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Memorandum

To	George Meservey, Director of Planning & Community Development Michael Domenica, PE, Program Manager
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Subject	**Town of Orleans, MA** **Water Quality and Wastewater Planning** **Task Number 10.1.B.1 – Demonstration Projects-Design and Implementation – Shellfish/Aquaculture – Town Cove Exploratory Mailing Summary Report - Final**
Project Number	60476644
From	Thomas Parece, P.E., AECOM Project Manager
Date	February 27, 2017

Approvals	Date	Signature / Initials
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Michael Domenica, PE, Water Resources Associates, Program Manager		

1. Purpose and Background

A. Overall Purpose of Shellfish Demonstrations

The overall purpose of the Town's shellfish demonstration projects is to monitor the nitrogen-removal impacts of both *Crassostrea virginica* (oysters) and *Mercenaria mercenaria* (hard clams) and utilize these measured results to develop full-scale plans for shellfish cultivation that help meet regulatory standards for nitrogen. The Town must achieve specific, quantitative goals for removing nitrogen within each of its estuaries to meet the Total Maximum Daily Load (TMDL). The design of a full-scale shellfish project for a particular waterbody to meet a prescribed nitrogen-removal target must be based on certain site-specific values, such as total annual growth in shellfish biomass and enhanced denitrification rates. The size and spatial configuration of a full-scale project are directly related to the values measured through these demonstrations.

Demonstrations are designed to:

- Evaluate the efficacy of oysters and quahogs in achieving reduced nitrogen concentrations within the Town's impaired waters;
- Determine the most advantageous approaches for growing the quantities of shellfish prescribed to meet nitrogen removal goals; and
- Develop realistic cost estimates for the preferred approaches to growing shellfish to meet nitrogen removal goals in specific waterbodies.

These demonstrations will help determine the role of shellfish in the overall strategy for reducing the nitrogen loads within the Town's impaired estuaries as was presented in the Town's ACWMP (2017).

B. Background of Exploring Enhanced Shellfish Propagation in Town Cove

Expanding both quahog and oyster biomass in Town Cove was first described in the shellfish component of the Orleans Consensus Agreement (2015), and was further discussed during the Town-sponsored June 2015 Shellfish Forum where scientists, engineers, growers and regulators met to review the shellfish component of the Consensus Agreement. The outcomes of the Shellfish Forum are documented in the Phase I: Orleans Shellfish Operations and Program Expansion Plan dated June 2015, available on the Town's website. Based on this prior work and field investigations with the Shellfish Constable, the AECOM technical team recommended a shellfish demonstration in Town Cove that built on the Town's existing quahog propagation efforts including the areas and quantities of seed planted. This analysis is documented in Draft Technical Memorandum on Site Characterization (Draft Tech Memo) prepared by the AECOM Technical Team, which includes representatives from AECOM, Science Wares, Biomimicry New England/UMass Boston, and MT Environmental/Beach Point Shellfish.

The second phase of evaluating locations for shellfish demonstrations included a peer review of the Draft Tech Memo to finalize the sites that should be included for shellfish demonstration projects. This in-depth critique involved review and comments from several outside experts as well as several meetings with a Town of Orleans Shellfish Working Group (SWG) that consists of the Shellfish Constable/Harbormaster and 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.

Outside experts that reviewed the Draft Tech Memo included:

- Diane Murphy, Barnstable County Cooperative Extension;
- Josh Reitsma, Barnstable County Cooperative Extension;
- Sandy MacFarlane, former Orleans Shellfish Constable;
- Henry Lind, former Eastham Shellfish Constable;
- Chatham Shellfish Propagation Department; and
- Dave Slack, Shellfish and Waterways Committee.

After this two-step, detailed evaluation process, four demonstration programs were selected, including exploring the potential for expanded quahog propagation in Town Cove. These four demonstrations are described in detail in the Technical Memorandum on Final Site Characterization and Evaluation for Aquaculture/Shellfish Propagation (evaluation criteria and ranking) dated March 13, 2016. Written comments from the outside experts and responses from the Shellfish Technical Team are included in Appendix A of the Final Site Characterization Technical Memorandum.

