Assessment of Need, Impacts and Regulatory Feasibility Associated with Limited Improvement Dredging in the ACEC

Pleasant Bay Alliance

ORLEANS • CHATHAM • BREWSTER • HARWICH

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I. Purpose Statement

The purpose of this paper is to report on the status of the Alliance's examination of the potential need for, impacts from, and regulatory issues associated with improvement dredging in the Pleasant Bay ACEC. This paper is an examination of policy alternatives and is intended to gather public comment prior to making a recommendation to the Towns of Orleans, Chatham, Harwich and Brewster. This paper is not a proposal for improvement dredging in the ACEC.

II. Introduction

In 1987, Pleasant Bay was designated by the Commonwealth as an Area of Critical Environmental Concern (ACEC). State waterways regulations promulgated under MGL Chapter 91 prohibits improvement dredging in state-designated ACECs.[1] Improvement dredging means "*any dredging under a license or a permit in an area which has not been previously dredged or which extends the original dredged width, depth, length, or otherwise alters the original boundaries of a previously dredged area.*" (310 CMR 9.40). Previously permitted "maintenance" dredging is allowed within ACECs.

The prohibition on improvement dredging within the ACEC was thoroughly discussed during the ACEC nomination process. At that time, the ACEC boundary was drawn to exclude Aunt Lydia's Cove and a major portion of Chatham Harbor, due to the importance of navigation through those areas for the commercial fishing fleet. For the most part, however, it was felt that the periodic maintenance dredging of existing channels allowed in the ACEC would be sufficient to maintain navigation access throughout the system. Areas in which dredging had previously been permitted and would in the future be considered *maintenance* included the channels entering Round Cove, Quanset Pond, Paw Wah Pond, Lonnie's Pond, Kescayogansett Pond, and through the Narrows, and the bulkhead at Meetinghouse Pond.

Following the formation of a second barrier beach inlet in 2007, the improvement dredging prohibition resurfaced as an issue of concern. This is because the area around the 2007 inlet experienced significant sediment movement and this dynamic condition was expected to continue. Today, channels in this area are navigable, but there is potential for continued shifting of sediments that potentially could impede navigation in the future.

Traditionally navigated channels in the vicinity of the 2007 inlet are outside of previously permitted maintenance dredging areas and therefore would not be permitted for dredging under current state regulations. As discussed below, these channels were not dredged in

[1] State waterways regulations (310 CMR 9.40) prohibit the following activities in Areas of Critical Environmental Concern (ACECs): 1. improvement dredging, except for the sole purpose of fisheries or wildlife enhancement; and 2. dredged material disposal, except for the sole purpose of beach nourishment, dune construction or stabilization with proper vegetative cover, or the enhancement of fishery or wildlife resources.

the 1950's, as were other Pleasant Bay channels, because conditions at that time did not warrant dredging. The lack of a previous dredging permit does not reflect any particular resource sensitivities in those areas relative to any maintenance dredge channels in the Pleasant Bay system.

The potential need for dredging to maintain historic access in the vicinity of the 2007 inlet was raised at meeting of the Chatham Board of Selectmen in April 2008. At that time Alliance representatives reported that discussions with state officials had been initiated to explore regulatory options that may be available to enable the Town to pursue improvement dredging within the ACEC if it is deemed necessary to preserve historic navigation access.

Accordingly, the Alliance communities' *Pleasant Bay Resource Management Plan 2008 Update* included the following recommendation regarding improvement dredging:

> 8.6.2. Evaluate implications of improvement dredging. As part of the sediment management study outlined in Chapter 7, the Alliance will conduct a study of the potential need for, impacts from, and feasibility of improvement dredging in areas where shoaling is limiting access in areas that traditionally have served as important public navigable waterways. An analysis of the regulatory implications and issues associated with improvement dredging would need to be included in the study.

The findings of the Alliance's examination of the potential need for, impacts from, and regulatory issues associated with improvement dredging in the Pleasant Bay ACEC are summarized below.

III. Patterns of Shoaling in the Pleasant Bay System

A large percentage of the Pleasant Bay system is characterized by shallow sandy shoals and meandering channels. The areas of greatest shoal movement are generally in the vicinity of tidal inlets and channels with high tidal currents.

Areas adjacent to tidal inlets are particularly prone to migrating shoal patterns given the large potential for sediment introduction from the ocean beaches, strong tidal currents and high wave energy. Chatham Harbor is long recognized as having some of the most dynamic channel and shoal systems in the Commonwealth. Awareness of these challenging conditions increased following the formation of the inlet near the Chatham Lighthouse in 1987. The 1987 inlet caused the development of a highly variable flood and ebb shoal complex that created significant challenges to navigation. These changes required the development of an extensive dredging program to maintain navigation access for Chatham's commercial fishing fleet. The inlet also enabled higher energy waves to enter the harbor, resulting in considerable erosion of the adjoining, and previously sheltered, bayside beaches and upland property along the mainland. This erosion further contributed littoral sediments to the Bay, which enlarged harbor shoals.

The more recent inlet breach in 2007 has already caused many changes to the system that have and will continue to modify adjacent interior shoals. These changes include an 11% increase in the volume of water exchanging between the Atlantic Ocean and the Bay through the two inlet system (tidal prism), higher current velocity, particularly in proximity to the 2007 inlet, and an increase in the tide range of 7/10 of a foot (ACRE, 2008). The increase in tide range has resulted in lower low tides in many areas throughout Pleasant Bay, which further restricts access in some of the traditional navigation channels. Given the more northern location of the 2007 inlet, the upper portions of Chatham Harbor and southern waters of Pleasant Bay in the general vicinity of Ministers Point and Strong Island are likely to be the regions of greatest change. This is due to the influx of sediment from the barrier beach, higher wave energy and further increases in tidal flow. Many of the channel systems between the Chatham mainland and Strong Island have become more dynamic due to the higher current velocities. A new flood shoal complex is forming inside the 2007 inlet and at this time it is unclear how, where, or in what manner this flood shoal will ultimately migrate. Consequently it is equally unclear how the traditional navigation channels will respond to the intrusion of new sediments, shoal movement and increased current velocities. Figure 2 shows changes in shoaling around the region of the 2007 inlet, from 2006-2010. Figure 3 shows existing conditions and identifies the areas where the greatest amount of shoal and channel migration is expected to occur over the next several years.

