in this area due to the large population of predatory Atlantic oyster drills (*Urosalpinx cinerea*). A study of the feasibility of expanding private aquaculture leases is needed to assess the Town's interest in this approach for shellfish propagation in Town Cove.

The expansion of private grants and or additional new grants for oysters, or other shellfish requires several permitting steps beginning with a recommendation from the Orleans Board of Selectmen to the Massachusetts Division of Marine Fisheries (DMF). A study of the feasibility of expanding private aquaculture leases is needed to assess the Town's and growers' interest in this approach for shellfish propagation in Town Cove.

### **3. Project Description: Shellfish Aquaculture Enhancement in Pleasant Bay and Town Cove**

The goal of this demonstration is to enhance shellfish production through private aquaculture in Pleasant Bay and assess the feasibility of increasing private aquaculture in Town Cove. This demonstration will build on previous experience with growers, and includes the following components:

- Developing a series of interview questions to determine growers' willingness to work with the town to expand shellfish propagation for the purposes of water quality improvements and increased economic benefit;
- Meeting with growers on their leases to identify techniques that could increase productivity and shellfish densities;
- Working with growers to establish a feasible estimate of the total number of shellfish anticipated to be grown and harvested annually for all leases in aggregate;
- Discussing the potential for the private sector growing shellfish in terminal ponds;
- Coordinating and engaging with Shellfish and Waterways Committee;
- Establishing baseline water quality conditions in the current lease area; and
- Evaluating areas in Town Cove for potential expansion of shellfish leases, beginning with a questionnaire to waterfront landowners.

In Pleasant Bay, the first step is to communicate with growers to assess interest. Understanding the opinions and concerns of growers through questionnaires and discussions will help define the needs of this group. Depending on the response from growers in Pleasant Bay, the next steps will be to evaluate current growing practices, and identify opportunities for improving these systems over the short and long term, and determining target numbers of shellfish that can be grown and harvested annually for all grants combined. Establishing baseline water quality conditions in this growing area will inform this process, and help quantify impacts from any increases in shellfish density.

For Town Cove, finding landowners who welcome aquaculture in their view scape is a key first step in assessing the potential for expanding shellfish leases in Town Cove. These parallel efforts will help establish the numerical targets for annual shellfish cultivation and sales that can be expected from private aquaculture in Orleans. Once quantified, the amount of shellfish harvested annually from private leases can then be included in the plan for meeting the Town’s numerical goals for nitrogen removal through shellfish cultivation and harvest. Figure 1 shows the locations of the current shellfish grants in Little Pleasant Bay.

**4. Work Plan for Shellfish Aquaculture Enhancement in Pleasant Bay and Town Cove**

Communicating with current growers in Pleasant Bay may take several forms, such as:

- Site visits to growing areas;
- Land-based interviews;
- Phone calls; and
- Group meetings.

