MEMORANDUM

TO: Julia Wyman and Kate Killerlain Morrison
FROM: Benjamin J. Goetsch
DATE: January 12, 2011
RE: Massachusetts town bylaws as they relate to restricting or conditioning human activities in and around eelgrass beds

This memo will explore the extent to which Massachusetts town bylaws relate to restricting or conditioning human activities in or around eelgrass beds. Eelgrass (*Zoster marina L.*) is a seagrass that grows in temperate waters, sometimes forming extensive underwater meadows that act as a nursery, habitat, and feeding ground for many fish, waterfowl, and invertebrates.[1] This memo will explore the different approaches to coastal management with regards to eelgrass beds, both within and outside of Buzzard's Bay, Massachusetts, in the towns of Falmouth, Mashpee, Wareham, Plymouth, Orleans, Bourne, Barnstable, and Marion. By examining some examples of town approaches, The Nature Conservancy can determine if a universal bylaw regulating eelgrass beds can be created for Massachusetts' towns.

There are extensive eelgrass beds in Buzzards Bay, a portion of Massachusetts located in Cape Cod.[2] Coastal towns in Buzzards Bay include: Westport; Dartmouth; New Bedford; Fairhaven; Mattapoisett; Marion; Wareham; Bourne; Falmouth; and Gosnold. Because of the special nature and susceptibility to pollution of eelgrass beds, Buzzards Bay National Estuary Program[3] (BBNEP) developed a Comprehensive

[1] Costa, *Eelgrass in Buzzards Bay*, *available at* http://www.buzzardsbay.org/eelgrass.htm (last accessed November 18, 2010). Also, for the purposes of this memo, protection of other forms of submerged aquatic vegetation, or SAV, such macrophytic algae, will be considered.
[2] Buzzards Bay National Estuary Program, Information on Buzzard's Bay Watershed Towns, *available at* http://www.buzzardsbay.org/towninfo.htm (last accessed 12/07/10).
[3] Buzzards Bay National Estuary Program, Mission and Identity, *available at* http://www.buzzardsbay.org/identmis.htm (last accessed 12/9/10).

Conservation and Management Plan that identified eelgrass protection as a priority concern that required management action.[4] The BBNEP is an advisory and planning unit of the Massachusetts Office of Coastal Zone Management that provides funding and technical assistance to municipalities and citizens to implement the recommended actions contained in BBNEP's various management plans. Using the assistance of the BBNEP program, many towns in Massachusetts have placed restrictions on activities that may occur in sensitive areas, protecting eelgrass and promoting healthy coastal ecosystems.

There are many activities that have a detrimental effect on eelgrass beds and some Massachusetts communities have already placed restrictions on those activities for a variety of reasons. Docks and piers can have a significant impact on the growth of eelgrass beds, including "shading out" of the beds by docks, where blocked sunlight causes a disruption in bed growth. Moreover, cumulative impacts of boating activity, especially activity causing sediment resuspension, such as sediment resuspension from propeller wash, can make water more turbid, and can lead to the loss of eelgrass. Chain dragging associated with moorings, both the actual dragging disturbance in eelgrass beds, and sediment resuspension by chain dragging, can also lead to direct and indirect eelgrass bed losses. The commercial harvesting of shellfish, usually soft-shelled clams, through the use of hydraulic dredging (or jet-clamming) is also a major activity that can harm and destroy eelgrass beds. To address these and other threats to eelgrass, towns in Massachusetts have taken a variety of approaches to protect this resource. This memo will explore different municipal approaches for eelgrass protection in Massachusetts.

I: THE ROLE OF MUNICIPALITIES IN EELGRASS PROTECTION

[4] The Comprehensive Conservation and Management Plan included strategies to protect and restore wetlands, habitat, and water quality and living resources in Buzzards Bay.

Municipalities play an important role in tideland management in Massachusetts. The Massachusetts Home Rule Amendment to the state constitution enables municipalities to adopt local bylaws and regulations that exceed state laws. Many local Conservation Commissions throughout Massachusetts have bylaws that exceed the minimum requirements established by state laws. These local bylaws help municipalities better address the needs and concerns of the local community. In turn, local concerns can often become widespread and influence nearby town bylaws. Additionally, sometimes towns join together to protect certain shared resource areas and adopt bylaws that reflect this coordinated approach.

A. MASSACHUSETTS WETLANDS PROTECTION ACT

One way municipalities regulate tideland activity through the Home Rule Amendment is through expanding on the Massachusetts Wetlands Protection Act Regulations (WPA).[5] Municipalities administer the WPA through a local Conservation Commission, which can also adopt more stringent regulations than those contained in the WPA. In general, the act identifies eight statutory interests, or "wetland resources values," for the protection of wetlands: public/private waters supply; groundwater supply; flood control; storm damage prevention; prevention of pollution; protection of land containing shellfish; protection of wildlife habitat; and protection of fisheries. In the coastal area, the act prohibits the altering, filling, or dredging of any "coastal wetland, beach, dune, flat, marsh, meadow or swamp bordering on the ocean or any estuary…or any land under said waters subject to tidal action, coastal storm flowage, or flooding."[6]

[5] 310 MASS. CODE REGS 10.00 (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 12/7/10).
[6] 310 MASS. CODE REGS 10.00 (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 1/06/11).

