

MEMORANDUM

DATE October 23, 2018

JOB NO. 2015-0121-01

TO Tom Daley
DPW & Natural Resources Director
Town of Orleans
tdaley@town.orleans.ma.us

FROM Leslie Fields
Direct Phone: 508-495-6225
lfields@whgrp.com

CC John Kelly
Nate Sears

RE: Nauset Estuary Progress Report – October 2018

This memo summarizes the work completed by Woods Hole Group, Inc. for the Town of Orleans during the months of September and October 2018.

1. Tide Gage Installation

Two tide gages were installed in Nauset Estuary on September 27, 2018 (Figure 1). The gages will in place recording water levels every 15 minutes until November 9, 2018. Data from the gages will be used to determine tidal datum elevations such as mean high water (MHW), mean low water (MLW), and mean tide level (MTL). The updated tidal datum information will then be used to adjust the bathymetric survey data to MLW so that revised dredge volumes can be calculated.



Figure 1. Tide gage locations installed in Fall 2018.



Invitation: We recommend the Town create a meeting invitation using DoodlePoll or similar online scheduling application. DoodlePoll will require the user to provide a meeting subject, location, as well as possible dates and times for the meeting. A link will then be provided by DoodlePoll which can be emailed to the invitees.

Dates/Times: We recommend scheduling the meeting with at least 3 weeks lead time and avoiding the week of Thanksgiving. With this in mind possible weeks are Nov 12-16, Nov 19-23, and Dec 3-7. The meeting should last about 2 hours. Suggested meeting slots are 10-12 AM, 1-3 PM, and 2-4 PM.

Invitation List: The following table provides agencies, names and email contacts for people that should be invited to the meeting.

Agency/Organization	Name	Email
Massachusetts Environmental Policy Act Unit (MEPA) - Assistant Director	Eve Schluter	eve.schluter@mass.gov
National Park Service, Cape Cod National Seashore (CCNS) - Superintendent - Deputy Superintendent - Park Planner - Aquatic Ecologist	Brian Carlstrom Kathy Tevyaw Lauren McKean Sophia Fox	brian_carlstrom@nps.gov kathy_tevyaw@nps.gov lauren_McKean@nps.gov Sophia_fox@nps.gov
Town of Orleans - Administrator - DPW & Natural Resources Director - Natural Resources Manager - Conservation Commission - Selectmen - Local fishermen	John Kelly Tom Daley Nate Sears John Jannell 1-2 people max	jkelly@town.orleans.ma.us tdaley@town.orleans.ma.us nsears@town.orleans.ma.us jjannell@town.orleans.ma.us
Town of Eastham - Administrator - Conservation Agent - Harbormaster - Selectmen - Local fishermen	Jacqueline Beebe Shana Brogan Ryan Nolan 1-2 people max	jbeebe@eastham-ma.gov conservation@eastham-ma.gov harbormaster@eastham-ma.gov
Massachusetts Dept. of Env. Protection - Chief Wetlands and Waterways, SERO - Waterways/Chapter 91 Program - Water Quality Program	Jim Mahala David Hill David Wong	jim.mahala@state.ma.us david.hill@state.ma.us david.wong@state.ma.us
Massachusetts Coastal Zone Management - Project Review & Dredging Coordinator - Cape & Islands Regional Coordinator	Bob Boeri Steve McKenna	robert.boeri@state.ma.us stephen.mckenna@state.ma.us
US Army Corps of Engineers - Regulatory Division Branch Chief	Barbara Newman	barbara.h.newman@usace.army.mil
Mass. Division of Marine Fisheries - Habitat Program Manager	Kathryn Ford	kathryn.ford@state.ma.us



Massachusetts Natural Heritage and Endangered Species Program - Endangered Species Review Biologist	Amy Hoenig	amy.hoenig@state.ma.us
NOAA National Marine Fisheries Service - NE Field Office Supervisor	Chris Boelke	christopher.boelke@noaa.gov

Suggested Email Invitation Content: A project summary, meeting objectives, and Doodlepoll link should be included in the body of the email invitation. A draft project summary and meeting objectives are provided below.

- Meeting Subject: Nauset Estuary Dredging & Beneficial Reuse Project
- Meeting Summary: The Town of Orleans is pursuing a dredging project in Nauset Estuary for the purpose of improving navigation and public safety, for both commercial and recreational uses of the waterbody. Shoaling within the estuary has advanced to a point where the commercial fishing vessels can no longer operate from the shelter of the town landings, and instead are staging from exposed moorings located behind the barrier beach just south of Nauset Inlet. The Town completed a Feasibility Study and follow-on investigations to evaluate the existing conditions as well as various dredging and beneficial reuse alternatives. To help advance the project to the permitting stage, the Town is holding a pre-application meeting with local, state, and federal regulatory agencies to introduce the project and solicit feedback on project alternatives. Your attendance at the meeting would be greatly appreciated. Please follow the Doodlepoll link below to indicate your availability.

(insert Doodlepoll link)

Once the meeting date has been selected you will receive another email with additional materials describing the project.

5. Project need narrative

As part of our previous work on this project the Woods Hole Group prepared the attached draft project need narrative. The project need will be presented as background information in the permit applications. Please feel free to comment on the draft document.