C. Specific Purpose of Preliminary Town Cove Questionnaires

Based on input from some members of the SWG, the AECOM Technical Team was encouraged to begin to gauge interest in gear-based oyster aquaculture as part of overall shellfish planning in Town Cove, in addition to the quahog demonstration project. To learn the perspectives of two key stakeholder groups with respect to gear-based aquaculture in Town Cove, two separate questionnaires were prepared.

One questionnaire was sent to waterfront property owners to learn their opinions on aesthetic, use conflicts and other potential concerns related to gear-based systems for growing shellfish in Town Cove. A different questionnaire was sent to wild commercial harvesters to learn their opinions regarding areas that might be suitable for gear-based aquaculture in Town Cove. The intent was to identify areas that were not considered productive by wild harvesters so that these locations could be further evaluated for aquaculture license sites (known in Orleans as grants). An additional goal of the questionnaires was to increase public awareness of the nitrogen pollution problem in Town Cove and to explain the possible role of shellfish as a solution.

This information complements the shellfish survey currently being planned for Town Cove through UMass Dartmouth School for Marine Science and Technology (SMAST). The goal of this survey is to identify current populations of quahogs and other organisms in order to determine target numbers for enhanced quahog propagation efforts. Local commercial harvesters will conduct the survey under the guidance of SMAST staff members who will train these harvesters in the appropriate survey protocols and methodologies to be used.

2. Information Gathering Approach and Results

Two questionnaires (Appendix A and Appendix B) were developed and disseminated to two initial stakeholder groups:

- Waterfront property owners; and
- Commercial harvesters of wild shellfish.

A. Waterfront Property Owners

To communicate with waterfront property owners, a questionnaire was developed by the AECOM Technical Team and reviewed carefully by the SWG. The purpose of this questionnaire was to learn how neighbors feel about the concept of gear-based aquaculture, for the purpose of growing oysters for water quality improvement. This mailing was sent to over 180 addresses. Each envelope was hand-addressed by members of the SWG because it was felt that this personalized approach would yield more responses. The three questions asked in the mailing were:

1. How do you feel about shellfish farms located in Town Cove (away from moorings and navigation channels)?
2. How do you feel about shellfish farms in proximity to your property?
3. How do you feel about seeing shellfish farms within your view scape?

Six property owners responded to the questionnaire within the deadline, five by phone, and one by email. Five responded positively to the idea of gear-based aquaculture near their property and within their view scape. Navigation was listed as a primary concern with respect to siting gear-based aquaculture. One respondent was interested in additional information on the Town's wastewater planning initiatives in general. There were no negative responses. The property owners that responded positively are located at various points along the length of the eastern shore of Town Cove (Figure 1).


TOWN COVE
TOWN COVE
0 400 800 Feet
1 inch = 800 feet

B. Commercial Harvesters of Wild Shellfish

After the questionnaire to the shorefront property owners had been completed, the SWG suggested that other stakeholders be asked for their input. Commercial wild harvesters were high on the priority list because their livelihood depends on access to the wild fishery in Town Cove. It was important to understand where they fish and to learn whether they thought there might be less productive areas that could be utilized for gear-based oyster aquaculture. The timing was fortuitous in that commercial shellfish licenses were being renewed, and it was thought that a questionnaire could be included with renewal paperwork. A different questionnaire was developed for the commercial wild harvesters to ask for their perspectives on increased gear-based aquaculture in Town Cove, and to learn where areas that are not currently harvested or productive might be located. The five questions asked in the mailing were:

1. Would you be willing to talk in person?
2. If new or expanded oyster aquaculture leases were allowed in Town Cove, where would you suggest they be located to minimally impact where you typically harvest and to minimally impact productive bottom? Please indicate several areas on the Town Cove map provided.
3. Approximately how far from shore do you typically do your fishing (wader depth or is boat used)?
4. Which shellfish species do you harvest commercially?
5. Do you have other comments and/or suggestions?