Municipalities often expand upon the WPA by adding additional statutory definitions and wetland resource values to their own wetlands protection act regulations. Towns can impose different conditions and regulations upon activities within specified resource areas, such as "land containing shellfish,"[7] that are recognized as especially important to different wetlands resource values. These additional town bylaws often complement the town's wetlands protection program and include additional limitations on docks, piers, and shore outhauls for various reasons related to the wetland resource values, such as the protection of shellfish and eelgrass. The additional regulations often are accompanied by rather scientific explanations that justify the specific regulation or restriction and help guide engineers and environmental consultants working on projects under the bylaws' jurisdiction.[8]

B. THE TOWN OF FALMOUTH

The town of Falmouth is a good example of how far towns have gone to protect tideland resource values using their power under the WPA with additional regulations. During 1997 and 1998, the BBNEP helped the town rewrite their regulations to bring them up to date and to be more consistent with the State's Wetland Protection Act regulations.[9] The Falmouth Wetland Regulations (FWR)[10] is promulgated by the Falmouth Conservation Commission pursuant to the authority granted to them under the

[7] 310 MASS. CODE REGS. 10.34 (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 1/06/11).
[8] Falmouth Conservation Commission, *Understanding the Falmouth Wetland Bylaw and Regulations*, *available at* http://www.buzzardsbay.org/falmouth/falmouth-wetland-brochure1.pdf (last accessed 12/07/10).
[9] Buzzards Bay National Estuary Program, *Town of Falmouth, MA Wetland Regulations*, *available at* http://www.buzzardsbay.org/falmregs.htm (last accessed 1/06/11).
[10] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.00 (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).

Falmouth Wetlands Bylaw, Chapter 235 of the Code of Falmouth.[11] The FWR 10.00 complements Chapter 235 of the Code of Falmouth and provides performance standards with regard to certain resource areas and activities.

Underlie Anadromous/Catadromous ("Fish Run").[14]

Within each resource area, there are resource area values, or statutory interests, that are protected by performance standards. The WPA resource area values are:

-protection of public and private water supply;
-protection of ground water supply;
-flood control;
-storm damage prevention;
-prevention of pollution;
-protection of land containing shellfish;
-protection of fisheries; and
-protection of wildlife habitat.[15]

In the WPA regulations for *Land Under the Ocean*, improvement dredging (i.e. area not previously dredged, as opposed to maintenance dredging of previously dredged areas) must not have any adverse effects on marine productivity. Adverse effects may arise from suspension or transport of pollutants, increases in turbidity, the smothering of bottom organisms, or the destruction of marine fisheries habitat or wildlife habitat.[16]

Furthermore, any activity, other than improvement dredging, "shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water dependent, have not adverse effects, on marine fisheries habitat or wildlife habitat caused by…(b) destruction of eelgrass (*Zostera marina*) or widgeon grass (*Rupia maritina*) beds;…(e) alterations of shallow submerged lands with high densities of polychaetes, mollusks or marcophytic algae."[17] The resource value of

[14] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.21, 57 (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[15] 310 MASS. CODE REGS. 10.00 (2) (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 1/06/11).
[16] 310 MASS. CODE REGS. 10.24 (3-5) (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 1/06/11).
[17] 310 MASS. CODE REGS 10.24 (6) (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 1/06/11).

eelgrass and macrophytic algae is expressed in the preamble[18] of this section:

> Nearshore areas of land under the ocean also provide important food for birds. For example, waterfowl feed heavily on vegetation (such as eel grass, widgeon grass, and macrophytic algae) and invertebrates (such as polychaetes and mollusks) found in estuaries and other shallow submerged land under the ocean. When a proposed project involves the dredging, removing, filling or altering of a nearshore area of land under the ocean, the issuing authority shall presume that the area is significant to the interests specified above.[19]

The explanation of the importance of eelgrass and other submerged vegetation in the preamble signals to the reader that there is a presumption that eelgrass is a significant resource and thus protected by the bylaw's following

prohibition on eelgrass destruction. However, like the WPA, Falmouth only prohibits "non-water dependent projects" from having "no [a]dverse effect on fisheries habitat or Wildlife habitat caused by:…(d) [a]lterations of shallow submerged lands with high densities of polychaetes, mollusks or macrophytic algae;" water dependent projects under the FWR are, as in the WPA, only required to minimize such adverse effects.[22]

In addition to the ten WPA resource areas, Falmouth identifies the additional resource area of *Land Under Estuaries*.[23] Furthermore, the Falmouth definition of *Land Under the Ocean* distinguished estuaries as a separate area, as "land extending from the low mean low water line to the Boundary of Falmouth's jurisdiction, but does not include Land Under Estuaries."[24] Likewise, the FWR defines estuaries as "the lower course of a river or stream where its current is met by the tides. Estuaries are characterized by a salinity of greater then five (5) ppm or by fluctuations in water elevations due to raise and fall of the tides."[25] In *Land Under Estuaries*, the same restrictions apply to dredging and similar activities affecting the resource as *Land Under the Ocean*, including the provision that "no project shall be permitted which will result in the destruction of eelgrass (*Zostera marina*) or widgeon grass (*Ruppia maritima*) beds."[26]

i. PARTICULAR AREAS OF CONCERN IN FALMOUTH

[22] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.25 (9)(d) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[23] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.26 (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[24] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.25 (2)(a) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[25] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.26 (2)(a) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[26] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.26 (10) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).