Project Need Narrative:

The proposed Nauset Estuary Dredging Project has been developed to provide improvements to navigation and public safety for both commercial and recreational users of the Nauset Estuary system. Shoaling within the estuary has advanced to the point where many commercial fishing vessels can no longer operate from the shelter of Town Cove, Snow Shore Landing, and Pricilla Landing in the Town of Orleans, and instead are operating from exposed moorings in the center of the navigation channel south of Nauset Inlet in the Town of Eastham (Figure 1). Traditionally, commercial fishing vessels could only pass through Nauset inlet for 2-3 hours before and after high tide. The evolution of shoaling within the navigation channel has further restricted that window, forcing members of the commercial fleet to moor their boats and stage their equipment closer to the inlet itself, at great risk and at great personal expense.

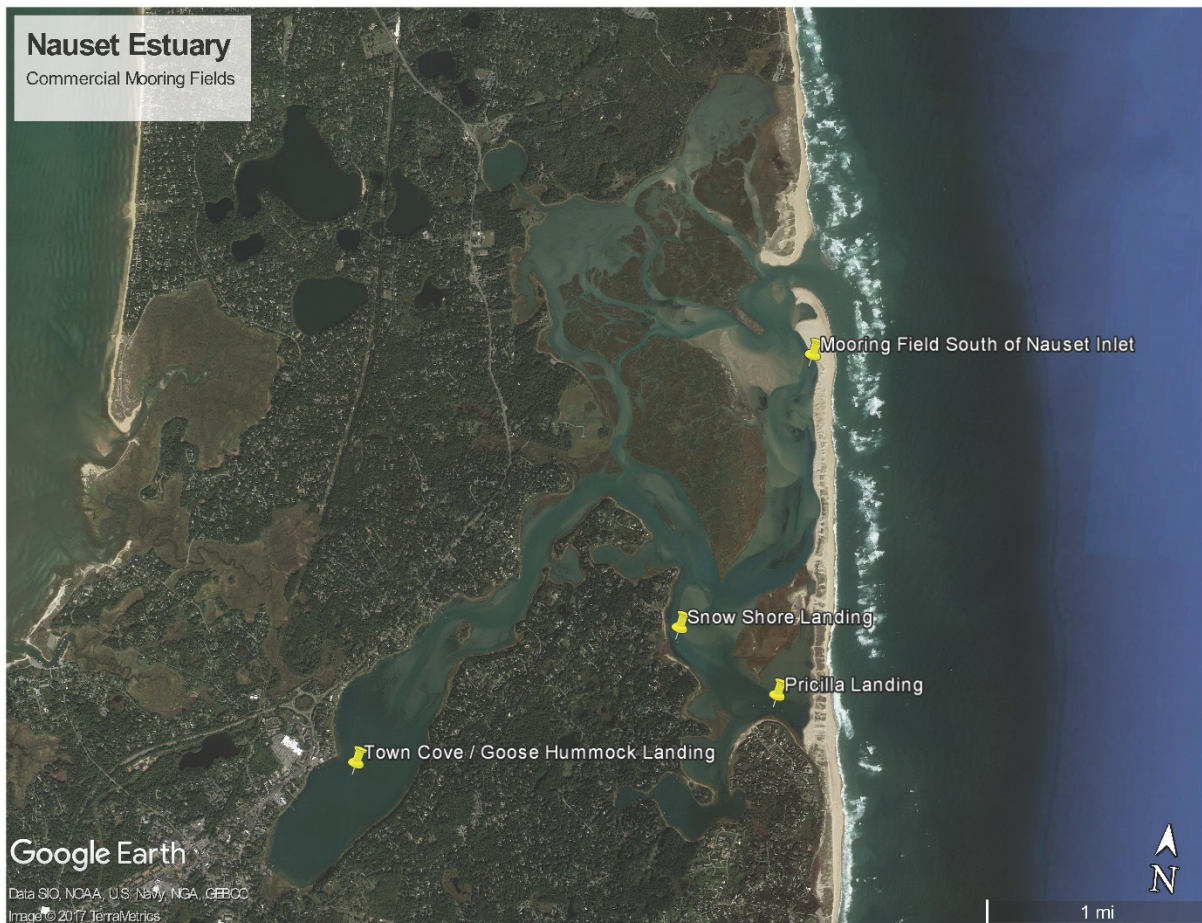


Figure 1- Aerial imagery of the Nauset Estuary system. Commercial mooring fields within Town Cove and at Snow Shore Landing, and Pricilla Landing have become largely inaccessible due to shoaling. Larger commercial vessels now moor in an exposed location in the navigation channel south of Nauset Inlet.

Nauset Estuary is also a popular year-round destination for recreational kayakers, paddleboarders, and boaters. As shoaling within the estuary system has advanced, the navigation channel leading to Nauset Inlet has narrowed substantially, bringing recreational users into contact with commercial users. Depending on the tide, commercial fishing vessels occupy much of the navigation channel while underway. During the summer months, when there is heavy recreational boat and kayak traffic within the channel, this poses a significant public safety risk as smaller boats may not have room to move out of the path of an oncoming vessel. The combination of advancing shoals, narrow channel width, and inexperience on the part of many recreational mariners has set the stage for conflict between user groups. The primary goals of the proposed Nauset Estuary Dredging Project are to improve the navigability of the estuary, which will inherently minimize conflict between user groups, while enhancing public safety.

