Falmouth Wetland Regulations
Part III Inland

FWR 10.51: Introduction

FWR 10.51 through 10.60 applies to all work which will remove, fill, dredge, build upon, degrade or otherwise alter any bank, freshwater wetland, land under water bodies, land subject to flooding or vernal pool. FWR 10.51 through 10.60 pertains to inland (as opposed to coastal) resource areas, and is promulgated in addition to FWR 10.01 through 10.20 and FWR 10.21 through 10.40. A project may be subject to regulation under both FWR 10.01 through 10.40 and FWR 10.51 through 10.80, in which case compliance with all applicable regulations is required.

FWR 10.51 through 10.60 is grouped into five resource areas. Each section begins with a Preamble which specifies the resource area values identified in Chapter 235 of the Code of Falmouth to which that resource area is or is likely to be significant. The next subsection defines the resource area and describes the characteristics of that area which are critical to the protection of the resource area values so identified. The next subsection sets forth the presumptions concerning the significance of the resource area. The last subsection contains the general performance standards to be applied to any work that will remove, fill, dredge, build upon, degrade or otherwise alter the resource area.

FWR 10.52: Purpose

FWR 10.51 through 10.60 is intended to establish criteria and standards for the uniform and coordinated administration of the provisions of Chapter 235 of the Code of Falmouth. It is intended to ensure that development in and near inland wetlands is sited, designed, constructed and maintained in a manner that protects the public resource area values identified in Chapter 235 of the Code of Falmouth and served by these resource areas.

FWR 10.51 through 10.60 is intended to notify both persons proposing work in Areas Subject to Protection Under Chapter 235 of the Code of Falmouth and the Commission that work as to the performance standards that should be applied. These standards are intended to identify the level of protection that the Commission must impose in order to contribute to the protection of the resource area identified in Chapter 235 of the Code of Falmouth. It is the responsibility of the person proposing work to design and complete their project in conformance with these performance standards. It is the responsibility of the Commission to impose such conditions on a proposed project as to ensure that the project is designed and completed in a manner consistent with these standards.

FWR 10.53: General Provisions

(1) If the Commission determines that a resource area is significant to a resource area value identified in Chapter 235 of the Code of Falmouth for which no presumption is stated in the Preamble to the applicable section, the Commission shall impose such conditions as are necessary to contribute to the protection of such resource area values.

(2) Notwithstanding the provisions of FWR 10.54 through 10.60, the Conservation Commission may issue a Permit and impose such conditions as will contribute to the resource area values identified in Chapter 235 of the Code of Falmouth permitting the following limited projects (although no such project may be permitted which will result in a net loss of freshwater wetland area or function, or which will have any adverse effect on habitat sites of rare species):

(a) The construction, reconstruction, operation and maintenance of underground and overhead public utilities, such as electrical distribution or transmission lines, or communication, sewer, water and natural gas lines, may be permitted, in accordance with the following general conditions and any additional conditions deemed necessary by the Commission:

1. the Commission may require a reasonable alternative route with fewer adverse effects for a local distribution or connecting line not reviewed by the Energy Facilities Siting Council;
2. best available measures shall be used to minimize adverse effects during construction;
3. the surface vegetation and contours of the area shall be substantially restored; and
4. all sewer lines shall be constructed to minimize inflow and leakage.

(b) Maintenance and improvement of existing public roadways, but limited to widening less than a single lane, adding shoulders, correcting substandard intersections, and improving inadequate drainage systems.

10.53: continued

(c) The maintenance of beaches and boat launching ramps which existed on August 15, 1998.
(d) The maintenance, repair and improvement (but not substantial enlargement) of structures, including dams and reservoirs and appurtenant works to such dams and reservoirs, buildings, piers, towers, headwalls, bridges, and culverts which existed on August 15, 1998.
(e) The construction and maintenance of catwalks, footbridges, docks, piers, boathouses, boat shelters, duck blinds, skeet and trap shooting decks and observation decks (dock(s), etc.); provided, however, that such structures are constructed consistent with the provisions below:

1. Docks etc., shall not exceed over one hundred feet (100 ft.) in length beyond the upland edge of the Bank (inland) so that legitimate passage along a beach or through navigation over the waters for recreational or aquacultural purposes or aquacultural purposes is not prohibited or unreasonably impeded ;
2. To keep disturbance of the bottom minimal at all times during both construction and use, the water depth at the end of the dock, etc., shall be a minimum of three (3) feet at the time of mean low water.
3. The area of the terminal "L" or "T" shape in a fixed dock etc., or the float, or the float, or combination thereof, shall not exceed 100 square feet;
4. The design and construction shall not interfere with recreational intertidal lateral access;
5. Boats at the dock, etc. shall not be allowed to leak oil or other pollutants into water;
6. Motor boats shall not be run in gear while tied to the dock, etc. since prop wash stirs up sediment and causes bank erosion;
7. Floating docks, etc. shall be fixed by piers;
8. Off-season storage of temporary/seasonal docks, etc and floats shall be in upland areas;
9. The landward approach to a dock, etc. shall not harm vegetation on a freshwater wetland inland bank (A freshwater marsh or bank shall be crossed by a raised walkway.);
10. An area where the float(s), if any, will be stored shall be designated on the plan;
11. Over freshwater wetlands the decking surface shall have a minimum of 50% open area;
12. The maximum horizontal footcandle level as measured directly below each complete lighting unit shall not exceed 0.2 footcandles (Fc)
13. Wood material used in the construction of the dock, etc. shall not be treated with any type of wood preservative.
14. The performance standards of FWR 10.53(2)(e) 5, 6, and 8 shall be included in all Permits concerning docks, etc. as a continuing order, and shall be so designated on the Certificate of Compliance. Failure to comply with these conditions shall be grounds for the Commission to revoke the permit and order the removal of the dock, etc.
15. Notwithstanding the provisions of FWR 10.53(2)(e), no dock, etc. no project may be permitted which will have any adverse effect on habitat sites of rare species.

(f) The routine maintenance and repair of road drainage structures including culverts and catch basins, drainage easements, ditches, watercourses and artificial water conveyances to insure flow capacities which existed on August 15, 1998.
(g) Lake drawdown projects (except those related to the breaching of a dam or a reservoir or an appurtenant work to such dam or reservoir) undertaken in response to written Orders or Recommendation Letters issued by the Department of Environmental Management Office of Dam Safety (DEM). The Commission shall, in the Permit, limit the duration of the drawdown based on information contained in the written finding or superseding finding by DEM pursuant to M.G.L. c. 253, §§ 44 through 50, concerning the time required to repair the dam and the economic practicability of repairing the dam. In no event shall the drawdown continue longer than three years without a new or extended Permit being obtained. Water levels that existed immediately prior to such drawdowns shall be restored no later than the expiration date of the Permit or any new or extended Permit, and a new Permit Application need not be filed for such restoration.
(h) The exploration, development, construction, expansion, maintenance, operation, and replacement of public water supply wells or wellfields (including necessary associated roads, ways, structures, and underground and overhead utility lines) derived from groundwater, provided, however, that:

1. approval for the water supply has been granted under the Public Water Supply Source Approval Process pursuant to 310 CMR 22.21 and/or the Water Management Act, M.G.L. c. 21G. This general condition shall not apply to exploration; and
2. such projects shall be designed, constructed, implemented, operated, and maintained to avoid or, where avoidance is not practicable, to minimize impacts to resource areas, and to meet the following standards to the maximum extent practicable:
    a. hydrological changes to resource areas shall be minimized;

10.53: continued

b. best management practices shall be used to minimize adverse impacts during construction, including prevention of erosion and siltation of adjacent water bodies and wetlands in accordance with standard U.S.D.A. Soil Conservation Service methods;

c. mitigating measures shall be implemented that contribute to the protection of the resource area values identified in Chapter 235 of the Code of Falmouth;

d. compensatory storage shall be provided in accordance with the standards of 310 CMR 10.57(4)(a)1. for all flood storage volume that will be lost;

e. no access road or other structure or activity shall restrict flows so as to cause an increase in flood stage or velocity;

f. temporary structures and work areas in resource areas, including access roads, shall be removed within 30 days of completion of the work. Temporary alterations to resource areas shall be substantially restored to preexisting hydrology and topography. At least 75% of the surface of any area of disturbed vegetation shall be reestablished with indigenous wetland plant species within two growing seasons and prior to said vegetative reestablishment any exposed soil in the area of disturbed vegetation shall be temporarily stabilized to prevent erosion in accordance with standard U.S.D.A. Soil Conservation Service methods; and

g. work in resource areas shall occur only when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment being used.