Falmouth has a District of Critical Planning Concern (DCPC)[27], the Black Beach/Great Sippewissett Marsh, which is reflected in the FWR as its own resource area with additional resource area values.[28] Falmouth designed the 340-acre Black Beach/Sippewessit Marsh DCPC to protect the important habitat found in the barrier beaches and salt marshes in West Falmouth. Of particular importance to eelgrass protection is the resource area value of "[p]rotection of coastal ecosystems which support the continued viability if [h]arvestable shellfish and finfish habitat,"[29] which includes "the protection of eelgrass beds, salt ponds and salt marshes."[30] Also included in the definition is the "protection of ecosystem elements such as the salinity and regime and water quality."[31] The recognition of these other physical factors justifies the further restrictions found in the bylaw on septic systems and stormwater projects that could indirectly affect shellfish habitat and eelgrass beds by decreasing water quality.[32]

Under the FWR, "[h]arvestable shellfish and finfish" are those shellfish and finfish species with commercial value.[33] Therefore, eelgrass is also recognized and protected as an integral part of the ecosystem that supports shellfish and finfish with commercial value. The added definition of "the protection of coastal ecosystems which support the continued viability of [h]arvestable shellfish and finfish habitat" and the accompanying

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[27] "For municipalities on Cape Cod, another kind of special area management plan is available through the Cape Cod Commission's Regional Policy Plan, called a District of Critical Planning Concern (DCPC). A municipality nominates the DCPC to protect specific interests. The Cape Cod Commission and Barnstable County Assembly of Delegates review this nomination, and if approved; they provide the municipality additional authority to designate the special area and adopt and implement zoning or wetlands bylaws." BBNEP, "Action Plan 17: Managing Coastal Watersheets and the Waterfront", *available at* http://www.buzzardsbay.org/newccmp/newccmp-watersheets.pdf (last accessed 12/7/10).
[28] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.39 (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[29] *Id.*
[30] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.04 (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[31] *Id.*
[32] *Id.*
[33] *Id.*

performance standards is perhaps the best example of a town wetland bylaw protecting eelgrass, even though it pertains only to the limited geographic area of the Black Beach/Sippewessit Marsh DCPC.

In the performance standards of the Black Beach/Sippewessit Marsh DCPC, there is a presumption that certain activities are significant to the identified resource area values. These include the "[t]he use of septic systems" and "[t]he construction, use, and maintenance of Docks and Piers."[34] The performance standard states that existing docks and piers will have an adverse effect on the listed resource area values.[35] Accordingly, in the Black Beach/Sippewessit Marsh DCPC, "[n]o new, or replacement, or substantial repair of an existing, Dock or Pier shall be permitted."[36] Also in the Black Beach/Sippewessit Marsh DCPC, no project may be permitted which will have an adverse effect on land containing shellfish.[37]

Outside the Black Beach/Sippewessit Marsh DCPC, there is a close connection in the FWR's restrictions on coastal docks and piers between the effects of docks on shellfish and eelgrass.[38] As a submission requirement for all dock projects, applicants must submit the "location of all eelgrass within 100 feet of the proposed dock,"[39] and "no new, replacement, or substantial alteration of an existing dock or pier shall be permitted

[34] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.39 (3)(b)(1-2)(2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[35] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.39 (3)(c)(3)(2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[36] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.39 (22) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[37] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.39 (28) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[38] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16 (1) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[39] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16(1)(b)(9) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).

within 50 feet of an area of eelgrass."[40] The fifty foot minimum standard and one-hundred foot survey ensure that eelgrass even nearby a proposed dock will be protected from any indirect impacts associated with dock construction and dock use.

Relevant parts of this bylaw also highlight the important ecological relationship between shellfish and eelgrass beds. The bylaw specifically names shellfish and aquaculture[41] as two of the resource area values to be protected. The bylaw notes that the construction, use, and maintenance of docks can have both significant and cumulative effects on shellfish beds and aquaculture. In addition to immediate impacts of construction and use of docks, accumulated impacts on shellfish from dock existence can include negative impacts from turbulence and prop dredging generated by boat traffic.[42] According to this excerpt from the introduction to the regulation on coastal docks and piers, the impacts on shellfish are numerous:

> High turbidity levels attenuate the sunlight necessary for photosynthetic processes responsible for the primary productivity and oxygen regeneration of the water. The suspended sediments settle on shellfish beds, smothering existing shellfish and altering the quality of the sand bottom essential for spat (mollusk larvae) settlement. Resuspension of bottom sediments causes redistribution of sediments, alteration in sediment grain size distribution and causes changes in bottom topography relief, elevation and grade, including creation of depressions in the bottom. Resuspension of sediments into depressions creates deep pockets of sediment which may not be able to physically support shellfish or which can become anoxic and therefore not support shellfish. Resuspension of sediments during the period of shellfish larval settlement hinders or prevents the effective settlement of shellfish larvae. FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16 (2008).

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[40] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16(1)(h)(5) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).