Commercial Uses of Nauset Estuary:

To better understand the dynamics of the estuary, impacts to the commercial fishing industry, and need for the project, a series of fisheries stakeholder meetings were held in the Town of Eastham and the Town of Orleans. Over two dozen members of the commercial fishing community met with officials from both Towns and partners from Woods Hole Group to articulate how the northward migration of the inlet and dynamic changes in shoaling have impacted their industry and the navigability of the estuary. It became clear that changes in shoaling within Nauset Estuary have fundamentally changed the way lobstermen, fin fishermen, and shell fishermen do business, requiring constant adaptive management which has resulted in substantial increases in operational costs. These changes prompted members of the Orleans and Eastham fishing communities to draft and submit letters to their respective Boards of Selectmen expressing their support for dredging of Nauset Estuary. In Orleans, a Special Town Meeting vote mobilized funding for the preliminary Nauset Estuary Dredging Feasibility Assessment completed by Woods Hole Group in 2016, as well as subsequent funding for further field studies, engineering design, and permitting. A similar article was passed at the Spring 2018 Eastham Town Meeting.

Members of the fleet cited concerns about how the shoaling and narrowing of the primary navigation channel has created a public safety hazard for commercial users, recreational boaters, and emergency first responders operating within the estuary. Given how quickly the channel has shoaled, the fleet believes the proposed project is critical to their ability to continue using Nauset Estuary for a safe harbor, for the maintenance of their vessels and gear, and for the pursuit of their fishing heritage. Therefore, the proposed Dredging Project was developed with direct input from members of the commercial fishing fleets, whose tremendous proprietary knowledge of the Nauset Estuary system complemented the scientific data collection, modeling, and dredge design completed by Woods Hole Group.

Commercial Moorings and Operational Considerations within Nauset Estuary:

Nauset Estuary is home to a robust commercial fishing community comprised of lobstermen, fin fishermen, and shell fishermen. Within the Town of Orleans, Town Cove (including Goose Hummock Landing & Cove Road Landing), Show Shore Landing, and Pricilla Landing are the primary landings utilized by the commercial fishing fleet to moor fishing boats, offload catch, and maintain fishing gear (Figure 2). In the Town of Eastham, Collen’s Landing and Hemenway landing are utilized by commercial fishermen operating smaller skiffs. Historically, commercial fishing vessels moored in the upper estuary and could leave port 2.5-3.0 hours prior to low tide, navigate the channel to Nauset inlet, and have enough clearance to cross the shoals to the fishing grounds. Recent increases in shoaling now require the fleet to leave 4.0-4.5 hours before low tide, to ensure there is enough water for their fishing vessels to clear the shoals that have accumulated within the navigation channel. The evolution of shoaling has added 1.5-2.0 hours to the beginning of each fishing trip, requiring boats to leave earlier to ensure there is enough water left within the estuary to ensure safe passage.

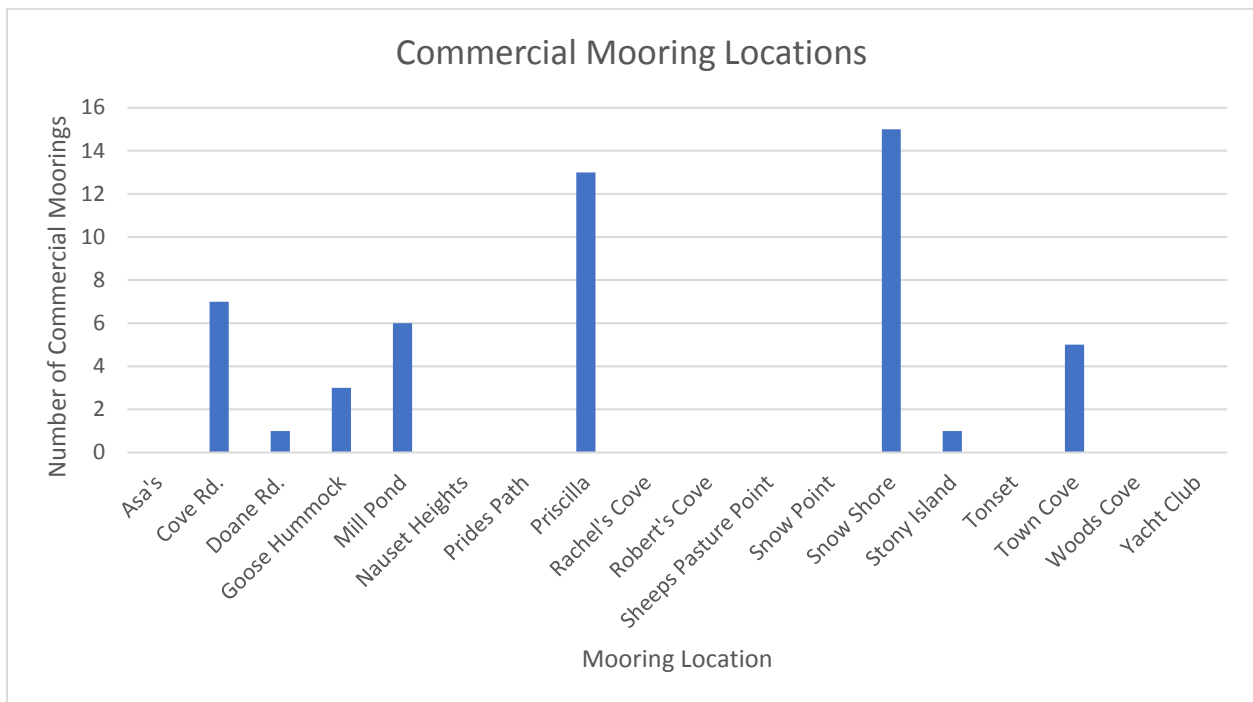


Figure 2- Commercial mooring distribution within the Town of Orleans. Cove Rd., Goose Hummock, and Yacht Club landings are both located within the greater Town Cove system.