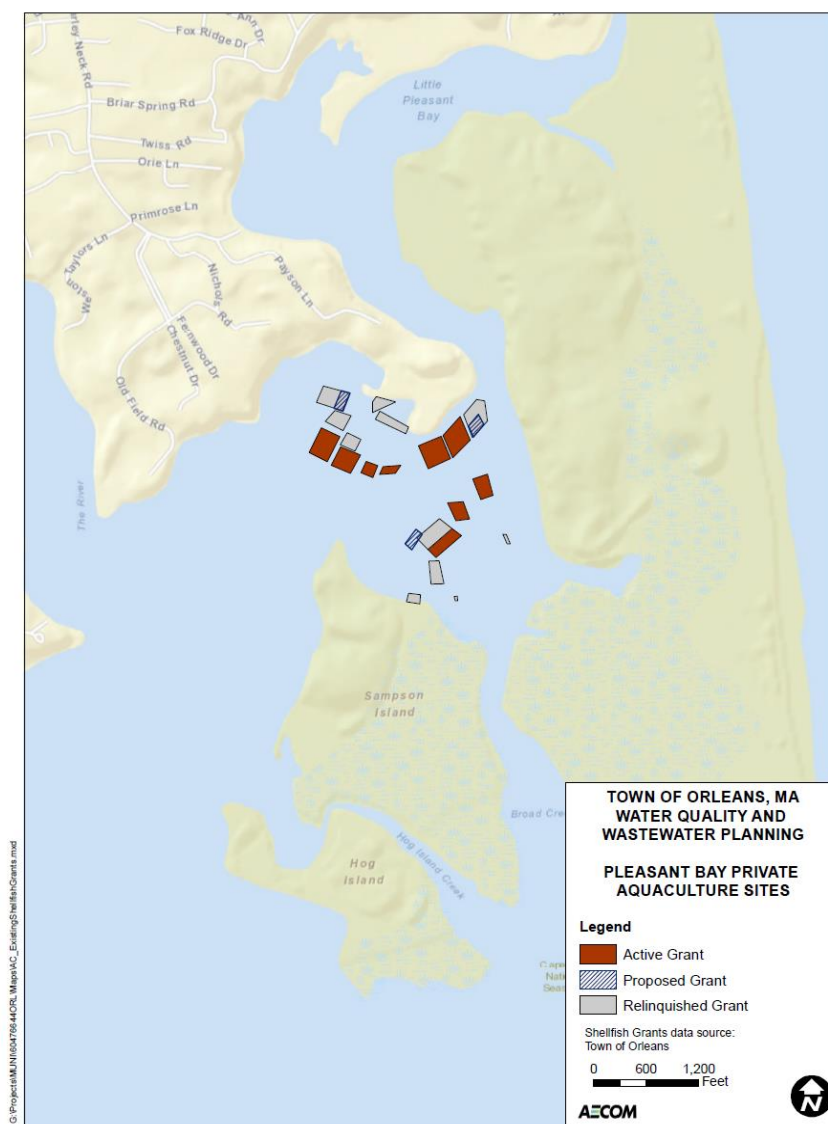


Figure 1: Pleasant Bay Private Aquaculture Sites

Deference will be given to each individual grower’s communication preference. A one-page fact sheet explaining the project and its goals with a short questionnaire will be provided to the growers as an initial communication step. The list of interview questions will be relatively brief and focused.

Questions could include the following:

- In order to increase shellfish production within the Town, what do you, as a grower, think the Town of Orleans should consider doing?

- Do you have any concerns or reservations that need to be addressed before you would consider participation in any expansion of aquaculture in Pleasant Bay?
- Would a suggestion box or other anonymous way to provide input help?
- Are you willing to increase production of shellfish on your lease; and if not, why not?
- What factors are currently constraining your ability to increase or expand current production?

A refinement of these questions as well as additional questions will be developed by the AECOM technical team in consultation with the SWG and other stakeholders such as the Barnstable County Cooperative Extension. To help identify constraints, a list will be included in the questionnaire, with a way to rank these issues. The list may include the following topic areas:

- Availability/cost of seed;
- Availability/cost of gear;
- Availability of and cost of labor;
- Size/productive potential of sites;
- Lack of market/low price for shellfish;
- Competition among growers;
- Predation (drills, crabs, etc.);
- Disease (MSX, Dermo);
- Permitting issues;
- Land use conflict;
- Infrastructure/gear storage issues;
- Site access issues;
- Lack of upweller sites and/or additional shellfish nursery sites;
- Fouling and other maintenance issues; and
- Other.

Meetings with growers are envisioned to initially be with individuals, and if there is interest a group meeting will be held. Timing of group meetings will not coincide with daylight low tides. In addition, site visits to the majority of the aquaculture grants at a time convenient to the farmer in the late fall of 2016, with follow up in the spring of 2017 is also planned. Participation in site visits on the part of the grower is optional. A summary of findings from interviews and site visits will be incorporated into a Draft Needs and Options Assessment. Once this Draft Needs and Options Assessment has been prepared, meetings with growers and the SWG will be held to get feedback on the Draft, and a final memorandum will be prepared.