The 2007 inlet has also impacted shoal and channel stability within the portion of Chatham Harbor between the two inlets. The 2007 inlet has captured a significant volume of the overall tidal prism for Pleasant Bay. Therefore, current velocities have moderated somewhat between the two inlets since the 1987 inlet is contributing relatively less water to the estuary than before the 2007 inlet was formed. This has slowed the rate and extent of shoal migration in Chatham Harbor and it is likely that the previously highly mobile flood shoal complex will become increasingly more stable in the short term. However, the longer-term changes within this portion of Chatham Harbor may still be significant. Over the next few decades, it is anticipated that the remnant island (North Beach Island) between the two inlets will break-up and ultimately migrate in a west to southwesterly direction. This has the potential to significantly alter the network of shoals and channels and shoreline morphology in Chatham Harbor in the coming years.

The changes in the Pleasant Bay and Chatham Harbor system following the formation of a second inlet in 2007 brought the prohibition on improvement dredging into sharper focus. This awareness led the Alliance to further study the potential need, potential resource impacts and regulatory issues associated with improvement dredging. These studies are discussed below.

IV. Assessments

A. Potential Need

The Pleasant Bay Alliance undertook studies to measure existing conditions within traditionally navigated channels and to assess future trends in the movement of the barrier

beach and inlet configuration. These studies provided a basis for exploring potential impacts to navigation and the potential need for improvement dredging in the ACEC.

1. Pleasant Bay Hydrographic Survey Report (Coastal Engineering Company, Inc., 2009) The hydrographic survey measured existing channel depths to provide a baseline for assessing future changes in the following traditional channels:

- Minister's Point to Pleasant Bay, Chatham
- Bassing Harbor Entrance Channel, Chatham
- The Narrows, Orleans
- Crows Pond, Chatham
- Round Cove, Harwich
- Quanset Pond, Orleans
- Lonnie's Pond, Orleans
- Arey's Pond, Orleans
- Paw Wah Pond, Orleans

The surveys showed that some channels have areas that are at a depth of 2 feet or less at low water, as shown in Table 1. For historical reference, Table 1 also shows limiting depths from the mid-1950's based on data from the US Coast and Geodetic Survey, as well as depths shown on plans for maintenance dredging undertaken in1959. The study also calculated material volumes that would be generated by dredging of channels to specified dimensions. The volumes are shown in Table 2.

Table 1. Limiting Depths

Channel Location	1955-6 Limiting Depth at MLW	Depth of Maintenance Dredge as Permitted (Year)	2008 Approx. Limiting Depth (MLW)
East & West of Strong Island/Minister's Point to Pleasant Bay, Chatham	4'	NA	4.5'
Bassing Harbor	3'	NA	3'
Ryders Cove	5'	NA	not surveyed
Crows Pond	1'	NA	3'
Round Cove	1'	unknown	4'
Quanset Pond	1'	3' (1959*)	1.5'
The Narrows (cove)	1'	unknown	not surveyed
The Narrows (channel)	3'	6' (1959 & 1975*)	4.5'
Paw Wah Pond	.5'	3' (1959*)	1'
Areys Pond	1'	3' (1959*)	1.5'
KescayoGansett Pond	1'	3' (1959*)	1'
Meetinghouse Pond	3'	unknown	6'

*Depth as shown on plan. Actual depths, if different from plan, are not recorded. Sources: 1955-6 data from National Oceanic and Atmospheric Administration/National Ocean Service; 2008 data from *Pleasant Bay Hydrographic Surveys* (Coastal Engineering Company).

Table 2. Material Volume Calculations

	Channel Name	Channel Depth x Width	Dredge Volume (CYds)	1' Over-dredge Volume (CYds)
1	Minister's Point to Pleasant Bay, Chatham	4'x 60'	0	795
2	Bassing Harbor Entrance Channel, Chatham	4' x 60'	2,310	5,535
3	Crows Pond, Chatham	4' x 40'	1,943	2,916
4	Round Cove, Harwich	6' x 30'	1,300	1,450
5	Quanset Pond, Orleans	3' x 30'	365	410
6	The Narrows, Orleans	3' x 50'	0	0
7	Paw Wah Pond, Orleans	3' x 24'	1,530	1,020
8	Aery's Pond, Orleans	3' x 24'	850	1,860
9	KescayoGansett Pond, Orleans	3' x 24'	1.603	1,705
10	Meetinghouse Pond, Orleans	3' x 30'	0	250

Source: *Pleasant Bay Hydrographic Surveys*, Coastal Engineering Company, 2008

2. A Geomorphological Analysis of Nauset Beach/Pleasant Bay/Chatham Harbor For the Purpose of Estimating Future Configurations and Conditions (Dr. Graham Giese, et al, 2009) The geomorphological analysis or "inlet migration" study analyzes recent aerial photography and more than 150 years of historical data to assess the likely future movement of the outer beach and inlet system. The data show that the formation of the 2007 inlet is a continuation of an historical cycle that occurs in two distinct stages: an inlet development stage where a new breaching event launches a period of multiple inlets and changes in tides and tidal channels (current phase); and an inlet migration phase, where the system stabilizes and a single dominant inlet begins a southward migration. Under this trend a single stable inlet could be in place in 20 years and begin a southward migration in 30 years, potentially ending up somewhere between Minister's Point and Chatham Light in 50 years. The isolated portion of the barrier beach located between the 2007 inlet and the 1987 inlet (aka North Beach Island) would disintegrate overtime and its sediments would move landward.

3. Potential Impacts to Navigation

Based on the studies identified in 1. and 2. above, as well as on-going monitoring of channels by harbormasters, the Alliance developed GIS mapping of (1) marked channels identifying areas of maintenance dredging and (2) the area of dynamic shoaling where it is anticipated that future shoaling could impede navigation to a significant degree. These are depicted on Figure 3. Shoaling of channels may significantly reduce navigability of channels that allow passage from Pleasant Bay to Chatham Harbor and the Atlantic Ocean. The ability to travel through these waters is part of the historic use of Pleasant Bay. Of particular concern is the continuity of access for vessels in the commercial fishing fleet to reach "safe haven" in Pleasant Bay waters. Figure 4 shows the portion of the historic channel within the ACEC in which future dredging may be needed to maintain historic access. Given the predicted long-term migration of sediment moving in from Nauset Beach, the primary navigation way between Pleasant Bay and Chatham Harbor is likely to continue to be the waterway between Strong Island and the mainland. The cross-hatching on Figure 4 identifies this area as a zone in which natural channel migration is likely to occur and limited dredging might be needed. Please note that this

area does not denote a dredging footprint and it is anticipated that only limited areas within the zone may, potentially, require dredging.