[41] Aquaculture is an additional resource area value added to the FWR, and many other towns as well. Interesting to note is the fact that the Falmouth definition of "Aquaculture" is broader than other towns as it includes the commercial shellfish harvesting: "Aquaculture means: (a) The growing of aquatic organisms under controlled Conditions, including one or more of the following uses: raising, breeding or producing a specified type of animal or vegetable life including, but not limited to, finfish … shellfish… seaweeds; and (b) The commercial harvesting of shellfish for the purpose of selling said shellfish or any products derived there from, when carried out in a manner consistent with the rules and regulations of the Shellfish Constable relative to such commercial harvest." FALMOUTH, MASS., CODE, div.4 ch. FWR §10.04 (2008).

[42] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16 (1)(a) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).

Additionally, docks and piers that are placed in land containing shellfish can interfere with the harvesting of quahogs and scallops, therefore having a negative impact on the area's aquaculture value. To address this concern, Falmouth bylaws call for a shellfish survey[43] for all docks and a shellfish mitigation plan, depending on the results of the survey. [44] Under the general requirements and prohibition on all docks and piers, two district areas are designated:

(which, though undefined as a term, arguably includes eelgrass beds based on the other relevant portions of the bylaw, specifically relating to the DCPC), the town may order it to be removed at the owner's expense.[47] The further restrictions on uses associated with boating activities allow Falmouth officials to control the potential secondary effects of docks through the enforcement measures.

In addition to the Black Beach/Great Sippiwisset Marsh DCPC, Falmouth has another special management area that has a restrictive policy on new dock and pier construction. The Waquiot Bay Area of Critical Environmental Concern (ACEC) is managed through a coordinated effort between the towns of Falmouth and Mashpee.[48] An Area of Critical Environmental Concern (ACEC) is a place in Massachusetts that receives special recognition because of the quality, uniqueness, and significance of its natural and cultural resources. Such an area is identified and nominated at the community level and is reviewed and designated by the state's Secretary of Energy and Environmental Affairs.[49] Under the Falmouth regulations "[n]o new docks shall be allowed unless the applicant demonstrates that a public benefit will derive from the construction of the dock or pier."[50] These restrictive policies on docks help protect shellfish and eelgrass habitat, especially since Waquoit Bay has experienced historic losses of eelgrass beds in recent decades.[51]

C. THE TOWN OF MASHPEE

[47] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16(1)(i)(5) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[48] The Official Website for the Government of Massachusetts, ACEC Designations: Waquoit Bay, *available at* http://www.mass.gov/dcr/stewardship/acec/acecs/l-waqbay.htm (last accessed 12/7/10).
[49] *Id.*
[50] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16(1)(e) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[51] Waquoit Bay ACECE Resource Summary (2003), *available at* http://www.mass.gov/dcr/stewardship/acec/acecs/descriptions/WaquoitBay.pdf (last accessed 12/7/10).

Both Falmouth and Mashpee manage the Waquoit Bay ACEC, though Mashpee is not a coastal town with Buzzard's Bay. While Falmouth has a prohibition on new docks in this area, Mashpee regulates docks in the ACEC through different restrictions, some specifically related to eelgrass. As a general requirement for all proposals in all areas, including but not limited to docks in the ACEC, plans must be submitted which depict the presence and boundaries of eelgrass beds.[52] Additionally, for new docks or piers, plans must include locations of all eelgrass beds and shellfishing areas within 100 feet of the proposed project.[53] However, Mashpee's primary concern about the adverse impacts of docks concerns the blocking of sunlight to vegetation.

The concern is reflected Mashpee's regulations on docks, "[p]iers shall be designed and constructed so as to minimize the shading effects upon eelgrass, macrophytic algae, saltmarsh and/or dune grasses,"[54] The performance standard for dock floats seeks to avoid unacceptable significant or cumulative effects on the resource area value of recreation:

> The deployment of floats (anchored by piles or pipes and subject to the Commission's jurisdiction) shall be no greater than 150 square feet and/or more than 6 feet in width. Rationale – floats larger than this size present a problem for recreational shellfishermen, attempting to dig/rake underneath. Additionally, large floats block sunlight necessary for maintaining submerged aquatic vegetation (abbrev. – S.A.V., such as Eelgrass). The S.A.V., in turn serves as the base of the benthic community, including shellfish.[55]

In contrast, the Falmouth regulations do not show the same degree of concern for sunlight

[52] MASHPEE, MASS., CODE, ch. 172 §3(A)(6)(c) (2006), *available at* http://www.ci.mashpee.ma.us/Pages/MashpeeMA_Conservation/formfolder/172reg110308.pdf (last accessed 12/7/10).
[53] MASHPEE, MASS., CODE, ch. 172 §3(A)(9)(c-d) (2006), *available at* http://www.ci.mashpee.ma.us/Pages/MashpeeMA_Conservation/formfolder/172reg110308.pdf (last accessed 12/7/10).
[54] MASHPEE, MASS., CODE, ch. 172 §3(A)(9)(j) (2006), *available at* http://www.ci.mashpee.ma.us/Pages/MashpeeMA_Conservation/formfolder/172reg110308.pdf (last accessed 12/7/10).
[55] MASHPEE, MASS., CODE, ch. 172 §9(L)(2)(a) (2006), *available at* http://www.ci.mashpee.ma.us/Pages/MashpeeMA_Conservation/formfolder/172reg110308.pdf (last accessed 12/7/10).

reaching vegetation. As the FWR states: "[e]xcept for the floating portions of a dock, the decking surface shall not reduce normal ambient lighting, i.e. natural sunlight, by more than 50 percent."[56] It should also be noted that shellfish mitigation often requires the removal and transplanting of shellfish that may be harmed by a dock to a suitable approved location. As an ACEC is recognized at the state level, no shellfish mitigation is allowed in an ACEC under the state WPA.[57]

D. THE TOWN OF WAREHAM

Wareham regulates docks with regards to eelgrass under the following conditions: "in order to adequately prevent the disruption of eelgrass beds no part of the dock or pier, or float system, shall be constructed in, above, or within 50' of eelgrass beds."[58] All dock plans must include the presence of eelgrass within 75 feet of the proposed structure based on a site specific survey conducted during the appropriate time of year when it can be readily identified, i.e. July 1 to November 15.[59] The inclusion of seasonal requirements for an eelgrass survey ensures that eelgrass habitat is accurately recorded as the plant does not grow and may not even be present during different seasons.