(i) The closure of landfills when undertaken to comply with the requirements of 310 CMR 19.000; provided, however, that:

1. a project design alternative analysis shall be prepared in accordance with 310 CMR 19.150; and

2. such projects shall be designed, constructed, implemented, operated, and maintained to avoid or, where avoidance is not practicable, to minimize impacts to resource areas, and to meet the following standards to the maximum extent practicable:

a. hydrological changes to resource areas shall be minimized;

b. best management practices shall be used to minimize adverse impacts during construction, including prevention of erosion and siltation of adjacent water bodies and wetlands in accordance with standard U.S.D.A. Soil Conservation Service methods;

c. mitigating measures shall be implemented that contribute to the protection of the resource area values identified in Chapter 235 of the Coded of Falmouth;

d. compensatory storage shall be provided in accordance with the standards of FWR 10.57(4)(a)1. for all flood storage volume that will be lost;

e. no access road, assessment or monitoring device, or other structure or activity shall restrict flows so as to cause an increase in flood stage or velocity;

f. temporary structures and work areas in resource areas, such as access roads and assessment and monitoring devices, shall be removed within 30 days of the Department's written determination that the closure of the facility has been completed in accordance with the closure permit. Temporary alterations to resource areas shall be substantially restored to preexisting hydrology and topography. At least 75% of the surface of any area of disturbed vegetation shall be reestablished with indigenous wetland plant species within two growing seasons and prior to said vegetative reestablishment any exposed soil in the area of disturbed vegetation shall be temporarily stabilized to prevent erosion in accordance with standard U.S.D.A. Soil Conservation Service methods. Temporary structures, work areas, and alterations to resource areas are those that no longer are necessary to fulfill the requirements of 310 CMR 19.000;

g. except for direct impacts to resource areas caused by the final cap and cover on the landfill, no changes in the existing topography or the existing soil and surface water levels shall be permitted, except for those resulting from temporary access roads;

h. work in resource areas shall occur only when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment used; and

i. such projects shall not include the construction of new landfills or the expansion or modification of existing landfills.

(j) Assessment, monitoring, containment, mitigation, and remediation of, or other response to, a release or threat of release of oil and/or hazardous material in accordance with the provisions of 310 CMR 40.0000 and the following general conditions (although no such measure may be permitted which is designed in accordance with the provisions of 310 CMR

10.53: continued

40.1020 solely to reduce contamination to a level lower than that which is needed to achieve "No Significant Risk" as defined

in 310 CMR 40.0006(10)):

1. there are no practicable alternatives to the response action being proposed that are consistent with the provisions of 310 CMR 40.0000 and that would be less damaging to resource areas. The alternatives analysis shall include, at a minimum, the following:
   a. an alternative that does not alter resource areas, which will provide baseline data for evaluating other alternatives; and
   b. an assessment of alternatives to both temporary and permanent impacts to resource areas.
2. such projects shall be designed, constructed, implemented, operated, and maintained to avoid or, where avoidance is not practicable, to minimize impacts to resource areas, and shall meet the following standards to the maximum extent practicable:
   a. hydrological changes to resource areas shall be minimized;
   b. best management practices shall be used to minimize adverse impacts during construction, including prevention of erosion and siltation of adjacent water bodies and wetlands in accordance with standard U.S.D.A. Soil Conservation Service methods;
   c. mitigating measures shall be implemented that contribute to the protection of the resource area values identified in Chapter 235 of the Code of Falmouth;
   d. compensatory storage shall be provided in accordance with the standards of FWR 10.57(4)(a)1. for all flood storage volume that will be lost;
   e. no access road, assessment or monitoring device, or other structure or activity shall restrict flows so as to cause an increase in flood stage or velocity;
   f. temporary structures and work areas in resource areas, such as access roads and assessment and monitoring devices, shall be removed within 30 days of completion of the work. Temporary alterations to resource areas shall be substantially restored to preexisting hydrology and topography. At least 75% of the surface of any area of disturbed vegetation shall be reestablished with indigenous wetland plant species within two growing seasons and prior to said vegetative reestablishment any exposed soil in the area of disturbed vegetation shall be temporarily stabilized to prevent erosion in accordance with standard U.S.D.A. Soil Conservation Service methods. Temporary structures, work areas, and alterations to resource areas are those that no longer are necessary to fulfill the requirements of 310 CMR 40.0000; and
   g. work in resource areas shall occur only when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment being used.

(k) The construction and maintenance of a new bike path or walking trail, used in the service of the public, of minimum practical width where reasonable means of access is unavailable. Such path or trail shall be constructed in such a manner so as to not restrict the flow of water.

(4) Notwithstanding the provisions of FWR 10.54 through 10.58, the Commission may issue a Permit for projects which will improve the natural capacity of a resource area(s) to protect the resource area values of water pollution control, protection of public and private water supply, groundwater, flood control, erosion and sediment control, fisheries, shellfish, and wildlife habitat, which are identified in Chapter 235 of the Code of Falmouth (although no such project may be permitted which will have any adverse effect on wildlife habitat sites of rare species). Such projects include, but are not limited to, the removal of aquatic nuisance vegetation to retard pond and lake eutrophication and the thinning or planting of vegetation to improve habitat value.

FWR 10.54: Bank (Inland Banks and Beaches)[1]

(1) Introduction. Banks are likely to be significant to public or private water supply, to ground water, to flood control, erosion and sedimentation control, storm damage prevention, water pollution control and to fisheries and wildlife habitat. Where Banks are composed of concrete, asphalt or other artificial impervious material, said Banks are likely to be significant to flood control and storm damage prevention.

Banks are areas where ground water discharges to the surface and where, under some circumstances, surface water recharges the ground water.

Where Banks are partially or totally vegetated, the vegetation serves to maintain the Banks' stability, which in turn protects water quality by reducing erosion and siltation.

Banks may also provide shade that moderates water temperatures, as well as providing breeding habitat, escape cover and food, all of which are significant to the protection of fisheries. Banks which drop off quickly or overhang the water's edge often contain numerous undercuts which are favorite hiding spots for important game species such as largemouth bass (Micropterus salmoides).

The topography, plant community composition and structure, and soil structure of banks together provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. Topography plays a role in determining the suitability of banks to serve as burrowing or feeding habitat. Soil structure also plays a role in determining the suitability for burrowing, hibernation and other cover. Bank topography and soil structure impact the bank's vegetative structure, as well. Bushes and other undergrowth, trees, vegetation extending from the bank into the water, and vegetation growing along the water's edge are also important to a wide variety of wildlife. A number of tubers and berry bushes also grow in banks and serve as important food for wildlife. Finally, banks may provide important shelter for wildlife which needs to move between wetland areas.

Banks act to confine floodwaters during the most frequent storms, preventing the spread of water to adjacent land. Because Banks confine water during such storms to an established channel they maintain water temperatures and depths necessary for the protection of fisheries. The maintenance of cool water temperatures during warm weather is critical to the survival of important game species such as brook trout (*Salvelinus frontinalis*), rainbow trout (*Oncorhynchus Mykiss*) and brown trout (*Salmo trutta*). An alteration of a Bank that permits water to frequently and consistently spread over a large and more shallow area increases the amount of property which is routinely flooded, as well as elevating water temperature and reducing fish habitat within the main channel, particularly during warm weather.

(2) Definition, Critical Characteristics and Boundary.

(a) A Bank is the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a freshwater wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and an upland. A Bank confines a intermittent stream when the intermittent stream flows in a particular location. A Bank may be partially or totally vegetated, or it may be comprised of exposed soil, gravel or stone.