It is acknowledged that the shallow characteristic of the system means that even under "best case" conditions some vessel drafts cannot be accommodated, and other vessels may be restricted at certain levels of the tide. Boaters in Pleasant Bay have always needed to navigate around tides, and this is not expected to change unless by natural occurrence.

Table 1 provides information on channel depths from historical and current sources. This provides a frame of reference for determining historical depths. The US Coast and Geodetic Survey listed limiting depths for access channels in Pleasant Bay in 1955-6. Clearly, some of the limiting depths indicated by the Geodetic Survey data were insufficient to allow navigation, and dredging was subsequently pursued. A number of channels for which depths of 1' were recorded in 1956 were later dredged in 1959 and are now considered maintenance dredging locations. The recent hydrographic survey undertaken in 2008 shows some loss of channel depth in some locations.

Channels between Pleasant Bay and Chatham Harbor were considered adequate to support access and, therefore, permits for dredging were not sought as they were for other locations in the 1950's. These traditional access ways between Pleasant Bay and Chatham Harbor are now in the vicinity of an area of dynamic shoaling due to the 2007 inlet and any dredging that would be needed to maintain historic access through this area would be considered improvement dredging. However, the lack of maintenance dredging permits does not reflect any particular resource sensitivities in this area relative to any maintenance dredge channels in the Pleasant Bay system.

It is uncertain how ongoing changes in this area may affect the functioning of the Chatham Fish Pier. In particular, it is unclear how or if the erosion of North Beach Island and the disbursement of sediments landward may alter access from the mainland to the open ocean. It is conceivable that at some point in time access to the Fish Pier may be impeded. In such a case an alternative homeport for the Chatham Fishing Fleet may be needed. Ryder's Cove has been mentioned as one possible alternative. However, the demonstration of need and feasibility of alternative locations is beyond the scope of this paper.

B. Regulatory Issues

On-going discussions between representatives of the Alliance and officials from Massachusetts Coastal Zone Management (MCZM), Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Division of Conservation and Recreation (MassDCR) ACEC program have explored regulatory options to allow limited improvement dredging if changes in the system severely impeded navigation. The purpose of any such dredging would be to maintain historic channels at historic depths, and not to facilitate more intense traffic or larger recreational vessels. The areas being monitored for this potential need are areas where new sand has overlaid the bottom as a result of the 2007 inlet.

During the course of these discussions, four regulatory options for pursuing improvement dredging in the ACEC, if needed, were identified. Each of these options is described below:

1. Resource Management Plan Amendment. Modify the Resource Management Plan to include conditions under which improvement dredging in the ACEC would be permissible. Under this option, the Alliance would propose an amendment to the resource management plan to the Towns of Orleans, Chatham, Harwich and Brewster. Town Meetings in each town would need to adopt the amendment. The plan amendment would then be submitted to the Secretary of the Executive Office of Energy and Environmental Affairs for approval. If approved, the change would become part of the resource management plan.
Assessment: The plan amendment would demonstrate that improvement dredging under certain conditions would not be inconsistent with the plan. However, this change would only provide part of a regulatory strategy. It would still be necessary to either amend state regulations or seek a variance from them. In either case the RMP amendment would provide an indication of the communities' resource management objectives and conditions with respect to improvement dredging.
Disposition: Draft a plan amendment and circulate for public comment.

2. Regulatory Changes. Seek changes to the state environmental regulations that currently prohibit improvement dredging in an ACEC. Regulatory changes would be needed for Chapter 91 (to remove the prohibition), and possibly for Wetlands Protection Regulations (to address the "no adverse effect" standard) and regulations for the issuance of a water quality certification.
Assessment: Initially, the approach was deemed to be the most time consuming and difficult of the options to pursue because of the long and involved process required for changing any state regulation, and the unintended consequences of changing statewide regulations to address a regional issue. Subsequently, DEP announced its intention to revise regulations governing Waterways, 401 Water Quality Certification, and Wetlands Protection to reflect the Ocean Management Plan. If the process of regulatory revision gets underway for this purpose as planned, it would be possible to amend the three areas of state regulations as they affect improvement dredging within the same revision process. It is noted, however, that an outright allowance for improvement dredging is not desired in Pleasant Bay, and that any such allowance would only extend to the area identified on Figure 4 as the *Zone of Potential Future Maintenance Dredging*. The control of the location of potential improvement dredging could be ensured by requiring consistency with the RMP in the revised regulations, and ensuring that conditions for when and where improvement dredging is allowable are clearly spelled out in the RMP amendment.
Disposition: It was agreed to further study the potential for including state regulatory revisions as they affect the dredging prohibition within the same revisions process for the Ocean Management Plan.

3. Variance Procedure. Under this approach, the municipality proposing the improvement dredging would need to seek a variance from three state permits: Chapter 91, wetlands, and 401 water quality certification. Most likely, the variance would address a zone, within which individual dredging permits could be applied for. The variance would not, therefore, include specific dredging footprints and volumes, and those items would be spelled out in subsequent permits. The request for variances from state permits would follow other applicable local and regional permitting processes. Standard conditions for the granting of variances would need to be met. These conditions are: (1) demonstration of overriding public benefit (i.e. safety), (2) demonstration of avoidance, minimization and no alternative, (3) mitigation provided, and (4) activity conforming to best management practices.
Assessment: This approach offers desired flexibility in that it would enable the Town to undertake the time consuming variance process before an emergency situation arises, thus avoiding a lengthy review period during a period of extreme conditions. However, all variance criteria would need to be met, including mitigation of the resources affected, which may be difficult to demonstrate in the case of loss of eelgrass.
Disposition: Proceed with exploration of this option along with the RMP amendment.