The summer of 2016 was the fourth fishing season that required larger, commercial vessels to moor within the navigation channel in the outer limits of estuary south of Nauset inlet. This location in the Town of Eastham was selected because it reduced the distance fishing boats would have to navigate to reach the inlet. It was reported that the 250-lb. mushroom mooring and steamer chain needed to moor in that location would cost each vessel an estimated \$500-

600. Further, Orleans-based boats mooring in the Town of Eastham were subject to a higher, \$200 annual fee to moor their boats outside of Town.

Commercial fishermen opting to moor in this new location park at Town Landings within the Town of Orleans, load all necessary gear into a work skiff, and shuttle themselves, their crew, and their gear to the boat. The remote location of the new mooring field has required many fishermen to invest in new work boats that can handle heavier loads and strong currents. Estimates for a new work skiff with a 50hp outboard motor capable of navigating the estuary can range up to \$11,000. In addition to working around the tides, boats moored in the navigation channel behind the barrier beach must spend an additional 2 hours per trip accessing their mooring and offloading their catch, which over the course of the fishing season can result in a 20-30% increase in operational costs. Further, a breakdown of the water circulation pump aboard the fishing vessel or the outboard motor aboard the work skiff has the potential to compromise the catch.

Commercial vessels required to moor in the navigation channel behind the barrier beach face swift currents and exposure to coastal storms that were previously avoided when they were able to moor within the upper estuary. It was reported that several moorings within the navigation channel needed to be moved multiple times during the summer of 2016 due to the rapid changes in shoaling and transport of sediment into and out of the navigation channel. The swift currents found in this high velocity zone have the ability to compromise rudders, cutlass bearings, and propellers of commercial vessels should the mooring chain wrap around hardware while the boat is moored. The twisting of the mooring chain also puts these boats at risk of shank wrapping if the mooring should stand on end, putting the vessel at risk of “popping the mooring” and being set adrift. Boats compromised at the mooring or set adrift would be at risk of spilling 120+ gallons of diesel fuel and / or hydraulic fluid into the estuary.

For lobstermen and fin fishermen operating out of Nauset Estuary, shoaling is a major consideration throughout the fishing season which generally lasts from May-November. Most of the larger boats moored in the outer estuary and fishing offshore have a 3.5’ draft unloaded and nearly a 5.0’ draft when loaded and returning to port, requiring a navigable channel to -5.0’ at mean low water. Weather dependent, offshore fishermen may run up to 7 trips per week in season. In addition to the boats that have moved their mooring locations to the outer estuary, three commercial fishermen are now opting to fish out of the Town of Chatham as the navigational advantage of fishing outside Nauset Estuary has offset the added cost of fishing outside the Town of Orleans.

Value of Commercial Fishing Industry within Nauset Estuary:

Nauset Estuary supports a longstanding fishing heritage within the Towns of Eastham and Orleans. Commercial fishermen from both Towns utilize the Nauset Estuary system for safe harbor and for its shellfishing resources, supporting many residents of Eastham and Orleans with full-time, year-round employment. Commercial fishing also presents part-time and

seasonal employees with a way to supplement their income through the off-season. The economic impact of the commercial fishery extends well beyond the Town Landings to the wholesale dealers who purchase direct from the fishermen and distribute the catch to local seafood markets and restaurants who rely on fresh local seafood to meet demand. From 2005 to 2015, 18,046,719 lbs. of lobster, finfish, and shellfish were landed within the Town of Orleans, including all ports within Pleasant Bay, Rock Harbor, and Nauset Estuary, at a combined value of \$19,520,758 (Figure 3). During that time, the average number of pounds landed per year was 1,640,641 lbs. at an average value of \$1,774,614.