In addition, the Wareham bylaw states, "piers shall not be allowed to be constructed within significant shellfish habitat as determined by the DMF and/or the Wareham Shellfish Constable…[t]he absence of shellfish may not mean that productive

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[56] FALMOUTH, MASS., CODE, div.4 ch. FWR §10.16 (1)(c)(4) (2008), *available at* http://www.ecode360.com/?custId=FA1385 (last accessed 1/06/11).
[57] 310 MASS. CODE REGS 10.34(6) (2009), *available at* http://www.mass.gov/dep/service/regulations/310cmr10a.pdf (last accessed 1/06/11).
[58] WAREHAM, MASS., CODE, div. VI art. 1 §XVI (C)(8) (2008), *available at* http://www.wareham.ma.us/Public_Documents/WarehamMA_Conservation/Wetland%20Protective%20By-Law?textPage=1 (last accessed 12/7/10).
[59] WAREHAM, MASS., CODE, div. VI art. 1 §XVI (B) (2008), *available at* http://www.wareham.ma.us/Public_Documents/WarehamMA_Conservation/Wetland%20Protective%20By-Law?textPage=1 (last accessed 12/7/10).

shellfish habitat does not exist."[60] The bylaw is clear that shellfish habitat includes areas where shellfish are currently present, as well as potential future habitat and past historical habitat. The bylaw can protect these resources more effectively by taking into account the longer-term natural cycles that can govern the presence and propagation of shellfish in an area.

Wareham also has restrictions on activities affecting eelgrass within the definition of *erosion and sedimentation control*:

> The term "erosion and sedimentation control" shall include both the ability of the Wetland Resource Area to perform these functions and the responsibility of the project applicant to propose a design that incorporates these controls into the plan to prevent damage to the resource area, buffer zone or abutting properties from erosion and sedimentation and water displacement caused by the project. Furthermore, each proposed project must be designed to prevent damage to the resource area due to scouring, propeller wash/shear, resuspension of sediments and from increased wave energy. Projects shall be designed to cause no adverse effect on significant shellfish habitat and/or eelgrass beds.[61]

While this definition seems to provide a performance standard and apparently relates to propeller turbulence, which usually relates to dock impacts, the bylaws does not expand on or use the term in any meaningful way, even in the section pertaining to docks. This may be an example of a good expanded definition that has no practical effect as the bylaws does not provide for any method of implementation. However, the presence of a concern for eelgrass in the definition for "erosion and sediment control" does suggest that the drafters thought eelgrass could help stabilize coastlines and help prevent erosion and sediment loss. A bylaw like this one presents the danger that decision makers may interpret and apply this resource value inconsistently leading to inefficient management.

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[60] WAREHAM, MASS., CODE, div. VI art.1 §XVI (C)(9) (2008), *available at* http://www.wareham.ma.us/Public_Documents/WarehamMA_Conservation/Wetland%20Protective%20By-Law?textPage=1 (last accessed 12/7/10).

[61] WAREHAM, MASS., CODE, div. VI art.1 §VII (1) (2008), *available at* http://www.wareham.ma.us/Public_Documents/WarehamMA_Conservation/Wetland%20Protective%20By-Law?textPage=1 (last accessed 12/7/10).

Given that the cumulative impacts of docks and their use pose one of the greatest dangers to eelgrass beds, there is a particular need to be consistent in enforcing dock restrictions where eelgrass may be impacted.

E. THE TOWN OF PLYMOUTH

In Plymouth, the wetlands regulations are much the same as the state WPA. However, in Plymouth's provision covering land under oceans, projects that do not fall under improvement dredging, regardless of water dependence, shall be designed and performed so as to cause no adverse effects on wildlife, marine fisheries or shellfisheries caused by, "destruction or diminution in the quality, quantity, vitality or productivity of eelgrass (*Zostera Marina*) beds or other forms of submerged aquatic vegetation."[62] This regulation, though similar to others, is a good example of specifically expanding a regulation's focus beyond eelgrass to include other forms of submerged aquatic vegetation. However, it still requires that potential actors know what the other forms of submerged aquatic vegetation are.