(b) The physical characteristics of a Bank, as well as its location, as described in the foregoing FWR 10.54(2)(a), are critical to the protection of the resource area values specified in FWR 10.54(1).

(c) The upper boundary of a Bank is the first observable break in the slope or the mean annual flood level, whichever is lower. The lower boundary of a Bank is the mean annual low flow level.

(3) Presumption. Where a proposed activity involves the removing, filling, dredging, building upon, degrading or otherwise altering of a Bank, the Commission shall presume that such area is significant to, and the activity shall have a significant or cumulative effect upon, the resource area values specified in FWR 10.54(1). These presumptions are rebuttable and may be

[1] Additional regulations regarding inland banks in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding inland banks the Waquoit Bay ACEC are found in FWR 10.40.

10.54: continued

overcome upon a clear showing that the Bank does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth its grounds.

(4) General Performance Standard.
Where the Bank is determined to be significant to public or private water supply, to ground water, to flood control, erosion and sedimentation control, storm damage prevention, water pollution control and to fisheries and wildlife habitat, FWR 10.54(5) through (7) shall apply.

(5) Any proposed work on a Bank shall not impair the following:
(a) the physical stability of the Bank;
(b) the water carrying capacity of the existing channel within the Bank;
(c) ground water and surface water quality;
(d) the capacity of the Bank to provide breeding habitat, escape cover and food for fisheries;
(e) the capacity of the Bank to provide important wildlife habitat functions. A project or projects on a single lot, for which a Permit Application(s) is filed on or after August 15, 1998., that (cumulatively) alter(s) up to 25 feet of the length of the bank found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat.

(6) Notwithstanding the provisions of FWR 10.54(5), structures may be permitted in or on a Bank when required to prevent flood damage to facilities, buildings and roads constructed prior to August 15, 1998., including the renovation or reconstruction (but not substantial enlargement) of such facilities, buildings and roads, provided that the following requirements are met:
(a) The proposed protective structure, renovation or reconstruction is designed and constructed using best practical measures so as to minimize adverse effects on the characteristics and functions of the resource area;
(b) The applicant demonstrates that there is no reasonable method of protecting, renovating or rebuilding the facility in question other than the one proposed.

(7) Notwithstanding the provisions of FWR 10.54(5) or (6), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.55 Freshwater Wetlands (Wet Meadows, Marshes, Swamps and Bogs)[2]

(1) Introduction. Freshwater Wetlands are likely to be significant to public or private water supply, ground water, flood control, storm damage prevention, water pollution control, fisheries, erosion and sediment control, shellfish and wildlife habitat.

The plants and soils of freshwater wetlands remove or detain sediments, nutrients (such as nitrogen and phosphorous) and toxic substances (such as heavy metal compounds) that occur in run-off and flood waters.

Some nutrients and toxic substances are detained for years in plant root systems or in the soils. Others are held by plants during the growing season and released as the plants decay in the fall and winter. This latter phenomenon delays the impacts of nutrients and toxins until the cold weather period, when such impacts are less likely to reduce water quality.

In a coastal community such as Falmouth the water quality in the coastal areas is in large part a function of the water quality that flows out of the streams. For this reason, inland wetlands protect water quality in the shellfish beds.

[2] Additional regulations regarding freshwater wetlands in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding freshwater wetlands in the Waquoit Bay ACEC are found in FWR 10.40.

10.55: continued

Freshwater Wetlands are areas where ground water discharges to the surface and where, under some circumstances, surface water discharges to the ground water.

The profusion of vegetation in Freshwater Wetlands acts to slow down and reduce the passage of flood waters during periods of peak flows by providing temporary flood water storage and by facilitating water removal through evaporation and transpiration. This process reduces downstream flood crests and resulting damage to private and public property. During dry periods the water retained in Freshwater Wetlands is essential to the maintenance of base flow levels in rivers and streams, which in turn is important to the protection of water quality and water supplies.

Hydrology is the driving force which creates wetlands, but it is a transient, temporal parameter. The presence of water at or near the ground surface during a significant portion of the year supports, and in fact promotes, the growth of wetland indicator plants. Prolonged or frequent saturation or inundation also produces hydric soils, and creates anaerobic conditions that favor the growth of wetland indicator plants. Hydric soils are direct indicators of long-term hydrologic conditions and are present throughout the year.

Wetland vegetation supports a wide variety of insects, reptiles, amphibians, small mammals and birds which are a source of food for important game fish. Bluegills (*Lepomis macrochirus*), pumpkinseeds (*Lepomis gibbosus*), yellow perch (*Perca flavescens*), rock bass (*Ambloplites rupestris*) and all trout species feed upon nonaquatic insects. Large-mouth bass (*Micropterus salmoides*), chain pickerel (*Esox niger*) and northern pike (*Esox lucius*) feed upon small mammals, snakes, nonaquatic insects, birds and amphibians.

Wetland vegetation provides shade which moderates water temperatures important to fish life. Wetlands flooded by adjacent water bodies provide food, breeding habitat and cover for fish. Fish populations in the larval stage are particularly dependent upon food provided by over-bank flooding which occurs during peak flow periods (extreme storms) because most river and stream channels do not provide sufficient quantities of the microscopic plant and animal life required for food.

Freshwater wetlands are probably Falmouth's most important inland habitat for wildlife. The hydrologic regime, plant community composition and structure, soil composition and structure, topography, and water chemistry of freshwater wetlands provide important food, shelter, migratory and overwintering areas, and breeding areas for many birds, mammals, amphibians and reptiles. A wide variety of vegetated wetland plants, the nature of which are determined in large part by the depth and duration of water, as well as soil and water composition, are utilized by varied species as important areas for mating, nesting, brood rearing, shelter and food (directly and indirectly). The diversity and interspersion of the vegetative structure is also important in determining the nature of its wildlife habitat. Different habitat characteristics are used by different wildlife species during summer, winter and migratory seasons.

Although the vegetational community can often be analyzed to establish an accurate wetland boundary, sole reliance on the presence of wetland indicator plants can be misleading because some species thrive in both uplands and wetlands. Gently sloping areas often produce large transitional zones where the vegetational boundary is difficult to delineate. Hydrology can supplement vegetative criteria to enhance the technical accuracy, consistency, and credibility of wetland boundary delineations, and are especially useful for analyzing disturbed sites.

The sole reliance on the presence of a listed hydric soil to establish an accurate wetland boundary can also be misleading. Hydric soils lists do not include all hydric soils, nor do lists of hydric soil morphologies provide a complete list of all soil morphologies in wetlands. The driving force in wetlands is water. Plant community characteristics and soil morphology are only indicators of the hydrology of the site.

(2) Definition, Critical Characteristics and Boundary.

(a) The types of freshwater wetlands include wet meadows, marshes, swamps and bogs. Freshwater Wetlands are areas where the soils are saturated and/or inundated such that they support under normal conditions a predominance of wetland indicator plants.

(b) The physical characteristics of Freshwater Wetlands, as described in FWR 10.55(2)(a), are critical to the protection of the resource area values specified in FWR 10.55(1).

10.55: continued

(c) The boundary of Freshwater Wetlands is the line within which saturated or inundated conditions exist. Saturated or inundated conditions can be inferred when 50% or more of the vegetational community consists of wetland indicator plants. Wetland indicator plants are those classified in the indicator categories of Facultative, Facultative+, Facultative Wetland-, Facultative Wetland, Facultative Wetland+, or Obligate Wetland in the most recent edition of the National List of Plant Species That Occur in Wetlands (Fish & Wildlife Service, U.S. Department of the Interior) for the Falmouth area, Canadian hemlock (*Tsuga canadensis*), sphagnum moss (*Sphagnum spp.*) or plants exhibiting physiological or morphological adaptations to life in saturated or inundated conditions.