No written responses to the questionnaire were received, but several individuals attended the February 6, 2017 SWG meeting. Comments made during this meeting indicated that commercial harvesters believe that much of Town Cove is currently productive for quahogs, but populations have decreased over the years. The overall consensus amongst commercial harvesters was to increase quahog propagation in this waterbody. Another outcome of this meeting was to schedule a kick-off meeting with these commercial harvesters and SMAST to plan for the quahog survey. During this survey, areas that are potentially suitable for aquaculture because they are unproductive for quahogs and other species may be identified.

3. Summary and Recommendations

Based on the comments received from commercial harvesters, and discussions during SWG meetings, the recommended approach for increased shellfish propagation in Town Cove should focus on planting quahogs and possibly other native species. Gear-based aquaculture could be evaluated at some future point after the potential for quahog bottom-planting for commercial and recreational harvest and associated nitrogen removal is quantified.

4. Next Steps

The next steps include:

- Integrating the results of these surveys with the upcoming quahog inventory and shellfish assessment being conducted by SMAST (in collaboration with local commercial harvesters); and
- Focusing on bottom planting of commercially-important species in Town Cove, with gear-based aquaculture considered only after the potential for bottom-planting is determined.

Future planning for Town Cove will continue after the results of the quahog survey are evaluated. Nothing other than bottom planting commercially important species should occur in Town Cove without an overall plan for aquaculture in the estuary.

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Appendix A

Questionnaire Sent to Waterfront Residents

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Greetings,

As an owner of waterfront property on Town Cove, we would very much appreciate hearing your feedback on the opportunity for shellfish farming with floating gear to be used as part of achieving water quality improvements in Town Cove.

<u>Please respond by Monday, January 23, 2017.</u> Page 2 provides information for submitting your response, and shows a picture of a shellfish project using floating gear in Lonnie's Pond.

Background

Many parts of Orleans's estuaries, including Town Cove, now suffer from nitrogen pollution. Eighty-six percent of the nitrogen that we can control enters Town Cove from septic systems (via groundwater), with lawn/garden fertilizer and stormwater runoff contributing only five and eight percent respectively. When marine water remains polluted with nitrogen it looks cloudy and murky. Algal growth is accelerated, eelgrass beds die, oxygen in the water declines and fish and shellfish slowly disappear. If nitrogen pollution is not addressed, eventually our estuaries and harbors become largely unfit for shellfishing, and less desirable for swimming and boating. The upper reaches of the Town's estuaries, places like Town Cove, Mill Pond and Salt Pond in Eastham tend to have the most impaired water quality because they receive less tidal flushing due to their distance from the ocean inlet.

As voted by Town Meetings in 2015 & 2016, Orleans is conducting demonstration projects to evaluate potentially lower cost solutions for removing nitrogen and improving the water quality in Town Cove and Pleasant Bay. The use of shellfish is being evaluated because it is expected to be a cost-effective solution. These projects are helping the Town determine the best strategies for increasing the overall quantity of shellfish growing, for the purpose of meeting water quality goals within the estuaries. Based on the findings of these projects, shellfish could become an important part of the solution for removing the nitrogen that is polluting the town's embayments. This solution could also offer an opportunity for local shellfish farms to expand.

The first project took place in Lonnie's Pond in 2016 (Figure 1), where oysters were grown and their effects on the nitrogen concentrations in the pond monitored every two weeks between June and November by the UMASS Dartmouth School for Marine Science and Technology.

The next two demonstration projects involve enhanced shellfish farming/cultivation in Town Cove, including:

- A quahog inventory to establish the baseline population currently in Town Cove and provide a basis for determining how many additional quahogs could be planted annually on the bottom
- An assessment of areas where additional shellfish farms might be located and existing grants expanded

Shellfish cultivation occurs in designated, limited areas called grants or leases where farmers are allowed to grow shellfish. Oyster farming typically involves using floating gear. For example, Figure 1 shows the floating gear that was used during the 2016 project in Lonnie's Pond.