F. THE TOWN OF ORLEANS

Orleans has a general prohibition on docks within 50 feet of eelgrass beds,[63] and no other provisions specifically deal with eelgrass. However, Orleans does have a unique definition of *Shellfish Habitat* that appears to protect eelgrass. Orleans also lists *Shellfish Habitat* as a specific resource area value to be protected by the bylaw.[64] *Shellfish Habitat*

[62] PLYMOUTH, MASS., CODE, ch. 196 §10 (PART I)(A)(b) (2010), *available at* http://www.plymouth-ma.gov/Public_Documents/PlymouthMA_Planning/Wetlands%20Rules%20and%20Regs.pdf (last accessed 12/7/10).
[63] ORLEANS, MASS., CODE, ch. 196A-11 (D)(10)(h) (2009), *available at* http://www.e-codes.generalcode.com/codes/1150_A/Ch.%20196A,%20Wetlands%20Regulations.pdf (last accessed 1/7/11).
[64] ORLEANS, MASS., CODE, ch. 196A-1 (B)(1)(g) (2009), *available at* http://www.e-codes.generalcode.com/codes/1150_A/Ch.%20196A,%20Wetlands%20Regulations.pdf (last accessed 1/7/11).

is an expanded version of the resource area, *Land Containing Shellfish*, and is defined as:

> Those areas below the mean high water line in any coastal resource area that provides or has provided the characteristics including but not limited to sediment type and grain size, circulation patterns, hydrologic regime, water chemistry, plant communities and food supply, necessary to support shellfish species.[65]

The inclusion of "plant communities" in the definition certainly suggests that eelgrass should be considered, as it is in fact an important plant community for healthy shellfish habitat.

Orleans is also a managing town of the Pleasant Bay ACEC, along with Chatham and Harwich, and the Inner Cape Cod Bay ACEC, with towns Brewster and Chatham.[66] Dock management, and controlling cumulative impacts associated with "dock sprawl," was an important objective for Orleans in implementing the ACEC into their regulations because of the need to protect important shellfish habitat.[67] Under the regulations for the ACEC's and the Town Cove/Nauset Estuary (which is given equal protection in Orleans as an ACEC), new docks are not recommended and new docks are only allowed under very restrictive circumstances.[68] One general prohibition in these areas is docks within *Shellfish Habitat* as defined in the bylaw.[69] The other participating towns likewise have similar provisions so that dock management is consistent and coordinated throughout the ACECs.

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[65] ORLEANS, MASS., CODE, ch. 196A-4 (2009), *available at* http://www.e-codes.generalcode.com/codes/1150_A/Ch.%20196A,%20Wetlands%20Regulations.pdf (last accessed 1/7/11).
[66] Massachusetts Official Government Website, *Massachusetts Areas of Critical Environmental Concern (2009)*, *available at* http://www.mass.gov/dcr/stewardship/acec/acecs.htm (last accessed 12/7/10).
[67] Buzzards Bay National Estuary Program, *Action Plan 17: Managing Coastal Watersheets and the Waterfront* (2010), p.218, available at: http://www.buzzardsbay.org/newccmp/newccmp-watersheets.pdf (last accessed 12/7/10).
[68] ORLEANS, MASS., CODE, ch. 196A-11(C) (2009), *available at* http://www.e-codes.generalcode.com/codes/1150_A/Ch.%20196A,%20Wetlands%20Regulations.pdf (last accessed 1/7/11).
[69] ORLEANS, MASS., CODE, ch. 196A-11(D)(2) (2009), *available at* http://www.e-codes.generalcode.com/codes/1150_A/Ch.%20196A,%20Wetlands%20Regulations.pdf (last accessed 1/7/11).

G. THE TOWN OF BOURNE

The town of Bourne also uses an expanded definition for *Significant Shellfish Habitat*. Unlike Orleans' definition for *Shellfish Habitat*, which references important plant communities to shellfish, Bourne's definition contains specific concern for eelgrass:

> Significant Shellfish Habitat means those areas containing shellfish in densities (numbers) and/or habitat considered significant by the state Division of Marine Fisheries (DMF) and/or the Bourne Department of Natural Resources (DNR). The Commission shall also evaluate information provided by local recreational and commercial shellfishers and by the applicant. No project shall be permitted if it will cause any adverse effect on shellfish habitat and/or shellfish densities and/or impair the ability to harvest shellfish and/or cause adverse effect to eelgrass beds.[70]

Bourne also takes extra measures to define eelgrass beds as well:

> Eelgrass Beds means those areas where the marine substrate is populated by eelgrass (Zostera marina) in quantities considered significant to shellfish habitat as determined by DMF and/or Bourne DNR. Destruction of such beds is prohibited.[71]

Both definitions are referenced in the regulation's definition of erosion and sedimentation control:

> Erosion and Sedimentation Control means both the ability of the Wetland Resource Area to perform these functions and the responsibility of the project applicant to propose a design that incorporates these controls into the plan to prevent damage to the wetland resource area, buffer zone or abutting properties from erosion/sedimentation and water displacement caused by the project. Furthermore, each proposed project must be designed to prevent damage to the wetland resource area due to scouring, propeller wash/shear, resuspension of sediments and from increased wave energy. Projects shall be designed to cause no adverse effect on significant shellfish habitat and/or eelgrass beds.[72]

Erosion and sedimentation control is also a listed wetland resource value in Bourne.[73] This definition is similar to the definition of erosion and sedimentation control seen in Wareham. However, the regulation in Bourne appears to be better organized than Wareham, as the prohibitions on eelgrass destruction are repeated in multiple definitions,

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[70] BOURNE, MASS., CODE, ch. BWR §1.04 (2000), *available at* http://www.buzzardsbay.org/wetlandpage/bournewetregs.pdf (last accessed 12/7/10).
[71] *Id.*
[72] *Id.*
[73] BOURNE, MASS., CODE, ch. BWR §1.01(2) (2000), *available at* http://www.buzzardsbay.org/wetlandpage/bournewetregs.pdf (last accessed 12/7/10).

reinforcing the policy which hopefully leads to better more consistent management.