1. Areas containing a predominance of wetland indicator plants are presumed to indicate the presence of saturated or inundated conditions. Therefore, the boundary as determined by 50% or more wetland indicator plants shall be presumed accurate when:
   a. all dominant species have an indicator status of obligate, facultative wetland+, facultative wetland, or facultative wetland- and the slope is distinct or abrupt between the upland plant community and the wetland plant community;
   b. the Wetland Site Index (WSI)[3] is $\geq$.67
   c. the area where the work will occur is clearly limited to the buffer zone; or
   d. the Commission determines that sole reliance on wetland indicator plants will yield an accurate delineation.
2. When the boundary is not presumed accurate as described in FWR 10.55(2)(c)1.a. through d. or to overcome the presumption, credible evidence shall be submitted by a competent source demonstrating that the boundary of Freshwater Wetlands is the line within which saturated or inundated conditions exist. The Commission must evaluate all indicators of saturated or inundated conditions if submitted by a credible source, or may require credible evidence of saturated or inundated conditions when determining the boundary. Indicators of saturated or inundated conditions shall include one or more of the following (*see* FWR 10.70):
   a. groundwater, including the capillary fringe, within a major portion of the root zone;
   b. observation of prolonged or frequent flowing or standing surface water;
   c. characteristics of hydric soils.
3. Where an area has been disturbed (*e.g.* by cutting [lawns], filling, or cultivation), the lack of wetland indicator plants shall in no way be presumed to indicate that saturated or inundated conditions do not exist.
4. The determination that 50% of the plant community consists of wetland indicator plants shall be made by the commission if any one of the vegetative analysis methods listed below so indicates (*see* FWR 10.80):
   a. Department of Environmental Protection Dominance Test, $\geq$50% dominant plants being wetland indicator plants;
   b. Wetland Site Index, $\geq$0.45; or
   c. Relative Dominance of Wetland Species by Layering, $\geq$50% wetland indicator plants.
5. Areas containing soils with a water table at the soil surface during any time during the growing season are presumed to indicate the presence of saturated or inundated conditions such that they support under normal conditions a predominance of wetland indicator plants.

(3) Presumption. Where a proposed activity involves the removing, filling, dredging, building upon, degrading or otherwise altering of a Freshwater Wetland, the Commission shall presume that such area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.55(1). These presumptions are rebuttable and may be overcome upon a clear showing that the Freshwater Wetland does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth its grounds.

(4) General Performance Standards.

(a) Where the presumption set forth in FWR 10.55(3) is not overcome, any proposed work in a Freshwater Wetland shall not destroy or otherwise impair any portion of said area.

(b) Notwithstanding the provisions of FWR 10.55(4)(a), the Commission may issue a Permit allowing work which results

[3] See FWR 10.80

10.55: continued

in the loss of up to 1000 square feet of Freshwater Wetland when said area is replaced in accordance with the provisions of FWR 10.55(5) and the impact is both unavoidable and necessary.

(c) If work is permitted in Freshwater Wetlands pursuant to FWR 10.55(4)(b), the following shall apply;

1. The new wetland must be created before the existing wetland is filled, drained or destroyed (unless material from the existing wetland is to be used in the creation of the new wetland). Completion shall include at minimum the creation of a natural wetlands soil profile, grading to natural water level and planting of species as conditioned by the Commission. In no case, may other activities be undertaken until the replication is complete.

2. The applicant must monitor the replicated wetland for a minimum of three (3) years and submit an annual report to the Commission. This report must assess the soil, water, and plant conditions of the replicated wetland. The applicant may be required, on an annual basis, to remedy any deficiencies at the replication site; and

3. The edge of the proposed replicated wetland must be at least 100 feet from any property line unless written permission is granted by the adjoining property owner.

(5) Freshwater Wetlands shall be replaced according to the following general conditions and any additional, specific conditions the Commission deems necessary to ensure that the replacement area will function in a manner similar to the area that will be lost:

(a) the surface of the replacement area to be created ("the replacement area") shall be equal to that of the area that will be lost ("the lost area");

(b) the ground water and surface elevation of the replacement area shall be approximately equal to that of the lost area;

(c) the overall horizontal configuration and location of the replacement area with respect to the bank shall be similar to that of the lost area;

(d) the replacement area shall have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area;

(e) the replacement area shall be located within the same general area of the water body or reach of the waterway as the lost area;

(f) at least 90% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment any exposed soil in the replacement area shall be temporarily stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods;

(g) the replacement area has a hydrological regime consistent with Freshwater Wetlands. To achieve said hydrological regime the surface elevation of the replacement wetlands shall be no higher than the maximum annual groundwater elevation recorded for the site; and

(h) the replacement area shall be provided in a manner which is consistent with all other General Performance Standards for each resource area in FWR 10.00.

(6) Notwithstanding the provisions of FWR 10.55(4), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.56: Land Under Waterbodies (Under any Creek, Stream, Pond or Lake)[4]

(1) Preamble. Land Under Waterbodies is likely to be significant to public and private water supply, to ground water, flood control, storm damage prevention, water pollution control, to fisheries, recreation, aesthetics and wildlife habitat. Where such land is composed of concrete, asphalt or other artificial impervious material, said land is likely to be significant to flood control and storm damage prevention.

Where Land Under Waterbodies is composed of pervious material, such land represents a point of exchange between surface

[4] Additional regulations regarding land under waterbodies in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding land under water bodies in the Waquoit Bay ACEC are found in FWR 10.40.

10.56: continued

and ground water.

The physical nature of Land Under Waterbodies is highly variable, ranging from deep organic and fine sedimentary deposits to rocks and bedrock. The organic soils and sediments play an important role in the process of detaining and removing dissolved and particulate nutrients (such as nitrogen and phosphorous) from the surface water above. They also serve as traps for toxic substances (such as heavy metal compounds).

Land Under Waterbodies, in conjunction with banks, serves to confine floodwater within a definite channel during the most frequent storms. Filling within this channel blocks flows which in turn causes backwater and overbank flooding during such storms. An alteration of Land Under Waterbodies that causes water to frequently spread out over a larger area at a lower depth increases the amount of property which is routinely flooded. Additionally, it results in an elevation of water temperature and a decrease in habitat in the main channel, both of which are detrimental to fisheries, particularly during periods of warm weather and low flows.

Land under rivers, streams and creeks that is composed of gravel allows the circulation of cold, well oxygenated water necessary for the survival of important game fish species such as brook trout (*Salvelinus frontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutto*). River, stream and creek bottoms with a diverse structure composed of gravel, large and small boulders and rock outcrops provides escape cover and resting areas for the above mentioned game fish species (*salmonids*). Such bottom type also provides areas for the production of aquatic insects essential to fisheries.

Land under ponds and lakes is vital to a large assortment of warm water fish during spawning periods. Species such as large mouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieui*), blue gills (*Lepomis macrochirus*), pumpkinseeds (*Lepomis gibbosus*), black crappie (*Pomoxis nigromaculatus*) and rock bass (*Ambloplites rupestris*) build nests on the lake and bottom substrates within which they shed fertilize their eggs.

The plant community composition and structure, hydrologic regime, topography, soil composition and water quality of land under water bodies provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. Certain submerged, rooted vegetation is eaten by water fowl and some mammals. Some amphibians (as well as some invertebrate species eaten by vertebrate wildlife) attach their eggs to such vegetation. Some aquatic vegetation protruding out of the water is also used for nesting, and many species use dead vegetation resting on land under water but protruding above the surface for feeding and basking Soil composition is also important for hibernation and for animals which begin to burrow their tunnels under water. Hydrologic regime, topography, and water quality not only affect vegetation, but also determine which species feed in an area.

(2) Definition, Critical Characteristics and Boundaries.

(a) Land Under Waterbodies is the land beneath any creek, reservoir, stream, pond or lake. Said land may be composed of organic muck or peat, fine sediments, rocks or bedrock.

(b) The physical characteristics and location of Land Under Waterbodies specified in FWR 10.56(2)(a) are critical to the protection of the resource area values specified in FWR 10.56(1).

(c) The boundary of Land Under Waterbodies is the mean annual low water level.

(3) Presumption. Where a project involves removing, filling, dredging, building upon, degrading or otherwise altering of Land Under Waterbodies, the Commission shall presume that such area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.56(1). These presumptions are rebuttable and may be overcome upon a clear showing that said land does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth the grounds.

(4) General Performance Standards.