4. Boundary change. Under this option, one or more towns would seek a change in the boundary of the ACEC to exclude areas where improvement dredging might be proposed.
Assessment: This option was deemed unworkable for several reasons. The negative aspects of this approach include that a proposed boundary change would have to predict where future dredging might be needed. Also, it is impossible to predict whether all towns would support a boundary change and whether it would obtain Secretarial approval. A boundary change also would undermine the Pleasant Bay ACEC program.
Disposition: Do not pursue this option.

The most feasible regulatory scenarios that emerged were the combination of #1, RMP amendment spelling out conditions under which improvement dredging would be necessary and either #2, seeking changes to Chapter 91 regulations, or #3, seeking a variance from regulations for a designated zone.

It is anticipated that either combination of actions would trigger the requirement to file an Environmental Notification Form (ENF) with the Massachusetts Environmental Policy Act (MEPA) and may require preparation of an Environmental Impact Report (EIR).

C. Resource Impacts

Through the local, regional and state review and permitting process for a dredging project, the nature and extent of any potential resource impacts must be thoroughly

assessed. This assessment would involve the measurement and evaluation of current onsite resource surveys, along with consideration of historical resource data. In order to meet the criteria for a variance, or for the granting of permits, any proposed project would need to demonstrate that it avoids or minimizes any negative impact to resources, and that it provides mitigation for any undesirable resource impacts that cannot be avoided.

Resources of particular concern with regard to dredging include: water quality, eelgrass, shellfish and finfish. Water quality effects from dredging can include siltation and re-suspension of pollutants. Dredging must avoid eelgrass beds, which serve as critical habitat to a range of shellfish and finfish species. Potential impacts from dredging on shellfish beds, and current or historic shellfish habitat also must be quantified and considered, and avoided and minimized if the project is allowed to proceed.

As part of this evaluation of issues related to improvement dredging, the Alliance overlaid data on the location of eelgrass and shellfish resources from the Resource Management Plan 2008 Update, with the area of potential shoaling. Figure 5 shows shellfish resources, and Figure 6 shows eelgrass beds, both of which are present in the area of potential shoaling. While this information is provided for reference, it should be noted that the 2008 data is a snap shot of conditions in a rapidly changing area. In all probability, dredging would only occur in the event of a further shift in sediments, which would alter resource conditions as well as navigation in the area. An accurate assessment of resource impacts would need to be undertaken in view of a proposed dredging footprint and updated surveys of resource conditions.

D. Dredged Material Disposal

In accordance with Chapter 91, within an ACEC dredged material can only be disposed of for the sole purpose of beach nourishment, dune construction or stabilization with proper vegetative cover, or the enhancement of fishery or wildlife resources.

The Alliance has raised the possibility of a system-wide disposal plan that prioritizes sites for nourishment based on need rather than town boundary. This approach is possible from a regulatory standpoint provided there is compatibility of material, but may face hurdles at the local level given the potential cost of moving sediment from a dredge location to a nourishment site, as well as competing local needs for material.

There are a number of shoreline areas in the Pleasant Bay system that are in need of sediment supply and could potentially be sites to receive dredged material. Consideration of the sites would need to be evaluated in light of proposed dredging footprints and volumes, and sediment compatibility as those details became available. To the extent feasible, dredged material should remain in the Pleasant Bay system, with preference going to use of material on public over private locations. In instances where placement of material on private shoreline is deemed desirable, it is noted that placement of material on private shoreline would trigger the public strolling access requirements under Chapter 91.

IV. Key Findings

The area around the 2007 inlet has experienced significant sediment movement and this dynamic condition is likely to continue. The area of potential dynamic change is identified on Figure 2. Channels in this area currently are navigable, but there is potential for continued shifting of sediments that potentially could impede navigation in the future.

Improvement dredging within the portion of this area that is within the Pleasant Bay ACEC is prohibited under Chapter 91. Figure 4 shows the zone in which potential channel migration may occur and in which limited improvement dredging may be necessary to maintain historic access. A regulatory strategy would need to be endorsed by the Alliance communities and the state in order to enable a municipality to pursue improvement dredging within the ACEC if it is deemed necessary and in the public interest.

The most feasible regulatory path that would enable a municipality to propose improvement dredging would involve amending the RMP to set forth conditions under which it would not be inconsistent with the RMP for a municipality to proceed with improvement dredging. Such an amendment would not condone any particular dredging project, but would create a regulatory path to enable a municipality to make a case for the need for improvement dredging. In addition to the RMP amendment one of two actions would be required: (1) removal of the prohibitions on improvement dredging contained within state waterways, 401 water quality certification and wetlands protection regulations, or (2) for a municipality to seek a variance from prohibitions and restrictions on improvement dredging within those state regulations.

These approaches are a departure from current policy. The Alliance will be seeking public input on the merits of this approach prior to making a recommendation to the Boards of Selectmen or, subsequently, Town Meetings.