Likewise, the Bourne regulations on docks[74] require that all eelgrass be mapped within 200 feet of any proposed project[75] and that no new or expansion of an existing dock shall be permitted within 50 feet of any eelgrass beds.[76] Furthermore, dock submissions must include a Shellfish/Fisheries

or tongs are probably unimportant for bed survival under low intensity, but high intensity shellfishing efforts, or continued dredging from boats can remove large areas of eelgrass beds, as well as increase sediment resuspension and decrease water transparency.[81]

The town also allows the jet-clamming harvesting practice rather close to shore, at a minimum of six feet seaward from the mean low water line, where it is shallow enough for sunlight to reach the bottom and eelgrass can grow.[82] This is an example of a lack of coordination between the conservation commission, which administers the wetlands regulations, and the governing shellfish authorities of the town, in this case the Bourne Department of Natural Resources.[83] For this reason, more comprehensive protection strategies of resource values such as eelgrass are needed. One strategy that has also been strongly advocated by the BBNEP in the past is a municipal embayment plan, also known as harbor management plan or watersheet zoning plan.[84]

An embayment plan effectively plans for all watersheet uses (such as docks, recreational boating and swimming) and identifies resource protection areas, designates dock-free zones, mooring areas, boat exclusion zones, boat speed limit zones, exclusion zones for hydraulic dredging, and areas where dredging is permitted. The embayment plan should also specify times of year when construction or dredging is permitted so as to minimize ecosystem impacts. To effectively support such a plan, a municipality should

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[81] Costa, *Eelgrass in Buzzards Bay: Distribution, production, and historical changes in Abundance*, U. S. Environmental Protection Agency Technical Report. EPA 503/4-88-002, *available at* http://www.buzzardsbay.org/eelgrass/costa-thesis-entire.pdf (last accessed 12/16/10).

[82] BOURNE, MASS., Shellfish Regulations §6.3 (2010), *available at* http://www.buzzardsbay.org/wetlandpage/bournewetregs.pdf (last accessed 12/7/10).

[83] The only other town that allows for "jet-clamming" of wild stocks of soft shell clams is Barnstable, which allows for the harvesting at depths greater than 2 feet. *See* BARNSTABLE, MASS., CODE ch. 407-2 (2010), *available at* http://www.town.barnstable.ma.us/NaturalResources/2008ShellfishRegulations.pdf (last accessed 12/18/10).

[84] Buzzards Bay National Estuary Program, Wetlands Protection Action Plan, *available at* http://www.buzzardsbay.org/wetact.htm (last accessed 12/7/10).

document the distribution and abundance of shellfish beds, eelgrass beds, and any other valuable habitats. Only with this documentation and the plans in place will conservation commissions and harbormasters successfully deny activities that would adversely impact critical resource areas.[85]

H. THE TOWN OF MARION

Marion Waterway Regulations are unique among Buzzard's Bay towns in respect to the fact they require vessels over 25 feet in length to use helix anchors, which replace conventional mushroom anchors or mooring blocks.[86] Conventional mooring blocks may have a bottom area of 16 square feet or more. Chains attached to mooring weights scour eelgrass from the bottom. These chains also bounce up down off the bottom resuspending bottom sediments, greatly reducing transparency, that in turn can shade out eelgrass beds and elevate bacterial levels. Helix anchors screw into the ground and use elastic cords that avoid the negative impacts of traditional gear and tackle.[87]

In addition, with the help of the BBNEP, Marion created a Watersheet Zoning Model Dock and Pier Bylaw.[88] The purpose of the bylaw was to exclude very small lots from acquiring docks so as to prevent the prevalence of dock sprawl. Watersheet zoning works by dividing up the two-dimensional surface of the water (i.e. the watersheet) into zones that support or prohibit activities based upon the values assigned to each zone by the town. Though Marion's model bylaw was never passed, it represents an efficient and comprehensive strategy for excluding docks on based on the presence of shellfish habitat,

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[85] *Id.*
[86] MARION, MASS., Waterways Regulations §XI, (2007) *available at* http://www.marionma.gov/Pages/MarionMA_Harbormaster/waterwaysregs.pdf (last accessed 12/7/10).
[87] Buzzards Bay National Estuary Program, *Action Plan 8: Managing Impacts from Boating, Marinas and Moorings, available at* http://www.buzzardsbay.org/ (last accessed 12/18/10).
[88] Buzzards Bay National Estuary Program, *2005 Marion Watersheet Zoning Model Dock and Pier Bylaw, available at* http://www.buzzardsbay.org/dockpiermodel.htm (last accessed 12/7/10).

eelgrass beds, rare species habitat, and swimming beaches.