(a) Where the presumption set forth in FWR 10.56(3) is not overcome, any proposed work within Land Under Waterbodies shall not impair the following:

1. The water carrying capacity within the defined channel, which is provided by said land in conjunction with the

10.56: continued

banks;

2. Ground and surface water quality;
3. The capacity of said land to provide breeding habitat, escape cover and food for fisheries; and
4. The capacity of said land to provide important wildlife habitat functions. A project or projects on a single lot, for which Permit Application(s) is filed on or after August 15, 1998., that (cumulatively) alter(s) up to 1,000 square feet of land in this resource area found to be significant to wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold may be permitted if they will have no adverse effects on wildlife habitat.

(b) Notwithstanding the provisions of FWR 10.56(4)(a), the Commission may issue a Permit in accordance with Chapter 235 of the Code of Falmouth to maintain or improve boat channels used in the service of the public within Land Under Waterbodies when said work is designed and carried out using the best practical measures so as to minimize adverse effects such as the suspension or transport of pollutants, increases in turbidity, the smothering of bottom organisms, the accumulation of pollutants by organisms or the destruction of fisheries habitat or nutrient source areas.

(c) Notwithstanding the provisions of FWR 10.56(4)(a) or (b), no project may be permitted which will have any adverse effect on habitat sites of rare species.

FWR 10.57 Land Subject to Flooding (Bordering and Isolated Areas)[5]

(1) Introduction.

(a) Bordering Land Subject to Flooding:

1. Bordering Land Subject to Flooding is an area which floods from a rise in a bordering water body. Such areas are likely to be significant to flood control and storm damage prevention.

2. Bordering Land Subject to Flooding provides a temporary storage area for flood water which has overtopped the bank of the main channel of a creek, river or stream or the basin of a pond or lake. During periods of peak run-off, flood waters are both retained (*i.e.*, slowly released through evaporation and percolation) and detained (slowly released through surface discharge) by Bordering Land Subject to Flooding. Over time, incremental filling of these areas causes increases in the extent and level of flooding by eliminating flood storage volume or by restricting flows, thereby causing increases in damage to public and private properties.

3. All areas on the ten year floodplain of Bordering Land Subject to Flooding are also likely to be significant to the protection of wildlife habitat, except for those portions which have been so extensively altered by human activity that their important wildlife habitat functions have been effectively eliminated (such "altered" areas include paved and graveled areas, golf courses, cemeteries, playgrounds, landfills, fairgrounds, quarries, gravel pits, buildings, lawns, gardens, roadways (including shoulders and embankments), railroad tracks (including ballast and embankments), and similar areas lawfully existing on August 15, 1998. and maintained as such since that time).

The hydrologic regime, plant community composition and structure, topography, soil composition and proximity to water bodies and bordering vegetated wetlands of these portions of bordering land subject to flooding provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. Nutrients from flood waters, as well as the inundation of floodplain soil, create important wildlife habitat characteristics, such as richness and diversity of soil and vegetation. A great many species require or prefer habitat which is as close as possible to water and/or has moist conditions, characteristics generally present on lower floodplains. Similarly, lower floodplains, because of their proximity to water and vegetated wetlands, can provide important shelter for wildlife which needs to migrate between such areas, or between such areas and uplands. The "edge" where floodplain habitat borders vegetated wetlands or water bodies is frequently very high in wildlife richness and diversity. Similar "edges" may be found elsewhere the lower floodplain, where differences in topography and frequency of flooding have created varied soil and plant

[5] Additional regulations regarding land subject to flooding in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 10.39. Additional regulations regarding land subject to flooding in the Waquoit Bay ACEC are found in FWR 10.40.

10.57: continued

community composition and structure.

(b) Isolated Land Subject to Flooding:

1. Isolated Land Subject to Flooding is an isolated depression or a closed basin which serves as a ponding area for run-off or high ground water which has risen above the ground surface. Such areas are likely to be locally significant to flood control and storm damage prevention. In addition, where such areas are underlain by pervious material they are likely to be significant to public or private water supply and to ground water. Where such areas are underlain by pervious material covered by a mat of organic peat and muck, they are also likely to be significant to the water pollution control.

2. Isolated Land Subject to Flooding provides a temporary storage area where run-off and high ground water pond and slowly evaporate or percolate into the substrate. Filling causes lateral displacement of the ponded water onto contiguous properties, which may in turn result in damage to said properties.

3. Isolated Land Subject to Flooding, where it is underlain by pervious material, provides a point of exchange between ground and surface waters. Contaminants introduced into said area, such as septic system discharges and road salts, find easy access into the ground water and neighboring wells. Where these conditions occur and a mat of organic peat or muck covers the substrate of the area, said mat serves to detain and remove contaminants which might otherwise enter the ground water and neighboring wells.

(2) Definitions, Critical Characteristics and Boundaries.

(a) Bordering Land Subject to Flooding:

1. Bordering Land Subject to Flooding is an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, reservoirs, streams, ponds or lakes. It extends from the banks of these waterways and water bodies; where a freshwater wetland occurs, it extends from said wetland.

2. The topography and location of Bordering Land Subject to Flooding specified in the foregoing FWR 10.57(2)(a)1. are critical to the protection of the resource area values specified in FWR 10.57(1)(a). Where Bordering Land Subject to Flooding is significant to wildlife habitat, the physical characteristics as described in the foregoing FWR 10.57(1)(a)(3) are critical to the protection of that resource area value.

3. The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm. Said boundary shall be that determined by reference to the most recently available flood profile data prepared for the community within which the work is proposed under the National Flood Insurance Program (NFIP, currently administered by the Federal Emergency Management Agency, successor to the U.S. Department of Housing and Urban Development). Said boundary, so determined, shall be presumed accurate. This presumption may be overcome only by credible evidence from a registered professional engineer or other professional competent in such matters.

Where NFIP Profile data is unavailable, or is available for only land subject to coastal storm flowage, the boundary of Bordering Land Subject to Flooding shall be the maximum lateral extent of flood water which has been observed, recorded, or determined by hydrologic modeling, whichever is greater. In the event of a conflict, the Commission may require the applicant to determine the boundary of Bordering Land Subject to Flooding by engineering calculations which shall be:

a. based upon a design storm of seven and two-tenths inches of precipitation in 24 hours (*i.e.*, a Type III Rainfall, as defined by the U.S. Natural Resource Conservation Service);

b. based upon the standard methodologies set forth in U.S. Natural Resource Conservation Service Technical Release No. 55, *Urban Hydrology for Small Watersheds* and U.S. Natural Resource Conservation Service Technical Release No. 20; and

c. prepared by a registered professional engineer or other professional competent in such matters.

4. The boundary of the ten year floodplain is the estimated maximum lateral extent of the flood water which will theoretically result from the statistical ten-year frequency storm. Said boundary shall be determined as specified under FWR 10.57(2)(a)3., except that where NFIP Profile data is unavailable, the boundary shall be the maximum lateral extent of flood water which has been observed or recorded, or calculated, which ever is greatest, during a 10 year frequency storm and, in the event of conflict, engineering calculations under FWR 10.57(2)(a)3.b. and c. shall be based on a design storm of 4$^{8}/_{10}$ (4.8) inches of precipitation in 24 hours.

10.57: continued

(b) Isolated Land Subject to Flooding:

1. Isolated Land Subject to Flooding is an isolated depression or closed basin without an inlet or an outlet. It is an area which at least once a year confines standing water to a volume of at least 5000 cubic feet and to an average depth of at least six inches. Isolated Land Subject to Flooding may be underlain by pervious material, which in turn may be covered by a mat of organic peat or muck.

2. The characteristics specified in the foregoing FWR 10.57(2)(b)1. are critical to the protection of the resource area values specified in FWR 10.57(1)(b).