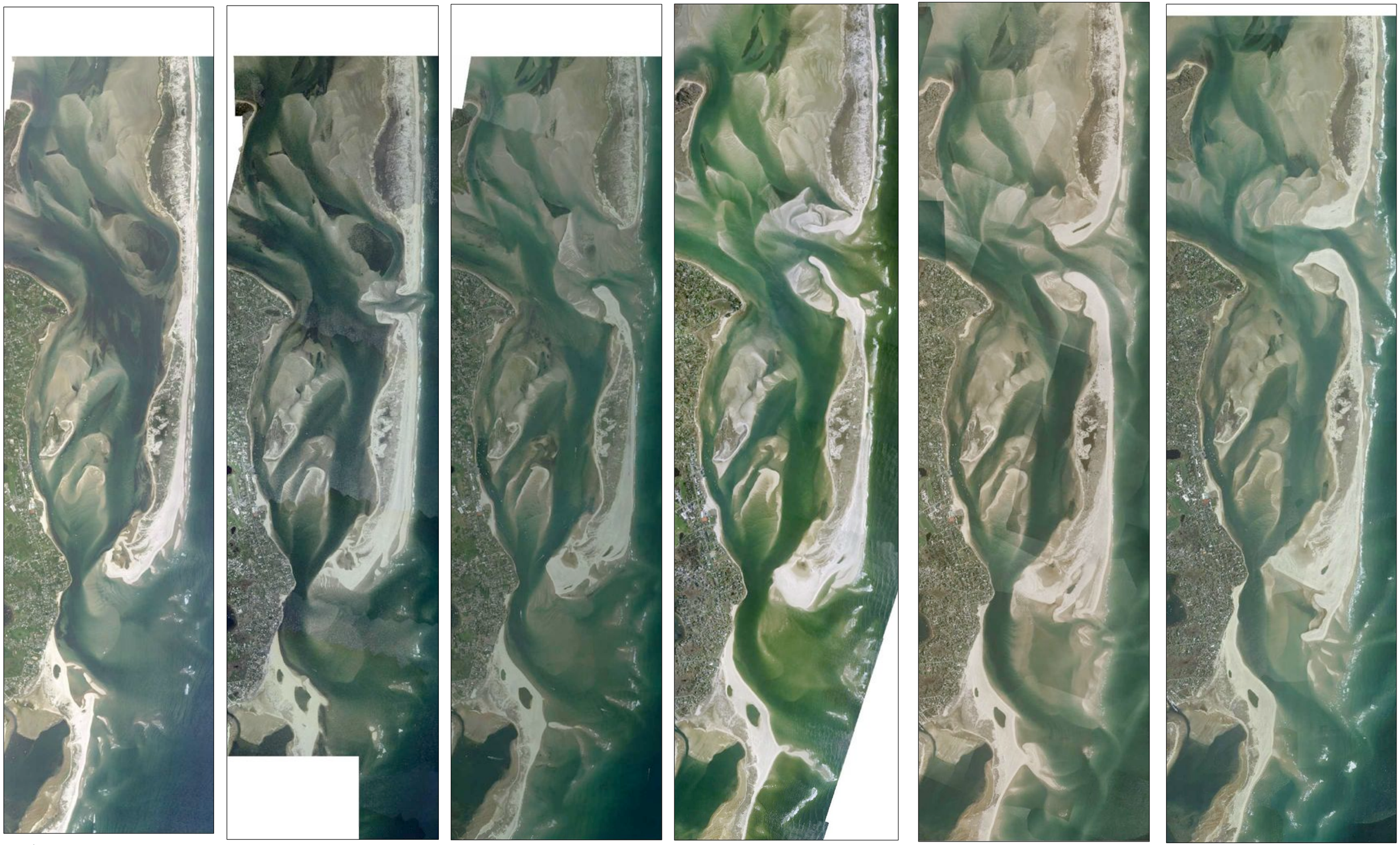
V. Next Steps

A draft Resource Management Plan (RMP) amendment (see appendix) has been prepared that would set forth conditions under which it would be considered consistent with the RMP to seek state authorization for improvement dredging. The RMP amendment does not presuppose any position the Alliance would take on a specific improvement dredging proposal. Any such position would be developed based on an assessment of information about the proposal.

The draft Resource Management Plan amendment, along with this background paper, will be made available for public comment. Over the coming weeks the Alliance will be meeting with local town committees and interested groups to review the background paper and draft RMP amendment. Based on public comment, the Alliance will make a recommendation to Selectmen in each of the four towns regarding whether to proceed with the RMP amendment.