The approach for potential expansion of aquaculture in Town Cove is to initially survey waterfront property owners to assess interest/aversion to aquaculture in the area, and work with those most familiar with the existing conditions in Town Cove. This will include the SWG, Natural Resources Manager, growers, and other local experts. Representatives of The Goose Hummock, Nauset Marine, Orleans Yacht Club, and other stakeholders will be interviewed to learn reactions to having gear in the water. A great deal of the Town Cove water surface is used by power boats (some towing water skiers and tubes), kayaks, standup paddle boards, sailboats, learn to sail programs and fishermen. A blank map will be provided enabling stakeholders to shade in parts of Town Cove that they use. This feedback will be aggregated onto a master map to help determine areas for aquaculture that do not conflict with current uses. Once constraints/barriers to additional shellfish production and site expansion in Town Cove are expressed through surveys, interviews and mapping, and potential solutions to mitigate constraints are identified, a summary and recommendations memo will be drafted and presented to the SWG, followed by a presentation to the Board of Selectmen (BOS).

**5. Implementation Schedule**

The project period for the first phase of the enhanced shellfish aquaculture demonstration is November 1, 2016 through June 30, 2017. Within this timeframe, the timing and activities to accomplish the various steps in this phase of this demonstration should proceed as follows:

**PLEASANT BAY**

November 1, 2016 through November 21, 2016	<ul style="list-style-type: none"> <li>Plan interviews and further develop interview questions to gauge interest from Pleasant Bay growers in exploring enhanced/expanded shellfish production in Pleasant Bay.</li> <li>Update Annual Shellfish Grant Report database</li> </ul>
November 28, 2016 through December 20, 2016	<ul style="list-style-type: none"> <li>Conduct grower interviews in coordination with Natural Resources Manager</li> </ul>
December 20, 2016 through January 6, 2017	<ul style="list-style-type: none"> <li>Aggregate and understand interview results</li> </ul>
January 6, 2017 thorough January 31, 2017	<ul style="list-style-type: none"> <li>Discuss interview findings and grower interest and suggestions in pursuing an enhanced shellfish aquaculture demonstration in Pleasant Bay with SWG</li> <li>Prepare Preliminary Draft Technical Memo of interview results, findings, and recommendations, with scopes of work and budgets (including SMAST) for FY 2018 warrant article and implementation</li> </ul>
February 1, 2017 through February 24, 2017	<ul style="list-style-type: none"> <li>Distribute Draft Technical Memorandum</li> </ul>
February 25, 2017 through April 28, 2017	<ul style="list-style-type: none"> <li>Finalize Draft Technical Memorandum</li> </ul>

**TOWN COVE**

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| November 10, 2016 – November 21,               | <ul style="list-style-type: none"> <li>• Send mailing to waterfront property owners around Town Cove to explore willingness to support aquaculture within their viewshed</li> <li>• Conduct site visit(s) in Town Cove to identify specific locations for additional aquaculture leases, review with Natural Resources Manager and the SWG</li> </ul> |
| November 28, 2016 through<br>December 20, 2016 | <ul style="list-style-type: none"> <li>• Prepare a preliminary list of possible lease sites in Town Cove using a matrix approach</li> </ul>   |
| January 6, 2017 through<br>January 18, 2017    | <ul style="list-style-type: none"> <li>• Review matrix/list with SWG</li> </ul>   |
| January 6, 2017 through<br>January 31, 2017    | <ul style="list-style-type: none"> <li>• Prepare Preliminary Draft Technical Memo of survey results, findings, and recommendations</li> </ul>   |
| February 1, 2017 through<br>February 24, 2017  | <ul style="list-style-type: none"> <li>• Distribute Draft Technical Memorandum of results of evaluation for Town Cove aquaculture enhancement</li> </ul>  |
| February 25, 2017 through<br>April 28, 2017    | <ul style="list-style-type: none"> <li>• Finalize Draft Technical Memorandum with scopes of work and budgets (including SMAST) for FY 2018 warrant article and implementation</li> </ul>  |

**6. Next Steps**

The Draft and Final Technical Memorandum will include analysis of survey results and interviews (Pleasant Bay only) with recommendations for demonstration project next steps.