3. The boundary of Isolated Land Subject to Flooding is the perimeter of the largest observed or recorded volume of water confined in said area, or a line bounding the area where flooding by runoff from a 100-year storm event is predicted. In the event of a conflict of opinion regarding the extent of water confined in an Isolated Land Subject to Flooding, the applicant may submit an opinion certified by a registered professional engineer, supported by engineering calculations, as to the probable extent of said water. Said calculations shall be prepared in accordance with the general requirements set forth in FWR 10.57(2)(a)3.a. through c., except that the maximum extent of said water shall be based upon the total volume (rather than peak rate) of run-off from the drainage area contributing to the Isolated Land Subject to Flooding and shall be further based upon the assumption that there is no infiltration of said run-off into the soil within the Isolated Land Subject to Flooding.

(3) Presumption.

Where a project involves removing, filling, dredging, building upon, degrading or otherwise altering of Land Subject to Flooding (both Bordering and Isolated Areas) the Commission shall presume that such an area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.57(1)(a) and (b). These presumptions may be overcome only upon a clear showing that said land does not play a role in the protection of said resource area values. In the event that these presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth its grounds.

(4) General Performance Standards.

(a) Bordering Land Subject to Flooding:

1. Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the Commission said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows.

Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek.

2. Work within Bordering Land Subject to Flooding, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.

3. Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. A project or projects on a single lot or parcel, for which Permit Application(s) is filed on or after August 15, 1998, that (cumulatively) alter(s) up to 2,500 square feet of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat.

(b) Isolated Land Subject to Flooding: A proposed project in Isolated Land Subject to Flooding shall not result in the following:

1. Flood damage due to filling which causes lateral displacement of water that would otherwise be confined within said area.

2. An adverse effect on public and private water supply or ground water supply, where said area is underlain by pervious material.

3. An adverse effect on the capacity of said area to prevent pollution of the ground water, where the area is underlain

10.57: continued

by pervious material which in turn is covered by a mat of organic peat and muck.

(5) Notwithstanding the provisions of FWR 10.57(4)(a) or (b), no project may be permitted which will have any adverse effect on wildlife habitat sites of rare vertebrate or invertebrate species.

(6) If such a site is available on the applicant's land, all septic tanks and leaching facilities shall be located outside the one hundred (100) foot buffer to the Isolated Land Subject to Flooding.

(7) There shall be no subsurface tanks containing fuel, gas, oil or other hazardous substances within Isolated Land Subject to Flooding.

FWR 10.58: Vernal Pools[6]

(1) Introduction. Vernal pools are significant to wildlife habitat. Vernal pools may also be freshwater wetlands or land subject to flooding. Vernal pools flood temporarily when the level of a bordering waterway or water body rises, or in cases where they are isolated from other waters, when precipitation or rising groundwater fills them. Such sites furnish critical breeding habitat for a number of amphibians, reptiles, and invertebrates, many of them rare, endangered, or threatened. Since flooding is temporary, fish are not present in these areas, so that for animals vulnerable to fish predation vernal pools are a sanctuary. A number of species depend on these pools for successful reproduction.

Adjacent upland may be important for migration and overwintering of species associated with vernal pools. Upland that remains cool and moist is required by various amphibians after their breeding season. Destruction of such conditions can extinguish a species locally. Thus the pools and their surrounding upland are an integrated habitat and must be protected together.

In the Town of Falmouth, the Conservation Commission has determined that the state criteria leave critical habitat vulnerable. Therefore, the Town assumes jurisdiction over all vernal pool habitat within its borders. Alteration, filling, destruction, or degradation of any such habitat is prohibited, with rare exceptions described herein.

A vernal pool is an essential breeding site for certain amphibians which generally require isolated areas that are generally flooded for at least two continuous months in the spring and/or summer and are free from fish predators. Most of these amphibians remain near the breeding pool during the remainder of their lifecycle. Many reptiles, birds and mammals also feed here.

.(2) Definition.

(a) Vernal pool means a confined basin depression which, at least in most years, holds water for a minimum of two continuous months during the spring and/or summer, and which are free of adult fish populations. These areas are essential breeding habitat, and provide other extremely important wildlife habitat functions during non-breeding season as well, for a variety of amphibian species such as wood frog (*Rana sylvatica*) and the spotted salamander (*Ambystoma maculatum*), and are important habitat for other wildlife species.

(b) A site is a vernal pool when it:

1. has been certified as a vernal pool by the Massachusetts Division of Fisheries and Wildlife,
2. has been mapped prior to the filing of the permit application or Request for Determination of Applicability by the Commission as a vernal pool; or
3. meets physical and biological criteria set forth by the Massachusetts Natural Heritage and Endangered Species

[6] Additional regulations regarding vernal pools in the Black Beach/Great Sippewissett Marsh District of Critical Planning Concern are found in FWR 1.39. Additional regulations regarding vernal pools in the Waquoit Bay ACEC are found in FWR 1.40.

10.58: continued

Program in its Guidelines for Certification of Vernal Pool Habitat (May 1988) as amended.[7]

(c) The term "vernal pool habitat" refers to the vernal pool itself, together with the lands within 100 feet of the vernal pool used by wildlife for migration and overwintering.

(d). The boundary of a vernal pool is that certified by the Massachusetts Division of Fisheries and Wildlife, or mapped by the Commission, whichever is greater. In the event of a lack of a clear boundary delineation certified by the Division of Fisheries and Wildlife, or mapped by the Commission, the boundary shall be determined by engineering calculations, as to the probable extent of said habitat, (Said calculations shall be prepared in accordance with the general requirements set forth in FWR 10.57(2)(a)3.a. through c., except that the maximum extent of said water shall be based upon the total volume (rather than peak rate) of run-off from the drainage area contributing to the vernal pool and shall be further based upon a design storm of 2$^{7}/_{10}$ (2.7) inches of precipitation in 24 hours) or by the mean annual high-water line, whichever is greater. (The mean annual high-water line means the line that is apparent from visible markings or changes in the character of soil's or vegetation due to the presence of water and which distinguishes between predominantly aquatic and predominantly terrestrial land. The mean annual high-water line may be identified by permanent water marks on boulders, and vegetation.)

(3) Presumption. Where a project involves removing, filling, dredging, building upon, degrading or otherwise altering of a vernal pool or vernal pool habitat, the Commission shall presume that such an area is significant to, and the proposed activity will have a significant or cumulative effect upon, the resource area values specified in FWR 10.58(1). These presumptions may be overcome only upon a clear showing that said land does not play a role in the protection of said resource area values. In the event that the presumptions are deemed to have been overcome, the Commission shall make a written determination to this effect, setting forth its grounds.

(4) Performance Standards.
Where the presumptions set forth in FWR 10.58(3) have not been overcome, any proposed activity shall have no adverse effect on the vernal pool.

(5) The Commission may permit work in the vernal pool habitat provided that the work will cumulatively remove, dredge, build upon, degrade, or otherwise alter less than 20% of the vernal pool habitat under control of the applicant, and that the area proposed to be removed, dredged, built upon, degraded, or otherwise altered is more than seventy-five (75) feet from the vernal pool.

(6) Not withstanding the provisions of FWR 10.58(5), where activity is proposed on a parcel created prior to August 15, 1998. and where no practicable alternative exists on the parcel that would allow a Vernal Pool buffer the width required in FWR 10.58(5) due to site constraints, the Commission may issue a permit to allow such activity provided the activity would not result in the cumulative alteration of more than 20% of the vernal pool habitat on the lot of the applicant.[8]

(7) Notwithstanding the provision of FWR 10.58(5) and (6) no project may be permitted which will have any adverse effect on wildlife habitat sites of rare species.

FWR 10.59 through FWR 10.69

Reserved

[7] Sites not yet certified by the state will be evaluated by a qualified wetlands biologist.

[8] A vernal pool may also be a freshwater wetland. For regulations regarding work near freshwater wetlands on lots created prior to August 15, 1998, see FWR 10.18(7).

FWR 10.70 Indicators of Wetland Hydrology

While vegetation is considered the most reliable indicator of long-term wetland hydrology because it is generally observable throughout the year, other indicators also may be used to confirm the presence of wetland hydrology. These other indicators are presented in three categories: morphological plant adaptations, evidence of surface water, and evidence of soil saturation. When delineating or reviewing a freshwater wetland boundary, note the presence of any of these other indicators and consider them in the evaluation. At many sites, these indicators can be used to refine the boundary delineation. When encountering difficult sites, it may be necessary to actively seek these other indicators to make the determination. However, some of these hydrologic indicators can be affected by recent heavy rain or seasons with above average amounts of precipitation. Conversely, these indicators may not be present during the entire year or may be absent during prolonged periods of drought.