Pleasant Bay Locus

Figure 1

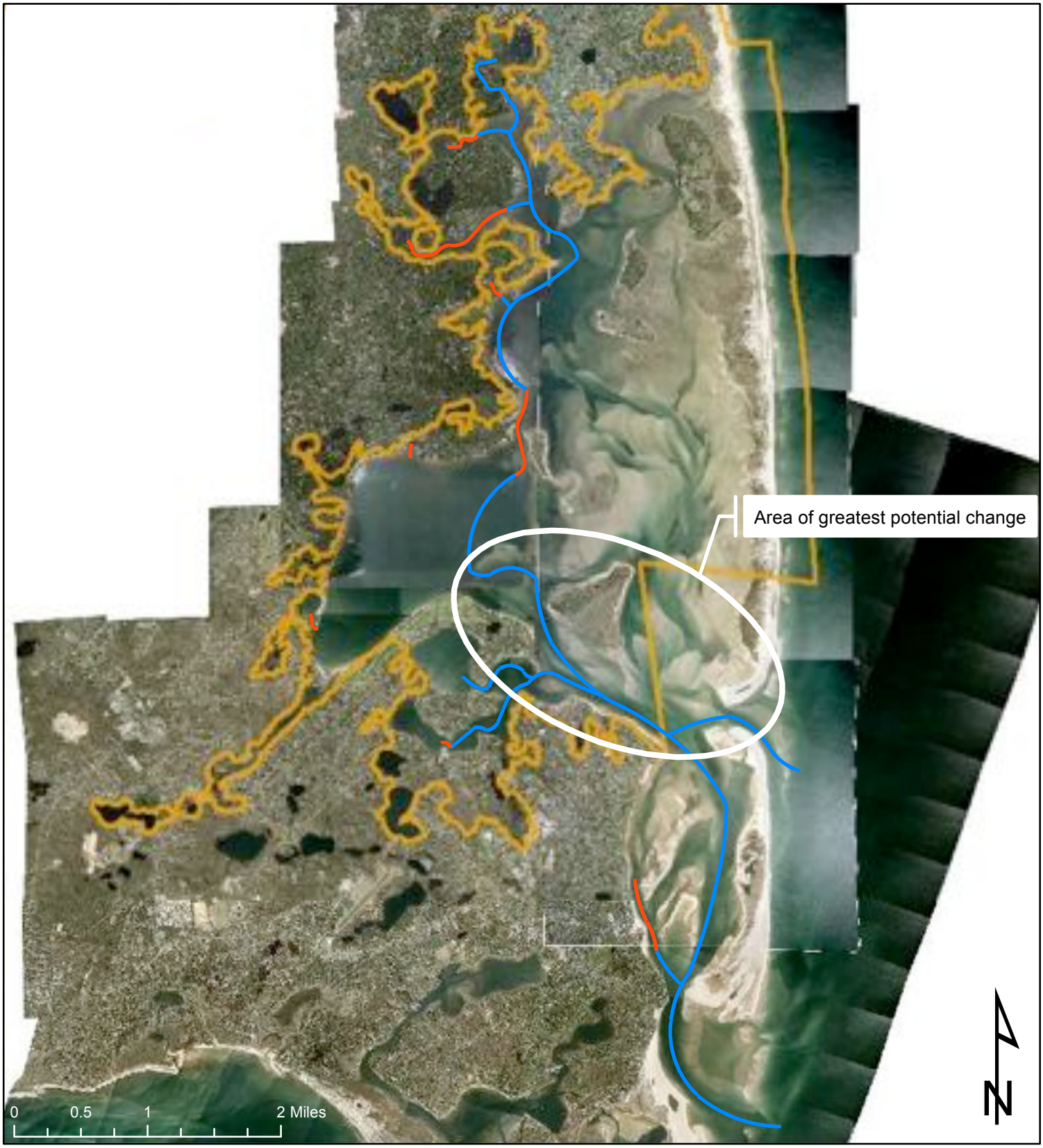


Chatham Inlet Development 2006-2011

Figure 2

0 0.25 0.5 1 Miles

Aerial Photography produced by James W. Sewall Company



Area of Greatest Potential Change

Figure 3

HISTORICAL MARKED NAVIGATION CHANNELS (NO DREDGE PERMIT EXISTS)

HISTORICAL MARKED NAVIGATION CHANNELS (DREDGE PERMIT EXISTS)

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

Data Sources:
Dredge Permit Areas: Pleasant Bay Coastal Processes Workgroup
ACEC: MassGIS
Aerial Photo Composite: 2005 and 2010
Location of permitted dredging channels are approximate and are shown for general reference purposes only.

Zone of Potential Future Dredging

Figure 4

ZONE OF POTENTIAL FUTURE DREDGING

HISTORICAL MARKED NAVIGATION CHANNELS (NO DREDGE PERMIT EXISTS)

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

Data Sources:
Dredge Permit Areas: Pleasant Bay Coastal Processes Workgroup
ACEC: MassGIS
Aerial Photo Composite: 2005 and 2010
Location of permitted dredging channels are approximate and are shown for general reference purposes only.

Shellfish Resources

Figure 5

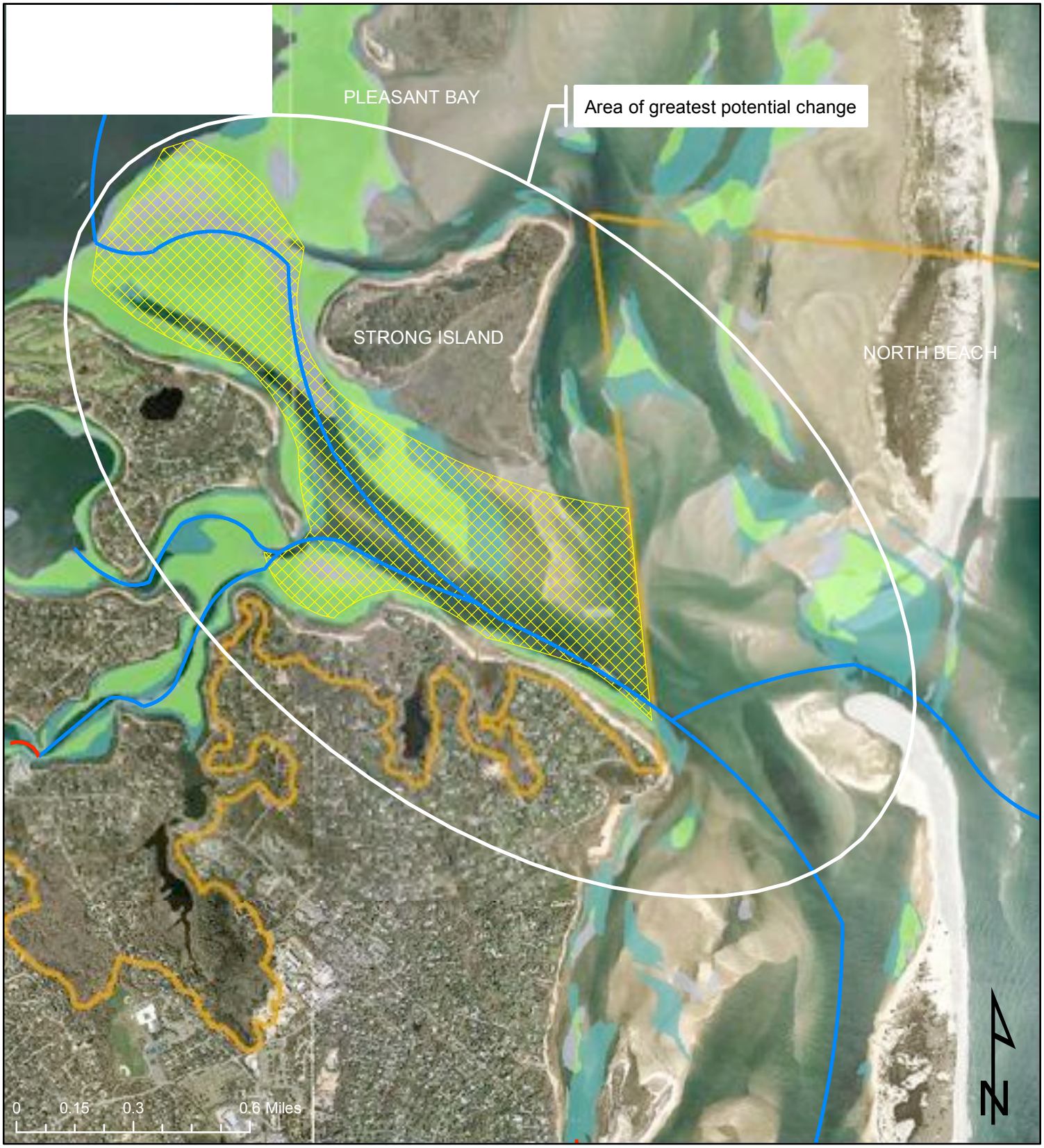
NO DREDGE PERMIT

ZONE OF POTENTIAL FUTURE DREDGING

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

SHELLFISH HABITAT

Data Sources:
Dredge Permit Areas: Pleasant Bay Coastal Processes Workgroup
ACEC: MassGIS
Aerial Photo Composite: 2005 and 2010
Location of permitted dredging channels are approximate and are shown for general reference purposes only.