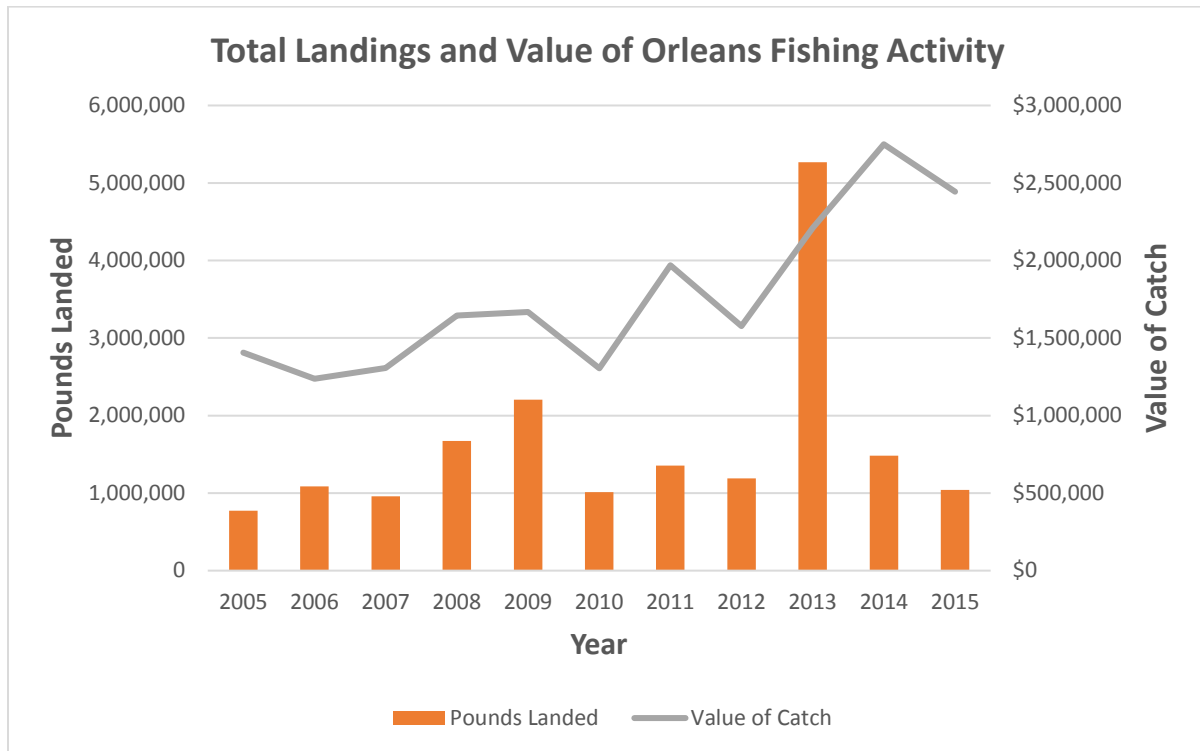


Figure 3- Total landings and value of lobster, finfish, and shellfish within the Town of Orleans.

Over the past five (5) years (2010-2015), within the Nauset Estuary system, 1,626,509 lbs. of lobster, 325,438 lbs. of finfish, and 1,298,982 lbs. of shellfish were landed at an approximate value of \$3,516,461 (Figure 4). Within the Town of Orleans and within Nauset Estuary, total pounds landed and value of the catch have fluctuated with changing State and Federal regulations, number of commercial fishing vessels, and variations in market price. Despite these fluctuations, the value of commercial fishing operations within the Town and within Nauset Estuary has continued to increase. Given that there has been no significant increase in pounds landed during that time, the increase in value may be driven by demand and subsequently, higher market prices.

From 2010 to 2015, there were an average of 19 lobster, 53 finfish, and 173 shellfish commercial permit holders operating within Nauset Estuary. After the total number of permits peaked in 2012, there has been a decline in the number of commercial permit holders

operating out of Nauset Estuary. In 2012 there were 18 lobstermen and 92 fin fishermen operating within the estuary, by 2015, the numbers had fallen to 16 lobstermen and 29 fin fishermen respectively (Figure 5). It should be noted that lobstermen and fin fishermen generally operate larger, deeper draft boats than shell fishermen. Therefore, lobstermen and fin fishermen rely heavily on a safe and navigable channel to reach Nauset Inlet and access offshore fishing grounds. Given the tremendous value and economic impact of the commercial fishing industry within Nauset Estuary, it will be important to maintain a safe and navigable channel so that lobstermen and fin fishermen can safely navigate to their offshore fishing grounds and so that shell fishermen can continue to access fertile shellfish grants.

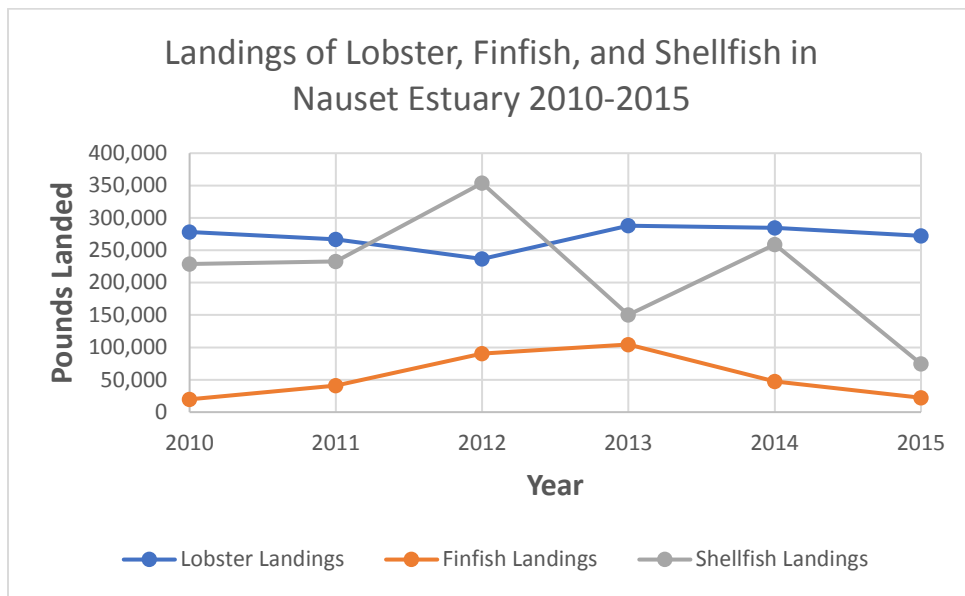


Figure 4- Total landings of lobster, finfish, and shellfish within Nauset Estuary 2010-2015.