FWR 10.71 Morphological Plant Adaptations to Hydric Conditions

(1) Introduction

Morphological adaptations are evident in the form or shape of a plant. Adaptations that result from inundation or saturation during the growing season are good indicators of wetland hydrology. In addition, plants demonstrating morphological adaptations are considered wetland indicator plants. Many species exhibit one or more morphological adaptations for occurrence in wetlands. However, not all individuals of a species will exhibit these adaptations under field conditions, and individuals occurring in uplands characteristically may not exhibit them.

(2) Definition

Morphological adaptations of plants to hydric conditions include:

(a) Shallow root systems are probably the most useful adaptations that indicate wetland hydrology in areas near the wetland/upland boundary. This indicator can be just as useful with shrubs, saplings, and herbs as it is with trees. For instance, look for swollen trunks or roots along the surface of the ground as evidence of shallow root systems, or observe them directly on overturned trees. The key is to compare the root structures of like or similar species growing further upslope in an upland setting. Be aware that shallow root systems also form in upland areas where bedrock is close to the surface or in very stony soils. Use soil maps and topography to confirm that shallow root systems are the result of wetland hydrology and not stony soils or bedrock.

(b) Buttressed or fluted trunks are good indicators of hydrology that are often cited in publications about wetland delineation. In Massachusetts, however, trees and saplings rarely demonstrate the exaggerated, swollen bases typical of this adaptation. The moderately swollen bases typically found in Massachusetts usually indicate the presence of shallow root systems.

(c) Adventitious roots are roots that form on plant stems in positions where roots normally do not occur. This adaptation is most common on active floodplains and may be found on box elder (*Acer negundo*), sycamore *(Platanus occidentalis),* pin oak *(Quercus palustris),* green ash *(Fraxinus pennsylvanica),* cottonwood *(Populus deltoides),* and willows *(Salix spp.).*

(d) Enlarged (hypertrophied) lenticels on woody plants are indicators of inundated or saturated growing conditions. Lenticels are small pores, usually resembling dots or thin horizontal lines on the stems and twigs of woody plants. In response to saturated or inundated growing conditions, these pores can become swollen or enlarged. Enlarged lenticels can occasionally be found on red maple *(Acer rubrum),* silver maple *(Acer saccharinum),* and willows *(Salix spp.).*

(e) Polymorphic leaves form on certain plant species when portions of the plant are submerged while other portions extend above water. Plants like mermaidweed *(Proserpinaca palustris),* water parsnip *(Sium suave),* and arrowheads *(Sagittaria latifolia)* have different leaf forms depending on whether they grow above or below the water surface. Underwater leaves tend to be narrow or finely divided; leaves above the water surface tend to be broader and less divided. Where both forms occur on the same plant (polymorphic leaves), these are good evidence of surface water for an extended period during the growing season.

(f) Air-filled tissue (aerenchyma) forms in the roots and stems of many plants in response to prolonged periods of saturation or inundation. These specialized tissues help move oxygen from plant structures above water to those that are underwater or in saturated soil. Plants that possess these air-filled tissues are spongy when squeezed and the air cells are obvious when the plants are cut.

10.71: continued

(3) Examples of Morphological adaptations.

Species	Common Name	Adaptation
Alisma spp.	Water plantain	Polymorphic leaves
Brasenia schreberi	Watershield	Inflated, floating leaves
Cladium mariscoides	Twig rush	Inflated stems
Cyperus spp. (most species)	Flat sedge	Inflated stems and leaves
Eleocharis spp. (most species)	Spikerush	Inflated stems and leaves
Fraxinus pennsylvanica	Green ash	Buttressed trunks; adventitious roots
Juncus SPP-	Rush	Inflated stems and leaves
Limnobium spongia	Frogbit	Inflated, floating leaves
Ludwigia spp.	Water primrose	Adventitious roots; inflated floating stems
Menyanthes trifoliata	Buckbean	Inflated stems (rhizome)
Myrica gale	Sweetgale	Hypertrophied lenticels
Nymphaea spp.	Water lily	Floating leaves
Nyssa sylvatica var. *biflora*	Swamp black gum	Buttressed trunks
Pinus rigida	Pitch pine	Shallow root system: buttressed roots
Pinus strobus	White pine	Shallow root system: buttressed roots
Platanus occidentalis	Sycamore	Adventitious roots
Populus deltoides	Cottonwood	Adventitious roots
Quercus palustris	Pin oak	Adventitious roots
Sagittaria spp.	Arrowhead	Polymorphic leaves
Salix spp.	Willow	Hypertrophied lenticels; adventitious roots; oxygen pathway to roots
Salix nigra	Black Willow	Adventitious Roots
Scirpus spp.	Bulrush	Inflated stems and leaves
Spartina alterniflora	Smooth cordgrass	Oxygen pathway to roots

FWR 10.72 Evidence of Surface Water

(1) Introduction
The presence of surface water during time of normal hydrological conditions shall be considered sufficient evidence of saturation of inundation. Indicators of surface water can be either biological of physical.

(2) Biological Indicators of Surface Water. The following indicators of wetland hydrology may be used as evidence of soil saturation:

(a) Fingernail clam and aquatic snail shells can occasionally be found in dry depressions and are good indicators of extended periods of inundation during the growing season. Be aware, however, that there are terrestrial snails in Massachusetts; their presence is not an indicator of wetland hydrology. Freshwater mussels, unlike fingernail clams, only occur in areas that are permanently flooded. The presence of mussel shells in areas other than aquatic habitats are not good indicators of wetland hydrology because they often are transported by predators.

(b) Caddisfly cases. Caddisfly cases can occasionally be found in dry pools or intermittent streams. Caddisflies are insects that are aquatic as larvae and winged as adults. The larvae of many species construct tubelike cases around themselves, made of leaf fragments, twigs, pine needles, or sand. These cases often persist long after the water has dried up and serve as good indicators of extended periods of inundation during the growing season.

(3) Physical Indicators of Surface Water

(a) Direct observation of inundation during the growing season is an obvious indication of the presence of water. Recent

10.72: continued

weather conditions should be taken into consideration when using this indicator to establish the presence of wetland hydrology.

(b) Water marks on trees, boulders, bridge abutments, or other objects are good indicators of extended periods of inundation. Water marks can be stained or silt covered areas, or an abrupt change in plant or lichen growth that is present on several objects at a consistent elevation.

(c) Water-stained leaves on the ground are an indicator of inundation. Water-stained leaves are usually dull gray or black in color, and are flattened compared with those in surrounding (upland) areas.

(d) Sediment deposits on plants, leaves, or the ground are indicators of surface water, but generally do not provide much information about the timing or duration of inundation.

(e) Drift lines are accumulations of plant material or debris that are deposited, usually in lines parallel to the stream flow, during flood events. Drift deposits may be evident on the ground or occasionally in the branches of trees and shrubs. They are good indicators of surface water, but do not provide much information about the timing or duration of flooding.

(f) Scoured areas are good indicators of flowing water. These generally can be recognized by the relative absence of leaf litter and other debris on the ground, or where fine soils have been washed away, leaving gravel and cobble. Scoured areas are good indicators of flowing conditions, but do not provide much information about the timing or duration of flowing water.

(g) Drainage patterns left by flowing water indicate the presence of surface water. These can be water-induced patterns on the ground (washboard or braided patterns in the sediments), channels in the leaf litter, or where vegetation has been bent in one direction by the force of running water. Although these patterns do serve as indicators of surface water, they also may occur in upland areas.

FWR 10.73 Evidence of Soil Saturation.

(1) The following indicators of wetland hydrology may be used as evidence of soil saturation:

(a) Free water in a soil test hole indicates depth to the water table at that particular time. The depth at which water is observed weeping out of the soil into the hole also is an indicator of water table depth. Free water or weeping within 12 inches of the surface is a good indicator of wetland hydrology. However, recent weather conditions should be considered when using this indicator.