Eelgrass Resources

Figure 6

ZONE OF POTENTIAL FUTURE DREDGING

MAINTENANCE PERMIT

NO DREDGE PERMIT

AREA OF CRITICAL ENVIRONMENTAL CONCERN (ACEC)

DEP EELGRASS

1995 ONLY

2001 ONLY

1995 AND 2001

Data Sources:
Dredge Permit Areas: Pleasant Bay Coastal Processes Workgroup
ACEC: MassGIS
Aerial Photo Composite: 2005 and 2010
Location of permitted dredging channels are approximate and are shown for general reference purposes only.

Appendix: Draft Resource Management Plan Amendment

Draft

DRAFT Pleasant Bay Resource Management Plan Amendment

Under the following conditions *within the area identified in Figure 4 as the Zone of Potential Future Dredging* in the Pleasant Bay ACEC, the resource management plan indicates that a municipality may seek local, regional and state authorization to undertake improvement dredging:

1. The proposed dredging is intended to maintain or restore historical navigable access for the public and is of the minimum scale necessary to maintain that access. Historical navigable access refers to the location of navigation channels and water depth at mean low water necessary to accommodate vessel drafts characteristic of the majority of vessels traditionally moored in Pleasant Bay and its subembayments. For contextual reference, historical channel depths are provided in Table 1, and the sizes of moored vessel are provided in Table 2. Figures A, B and C show channel width at a depth of four feet or greater.

2. Shoaling and changes in tidal regime have altered traditional channels such that historical navigable access between Pleasant Bay and Chatham Harbor, between either water body and the Atlantic Ocean, or through the entrance to Bassing Harbor, is severely impeded. Severely impeded access would, for example, preclude access by the commercial fleet for safe haven of vessels, or preclude safe and reasonable access by recreational boaters.

3. Through the permitting process, the municipality has undertaken an evaluation of alternatives to improvement dredging which demonstrates that the proposed improvement dredging is the preferred feasible alternative to restore historical navigable access with regard to avoiding and minimizing impacts to natural resources.

4. A feasible plan is proposed to place the dredged material within the Pleasant Bay system in a manner that is beneficial to resources protected under local and state wetlands protection regulations.

5. Through the permitting process the municipality has undertaken an evaluation of resource impacts resulting from proposed improvement dredging and placement of dredged material, and is able to demonstrate avoidance and minimization of resource impacts and adequate mitigation for any unavoidable impacts. Resource impacts of concern include those affecting shellfish populations and habitat, finfish populations and habitat and other resources and values protected under state and local wetlands protection regulations.

The proposed project would be subject to all applicable local, regional and state regulations. During regulatory proceedings the Alliance would provide public comments based an assessment of information and materials provided with regard to items 1 through 5 above and to further describe the proposed improvement dredging project.

Draft

Table 1. Limiting Depths

Channel Location	1955-6 Limiting Depth at MLW	Depth of Maintenance Dredge as Permitted (Year)	2008 Approx. Limiting Depth (MLW)
Bassing Harbor	3’	NA	3’
Ryders Cove	5’	NA	not surveyed
Crows Pond	1’	NA	3’
Round Cove	1’	unknown	4’
Quanset Pond	1’	3’ (1959*)	1.5’
The Narrows (cove)	1’	unknown	not surveyed
The Narrows (channel)	3’	6’ (1959 & 1975*)	4.5’
Paw Wah Pond	.5’	3’ (1959*)	1’
Areys Pond	1’	3’ (1959*)	1.5’
KescayoGansett Pond	1’	3’ (1959*)	1’
Meetinghouse Pond	3’	unknown	6’
East & West of Strong Island/Minister’s Pt to Pleasant Bay, Chatham	4’	NA	4.5’

*Depth as shown on plan. Actual depths, if different from plan, are not recorded. Sources: 1955-6 data from National Oceanic and Atmospheric Administration/National Ocean Service; 2008 data from *Pleasant Bay Hydrographic Surveys* (Coastal Engineering Company).

Table 2. Moored Vessels in Pleasant Bay by Size, 2007

Boat Size in Feet	<16	16-25	>25-40	>40	Total Moorings (% Increase since 1996)
Orleans	234	549	37	0	820 (29%)
Chatham	184	604	52	0	840 (36%)
Harwich	29	123	7	1	160 (20%)
Bay Total (% Total Moorings)	447 (25%)	1,276 (70%)	96 (5%)	1 (0%)	1,820

Source: Harbormasters of Orleans, Chatham, Harwich, 2007

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Figure 4. Zone of Potential Future Dredging in the ACEC