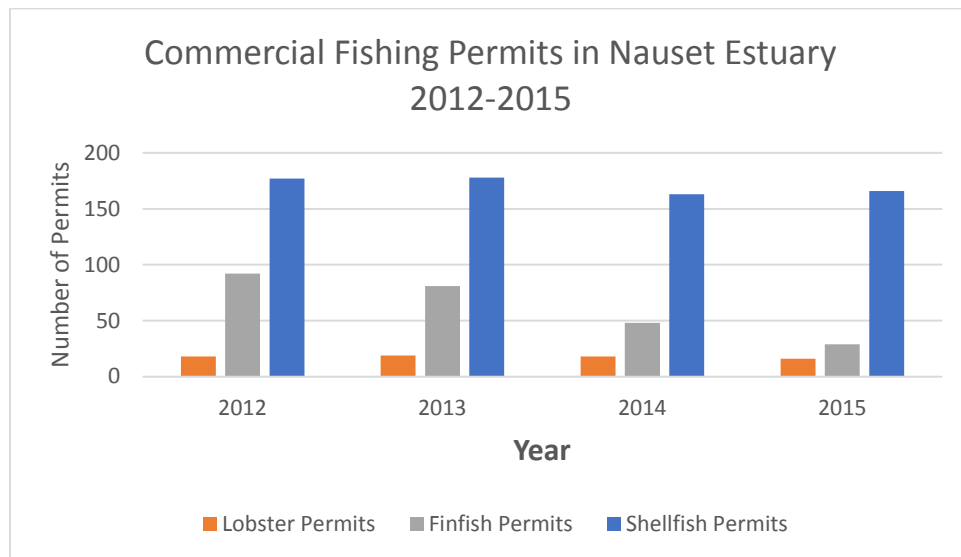


Figure 5- Lobster, finfish, and shellfish permits operating within Nauset Estuary from 2012-2015. After the number of permits peaked in 2012, there has been a decline in the number of lobster and finfish permits operating out of Nauset Estuary.

Recreational uses of Nauset Estuary:

In recent years, there has been a dramatic increase in recreational boat traffic within the Nauset Estuary system. During recent fisheries stakeholder group meetings, the Town of Orleans Harbormaster, Nate Sears, described how Orleans residents historically accessed Nauset Spit via OHRV access pathways. Recent restrictions in access to Nauset Spit have motivated many recreational users to launch or moor privately owned boats to access Nauset Spit via Nauset Estuary. This change in the way recreational users access the beach has caused recreational boat traffic within the estuary to increase, emphasizing the need for a safe and navigable channel. The proposed design would need to be wide enough and deep enough to accommodate both inexperienced and seasoned recreational mariners as well as commercial fishermen. In 2016, recreational moorings within the estuary outnumbered commercial moorings 411 to 51 (Figure 6).