The advantage of zoning regulations over wetlands bylaw regulations (which can often allow for varying degrees of interpretation, impact and mitigation) is the fact that a zoning scheme provides a clear cut "yes or no" answer concerning a proposed dock or pier. The Marion plan created zones and identified the resource area values mentioned above within them. The zones were then scored for relative value and a prohibition on all new docks was placed on the highest scoring zones. Even existing docks could only be maintained through special permits in these no pier construction zones. Most importantly, eelgrass was assigned the highest value of all the resources thus ensuring it received the highest amount of protection.[89]

A watersheet zoning program based on relative value scores that places a high value on eelgrass may be an efficient and reliable tool for managing human activities, like docks, in and around eelgrass bed. This is especially true for a town like Marion, which has a quite limited wetlands regulation that reflects only the state minimum requirements.[90]

I. THE TOWN OF BARNSTABLE

While not a complete watersheet management plan, like Marion's model bylaw, Barnstable has recently enacted a *Recreational Shellfish Area* and *Shellfish Relay Area Overlay District* into the town zoning bylaws.[91] The original purpose of the overlay district was to protect the general public's interest in and access to the public tidelands by prohibiting hydraulic clam harvesting (jet-clamming) and the construction of new docks

[89] *Id.*
[90] Marion, Massachusetts, Conservation Commission Website, *available at* http://www.marionma.gov/Pages/MarionMA_ConsComm/index (last accessed 12/7/10).
[91] BARNSTABLE, MASS., CODE ch. 240 §37.1 (2010), *available at* http://www.ecode360.com/documents/BA2043/source/382965.pdf (last accessed 12/18/10).

and piers in areas identified as significant habitat for recreational shellfishing and town shellfish propagation efforts.[92] The areas identified for inclusion in the overlay district are areas deemed to possess significant shellfish habitat by the Town's Natural Resource Department Shellfish Biologist.

The final version of the regulation omitted any mention of hydraulic dredging as a prohibited activity, but kept the prohibition on docks. Hydraulic dredging is already heavily restricted under the town shellfishing regulations and is not allowed in recreational areas.[93] Perhaps the inclusion of the prohibition on hydraulic dredging was seen as a redundant measure. Recreational shellfish and relay areas are places are not open to commercial harvesting and recreational shellfisherman can only use traditional clam rakes and hoes when harvesting there.[94] While clam rakes can still dislodge eelgrass roots, recreational harvesters are a lower intensity class of harvesters than commercial harvesters. The indirect result of the overlay district is the protection of eelgrass from two of the most potentially harmful activities: docks and jet clamming. The creation of overlay districts such as these in a town's zoning map gives the resource a blanket protection from all harmful activities with no need for a case by case consideration of each activity's potential harmful effects by the Conservation Commission or Shellfish Constable.[95]

II: THE FUTURE OF EELGRASS PROTECTION

[92] BARNSTABLE, MASS., CODE ch. 240 §37.1 (2010), *available at* http://www.ecode360.com/?custId=BA2043 (last accessed 12/18/10).
[93] BARNSTABLE, MASS., CODE ch. 407-2 (2010), *available at* http://www.town.barnstable.ma.us/NaturalResources/2008ShellfishRegulations.pdf (last accessed 12/18/10).
[94] BARNSTABLE, MASS., CODE ch. 407-7 (2010), *available at* http://www.town.barnstable.ma.us/NaturalResources/2008ShellfishRegulations.pdf (last accessed 12/18/10).
[95] *See* the Town of Barnstable Zoning Map, *available at* http://www.town.barnstable.ma.us/TownClerk/ZONING/TOWNZONE.PDF (last accessed 12/18/10).

Watersheet zoning, like Marion's model bylaw, or the recreational shellfishing overlay districts, as seen above in Barnstable, are perhaps the best methods for protecting eelgrass from human activities. Additional town definitions and resource areas expanded from the state WPA can certainly be effective at protecting eelgrass, but only to the degree a Conservation Commission is able, or chooses, to enforce them. This is especially true with regards to controlling the cumulative impacts of dock sprawl and jet-clamming. DCPC and ACEC designations can also be effective measures for protecting eelgrass, but towns must go through a nomination process and not every area will be eligible for approval.

A watersheet zoning plan, like Marion's Model Bylaw, can draw upon heightened values for eelgrass as represented in the bylaws to justify a higher score for eelgrass beds and their habitat. Incorporating the concern for eelgrass protection into a watersheet zoning scheme ensures that decisions are made based on clear criteria and not subject to interpretation as many town bylaws can be. However, the drawback to this approach is that it requires extensive surveys of the resources to identify the location of eelgrass beds. Further complicating this approach is the fact that potential or historical eelgrass habitat should be mapped as well in order to maximize the survival and restoration of the resource.

Alternatively, the creation of recreational or shellfish relay overlay districts may be more cost effective as Shellfish Constables are likely to be already very familiar with these sites through town shellfish propagation programs. The close relation of shellfish beds to eelgrass habitat means that protecting these areas from dock building and high intensity harvesting, such as by jet-clamming or even commercial dry digging, means that

valuable eelgrass habitat will be indirectly preserved and protected.

Presently, most coastal Massachusetts towns continue to use a case-by-case approach for permitting docks that is costly and time intensive for the town and applicants. Many towns require eelgrass and shellfish surveys for each project to be approved. Watersheet zoning or the creation of overlay districts would make permitting process more efficient and consistent by collecting the same data on a regional scale and presenting it in a clear graphic format. By presenting the data in a zoning map or overlay district, future applicants will be better able to manage their own expectations about what activities are appropriate in which areas and Conservation Commissions will be better able to defend their decisions. A model bylaw to protect eelgrass should incorporate such an approach.