Figure A. Pleasant Bay/Chatham Harbor Bathymetric Data

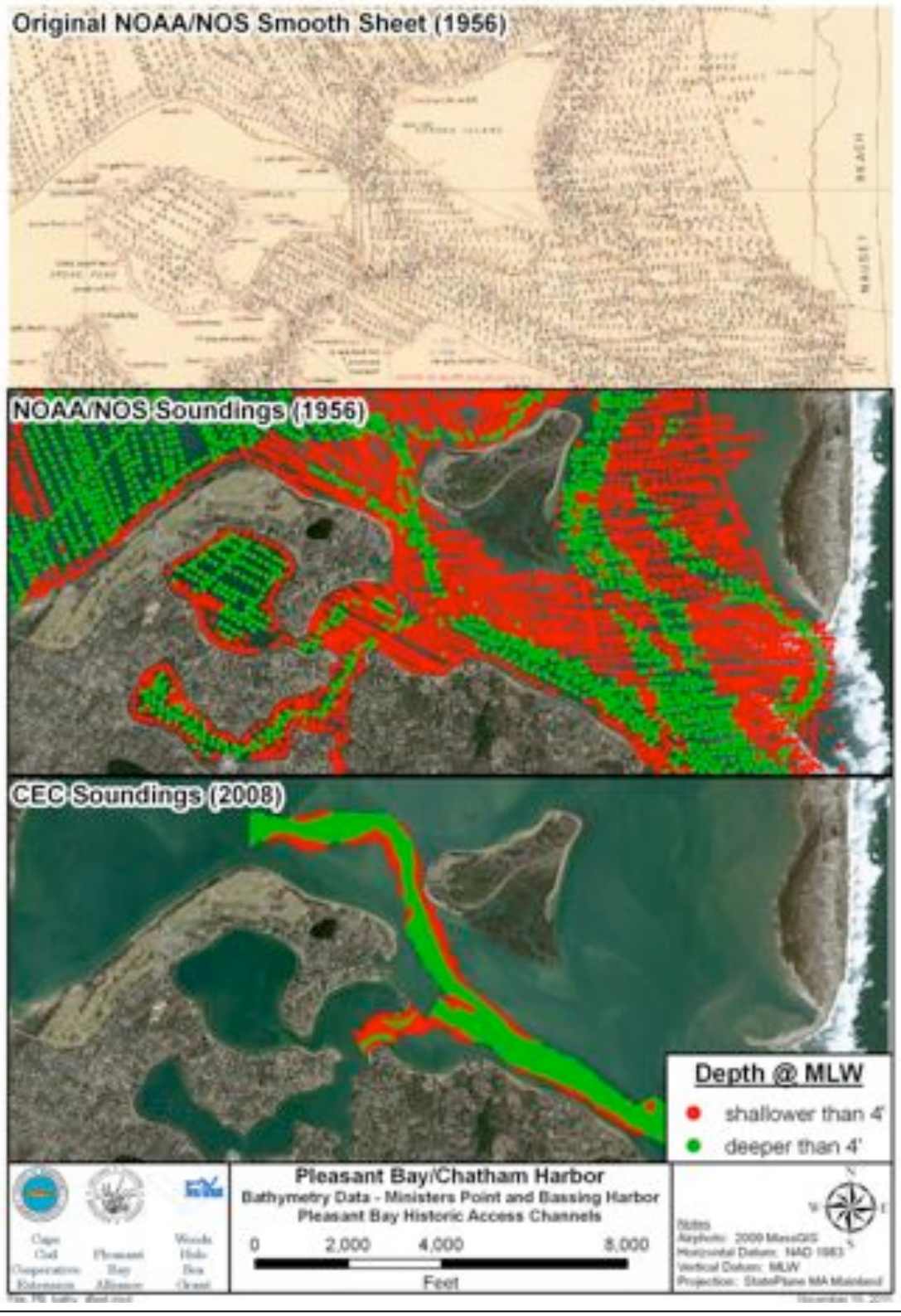

Figure B. Pleasant Bay/Chatham Harbor Bathymetric Data
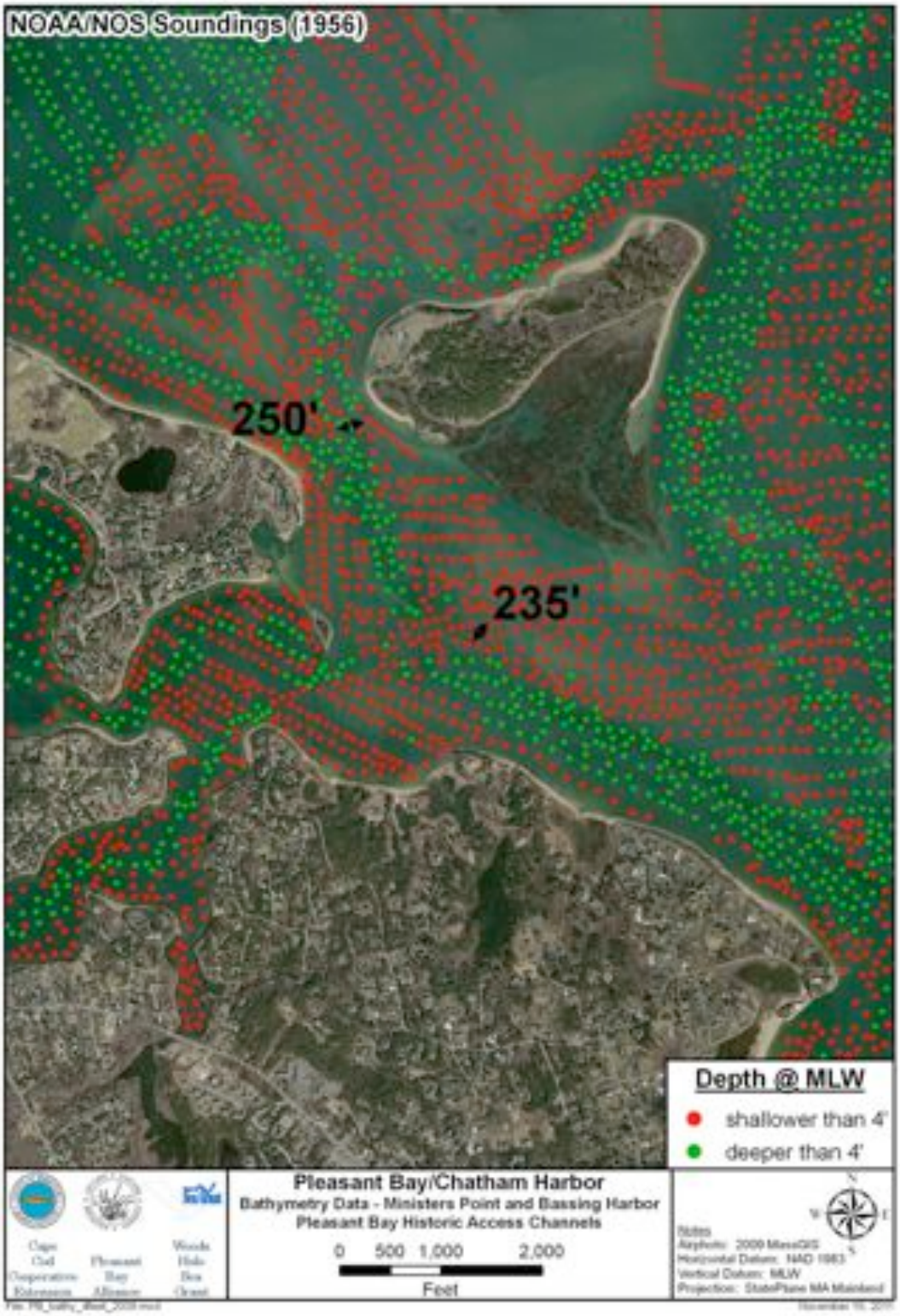
Figure C. Pleasant Bay/Chatham Harbor Bathymetric Data