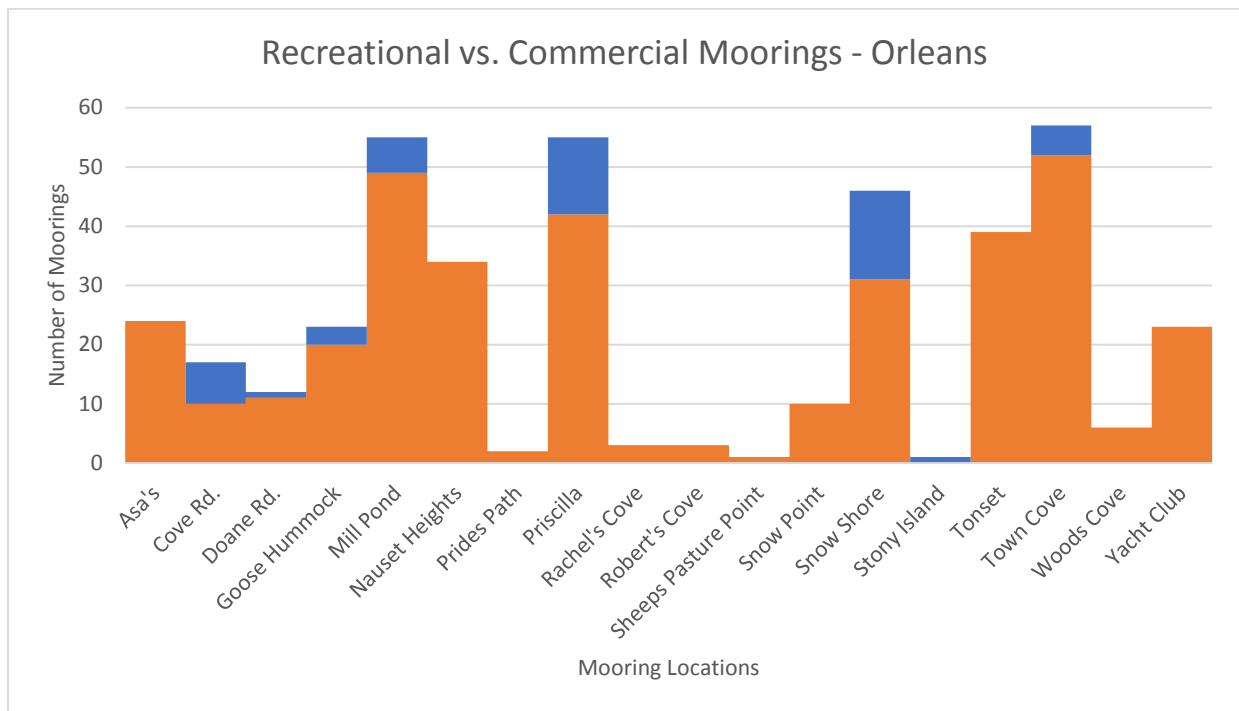


Figure 6- Recreational (orange) vs. Commercial (blue) moorings in Nauset Estuary. In 2016, total recreational moorings outnumbered commercial moorings 411 to 51.

Recreational Moorings and Boat Traffic Considerations within Nauset Estuary:

The summer months, from the beginning of June through the end of August, see the heaviest recreational boat traffic within Nauset Estuary. Moored recreational vessels are widely distributed throughout the estuary with the heaviest concentrations moored in Mill Pond, at Nauset Heights, Pricilla Landing, Tonset Landing, and within Town Cove (including Cove Road, Yacht Club, and Goose Hummock). Of the 411 recreational moorings in Nauset Estuary, 269 are located at these 8 landings with 105 located at the 4 landings in Town Cove. Town Cove also provides the easiest access to boat ramps and parking for recreational boaters launching their vessels from trailers. The majority of recreational boats used in the estuary range from 10-22 feet in length, however, some boats under 10 feet and many over 25 feet regularly navigate the waterway. Although most recreational boats draw significantly less water than the 3.5' drawn by large commercial vessels, mid-sized recreational boats struggle to navigate waters within the navigation channel at mid to low tide.

It is likely that recreational boats moored within or launched from Town Cove navigate the majority of the 4-mile long channel from Town Cove, past Hopkins Island, through the hole in the wall, and behind the barrier beach to Nauset Spit and Nauset Inlet during each outing. Recreational boaters moored outside Town Cove likely navigate the channel to access Goose Hummock Landing for fuel and supplies several times each summer. Therefore, the majority of recreational boaters rely on the navigability of the entire stretch of channel for recreational access, boat maintenance, fuel, and resupply. Navigating the channel in either direction can prove problematic for inexperienced mariners depending on the stage of the tide, accumulation of sediment, and shoaling within the navigation channel. In recent years, new shoals have accumulated within the navigation channel itself and historic shoals have continued to evolve, narrowing the width of the existing channel, impeding navigation (Figure 7).

In addition to recreational boaters, kayakers, stand-up paddleboarders, recreational fishermen, and recreational shellfishermen also make use of the resource area. The addition of so many recreational boaters and small, unmotorized craft to Nauset Estuary during the summer months increases the potential for conflict between user groups or injury and has presented local Town officials with a significant public safety hazard to consider. Officials from both Towns have identified how a wider, deeper, and therefore safer channel would help to mitigate conflicts between user groups, while ensuring first responders would be able to assist in the event of emergency.

Emergency Response within Nauset Estuary:

With so many diverse user groups making use of Nauset Estuary, accidents do happen, requiring swift emergency response. The Town of Orleans and the Town of Eastham fire departments along with the Harbor Patrol from the Town of Orleans and the Natural Resources office from the Town of Eastham all have the means to operate first response boats within Nauset Estuary. As the estuary has been deemed a non-navigable inlet by Federal authorities,

and because the U.S. Coast Guard's standard operating procedure does not allow patrol boats to respond to incidents in the surf, local authorities must be prepared to respond unassisted to any number of incidents, from groundings and mechanical failures, to collisions, drownings, kayakers in distress, and medical emergencies. For both fire departments, this requires launching a response boat from Town Cove in Orleans and navigating the Nauset Estuary channel to the location of the emergency. Given the condition of the existing navigation channel, a response would be particularly problematic during low tide or at night, when shoaling would be less visible to boat operators.