An important factor in determining the potential for additional shellfish farms in limited areas within Town Cove is to identify locations where property owners would support achieving environmental restoration goals by growing shellfish to remove excess nitrogen from the water.

Oysters feed by filtering algae and other particles that contain nitrogen out of the water column. Through this filter-feeding process, **oysters both improve water clarity and impact nitrogen concentrations.**

Figure 1. View of Lonnie's Pond Floating Bag Installation

By answering these three questions, you will help the Town understand how waterfront landowners feel about increasing shellfish grant locations to achieve water quality improvements, and identify how best to accomplish this goal:

1. **How do you feel about shellfish farms located in Town Cove (away from moorings and navigation channels)?**
2. **How do you feel about shellfish farms in proximity to your property?**
3. **How do you feel about seeing shellfish farms within your viewscape?**

Please call, email or write to the address below to share your thoughts as we begin the process of identifying suitable locations in Town Cove for shellfish cultivation in gear, such as that in Figure 1.

Orleans Department of Natural Resources, 141 Portanimicut Rd., Orleans MA 02653
Phone: 508.240.3755
Email: shellfishprojects@town.orleans.ma.us

This letter is being sent to all owners of waterfront property on Town Cove by the Town Shellfish Working Group. Please let us know about neighborhood associations or other residents that should also receive this letter. For additional information on the wastewater management projects in Orleans, please see: http://www.town.orleans.ma.us/water-quality-advisory-panel or contact the Town using the email address or phone number provided.

We very much appreciate your input on this topic.

Appendix B

Questionnaire Sent to Commercial Harvesters of Wild Shellfish

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Request for Feedback from Commercial Shellfish Harvesters (Town Cove)

PLEASE RETURN BY FRIDAY, FEBRUARY 10, 2017 TO:

NATE SEARS - 141 Portanimicut Rd., Orleans MA 02653 (phone: 508.240.3755)

Background

Orleans is moving forward with its plans to clean up our waterways by controlling the nitrogen pollution traveling into our estuaries through groundwater, fertilizer and stormwater. In addition to plans for sewering downtown, the Town is conducting demonstration projects to evaluate how shellfish cultivation could potentially contribute to nitrogen removal and other water quality improvements. These demonstrations will also help determine ways to increase the overall quantity of shellfish being grown and harvested in Pleasant Bay and Town Cove. Based on the findings of these projects, shellfish may become an important part of the solution for reducing the nitrogen that is polluting the town's estuaries. A significant amount of nitrogen must be removed to restore Town Cove's ecological health.

Increasing the number of quahogs that are planted as part of the Town's municipal propagation program is one of the approaches under review. In spring, 2017, a shellfish survey is planned to understand the current conditions and shellfish populations in Town Cove.

Oyster aquaculture is another way being considered to increase the quantity of shellfish removing nitrogen from the water in Pleasant Bay and Town Cove as part of their filter-feeding process. A preliminary assessment of areas where additional shellfish/oyster leases MIGHT be located in Town Cove is underway.

Commercial wild harvesters are being contacted because of your expertise and experience in harvesting quahogs in Town Cove. Your response to this survey will help us determine whether quahog propagation and oyster aquaculture should be included in the water quality improvement plan for Town Cove.

Your individual responses can be made anonymously, and will be incorporated into an overall summary report which will be reviewed by the Orleans Shellfish Working Group before submitting to the Town. It would be very helpful to the shellfish team and the Town if you participate in this review process. Restoring water quality is good for everyone, including those who harvest in these waters.

Questions

1. Would you be willing to talk in person? If so, please tell us your name, phone number, and when to call, and Sia Karplus will contact you to arrange a meeting or to discuss over the phone.
2. If new or expanded **oyster aquaculture leases** were allowed in Town Cove, **where** would you suggest they be located to minimally impact where you typically harvest and to minimally impact productive bottom? Please indicate several areas on the Town Cove map provided.
3. Approximately how far from shore do you typically do your fishing (wader depth or is boat used)?
4. Which shellfish species do you harvest commercially?
5. Do you have other comments and/or suggestions?

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