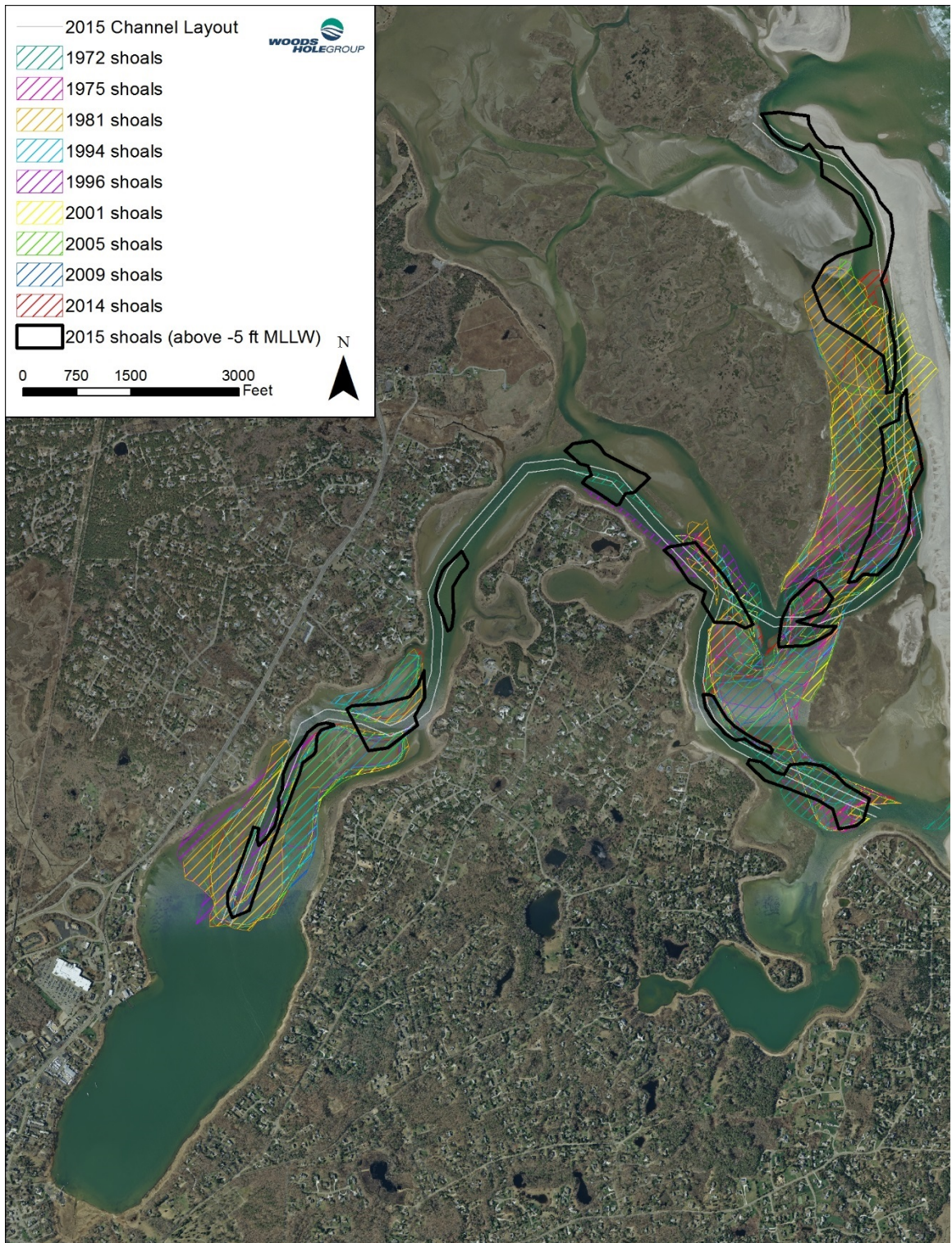


Figure 7- Patterns of historic shoaling within the Nauset Estuary channels compared with current shoal locations surveyed in November 2015. Current shoal locations present dangerous obstacles for recreational boaters to navigate.

Members of the Town of Eastham Fire Department were present at the fisheries working group meeting held at the Eastham Town Hall and described the challenges of responding to emergencies within Nauset Estuary. From 2006-2016, the Town of Eastham Fire Department responded to a total of 30 calls in the Nauset Estuary system, 16 of which required marine response using a dual-engine, 19-foot rigid inflatable response vessel with an 18-20-inch draft. During the same 10-year period, the Town of Orleans Fire Department reported a total of 18 incidents requiring marine response, 8 of which occurred in Town Cove, 6 along Nauset Beach, 3 at Nauset Inlet, and 1 along Coast Guard Beach in the Town of Eastham. Town of Orleans Fire Rescue operates out of a small, rigid inflatable vessel and is assisted by the larger Town of Orleans Harbormaster patrol boat, a 23-foot custom Privateer center console with a 12-inch draft.

Additional boats have run aground on offshore bars and have been swamped, requiring emergency responders to navigate the estuary to reach Nauset Inlet and respond to the emergency at hand. During a recent meeting, Nate Sears, Town of Orleans Harbormaster discussed the frequency with which inexperienced mariners run aground within the estuary. Often, the Town of Orleans marine patrol boat is able to tow the grounded vessel into deeper water, but reaching them through a restricted navigation channel puts staff from the Harbormaster's office at risk. Sears stated that this is such a frequent occurrence in the summer that formal records of non-life-threatening rescues carried out by his staff are rarely recorded.

Officials from the Town of Orleans and the Town of Eastham expressed concerns and doubt about their ability to respond to an emergency at Nauset Inlet on the low tide, given the shoaling that has encroached on the navigation channel. Members of the Eastham Fire Department cited a recent event during the spring of 2017, when the department responded to a reported cardiac arrest offshore of Nauset Inlet, requiring response boats to navigate the inlet to reach the victim. Although response boats are designed with shallow drafts, when under load with fuel, gear, and personnel, navigation through the estuary becomes increasingly hazardous, especially at low tide. During follow-up calls to Fire Chiefs in each Town, the need for a safe and navigable channel was emphasized, to ensure that emergency first responders would be able to reach commercial or recreational users in distress safely, regardless of the tide, day or night.