(b) Saturated soil usually occurs in areas above the water table due to capillary action within the soil. Saturated soils will yield water when squeezed. Saturated soil within 12 inches of the surface generally is a good indicator of wetland hydrology. However, recent weather conditions should be considered when using this indicator.

(c) Oxidized rhizospheres within the A-horizon together with low-chroma colors right below the A-horizon are good indicators of soil saturation during the growing season. Roots and other underground plant structures growing in saturated soil conditions may produce brightly colored areas in the soil called oxidized rhizospheres. Roots need oxygen in order to survive and function. Under anaerobic soil conditions, oxygen moves to the roots from other parts of the plant. Leakage of this oxygen results in the oxidation of iron in the soil surrounding the roots. In areas of fluctuating water tables, this process creates brightly colored root channels (oxidized rhizospheres) in the soil. Oxidized rhizospheres are often evident within the topsoil and can be especially useful for confirming the presence of saturated soil conditions just below the ground's surface. Look for orange-stained channels along living plant roots in the soil.

(d) Hydrological records, such as those from U.S. Geological Survey (USGS) stream gauging stations, U.S. Army Corps of Engineers data for major water bodies, state and local flood data, or NRCS state offices, can provide information on flood elevations, as well as the frequency and duration of flooding. Hydrological records that provide evidence of periods of continuous flooding from 7 to 21 days during the growing season are indicators of wetland hydrology.

(e) Hydric Soils (*see* FWR 10.74)

FWR 10.74 Hydric Soils

(1) Introduction

Soils found in wetlands are called hydric soils. Hydric soil is a relatively new term developed in the mid-1970s by wetland scientists working for the U.S. Fish and Wildlife Service with help from the Natural Resources Conservation Service (NRCS).

10.74: continued

Hydric soil is defined as "a soil that is saturated, ponded, or flooded long enough during the growing season to cause anaerobic conditions in the upper part." Anaerobic conditions produce physical and chemical changes in the soil that are readily observable and serve as hydric soil indicators. Hydric soil indicators generally require many years to develop. As a result, soils are good indicators of the long-term hydrology of an area. Once developed, the physical indicators of saturated conditions persist even after the hydrology of an area has been altered. Hydric soil indicators are especially useful for delineating wetlands where the vegetation has been altered.

The NRCS has developed local lists (by county) of soil series that are considered hydric. It is important to note, however, that boundaries shown on soil survey maps are approximate. A site visit is essential to verify the information contained in the soil survey and to accurately delineate the BVW boundary.

Hydric soils can be divided into two groups based on characteristics that can be observed in the field using soil test holes. These are organic soils and hydric mineral soils.

(a) Organic Soils. Organic soils are made up of partially to well decomposed plant material mixed with mineral elements. Generally, organic matter makes up 20-30 percent or more of the soil (depending on the amount of clay present). Organic soils form in certain wetlands (especially bogs, fens, and marshes) where anaerobic conditions slow the rate of decomposition and organic matter accumulates over time. They generally can be recognized in the field by their dark color, slippery or fibrous texture, and tendency to stain fingers when handled. Organic soils also are less resistant than mineral soils to probing with a knife or shovel. When walking across these soil areas, they often feel spongy underfoot.

Soils with at least 16 inches of organic material measured from the ground surface are hydric soils and are referred to as histosols. Histosols are classified as fibrists (peats), saprists (mucks), and hemists (mucky-peats and peaty-mucks). Soils with 8 to 16 inches of organic material measured from the ground surface also are hydric soils and are referred to as having a histic epipedon (thick organic surface layer). Histosols and soils with a histic epipedon are always hydric soils.

(b) Hydric Mineral Soils. Mineral soils contain less than 20-30 percent organic matter and are made up primarily of sand, silt, and clay, with varying amounts of gravel, cobbles, and stones. Hydric mineral soils are typically characterized by low-chroma colors (0-2 on the Munsell Soil Color Charts) that result from gleization.

Gleization occurs when iron is reduced and becomes mobile due to anaerobic soil conditions. Chemical change resulting from the presence of oxygen is called oxidation. Many of the bright colors (brown, orange, and red) found in upland soils are the result of oxidized iron on the surface of soil grains. Chemical change that results from the absence of oxygen (anaerobic conditions) is called reduction. When soils are saturated or inundated long enough to produce anaerobic conditions, iron is reduced. Unlike oxidized iron, reduced iron is soluble in water and may move a short distance, or is sometimes entirely leached out of saturated sandy soils. This leaching process often creates soils that are dull-colored (low-chroma) or gray. These are hydric soils and are known as gleyed soils. They are typically neutral gray or occasionally bluish, or greenish-gray in color. The Munsell Soil Color Charts have special pages for gleyed soils.

Some mineral soils may not readily show hydric soil characteristics due to texture (sandy soils), or floodplain dynamics. (*See* FWR 10.74(3) Soils that are Difficult to Analyze)

Under conditions of prolonged saturation, sulfur may become reduced and is converted by bacteria into sulfur gas (hydrogen sulfide), giving some wetland soils a smell like "rotten eggs."

In areas where the water table fluctuates, leading to alternating periods of oxidation and reduction, iron often accumulates in brightly colored mottles or concretions (hard nodules).

(2) Hydric Soil Indicators

The following is a list of some hydric soil indicators - any of which can be used to identify the presence of wetland hydrology:

(a) Histosols (organic soils). Histosols are soils with at least 16 inches of organic material measured from the soil surface.

(b) Histic epipedons. These are soils with 8 to 16 inches of organic material measured from the soil surface.

(c) Sulfidic material. A strong "rotten egg" smell generally is noticed immediately after the soil test hole is dug.

(d) Gleyed soils. Soils that are predominantly neutral gray, or occasionally greenish or bluish gray in color within 12 inches from the bottom of the 0-horizon. (The Munsell Soil Color Charts have special pages for gleyed soils.)

10.74: continued

(e) Soils with a matrix chroma of 0 or 1 and values of 4 or higher within 12 inches from the bottom of the 0-horizon.
(f) Within 12 inches from the bottom of the 0-horizon, soils with a chroma of 2 or less and values of 4 or higher in the matrix, and mottles with a chroma of 3 or higher.
(g) Within 12 inches from the bottom of the 0-horizon, soils with a matrix chroma of 3 and values of 4 or higher, with 10 percent or more low-chroma mottles, as well as indicators of saturation (i.e., mottles, oxidized rhizospheres, concretions, nodules) within 6 inches of the soil surface.

(3) Soils that are Difficult to Analyze

In most cases, the hydric soil indicators listed in FWR 10.74(2) are sufficient to identify wetland soils. However, certain soils are more difficult to assess, making it harder to determine whether hydric conditions exist. Use the most recent edition of Field Indicators for Identifying Hydric Soils in New England for a more extensive list of hydric soil morphologies. The following is a list and discussion of soils that are difficult to analyze:

(a) Sandy soils. Soil colors often are not distinctive in most sandy soils. Instead, look for these indicators of hydric sandy soils (Indicators of hydric soils may be lacking altogether in the soil of newly formed sand bars and interdunal depressions.):

1. high organic content in the surface layer (typically darker colors with values less than 3 and chroma of 2 or less) with mottles or other indicators of saturation directly below;
2. organic streaking directly below the A-horizon; or
3. matrix chroma of 3 (from the Munsell Soil Color Charts) in the top 12 inches of soil measured from the bottom of the 0-horizon, with distinct or prominent mottling.

(b) Floodplain soils. These soils usually are characterized by distinctly layered soil material. The layers form when new sediment is deposited during flood events. As a result of this pattern of deposition, hydric soil indicators may never form, or may be buried even though saturated or inundated conditions are present long enough to create wetland hydrology.
(c) A-horizons that are thick and very dark. A-horizons greater than or equal to 12 inches thick with values less than 3 and chroma of 2 or less are difficult to analyze because indicators of saturation are difficult to see. Therefore, look directly below the A-horizon for a matrix chroma of 1 or less and values of 4 or higher. If the matrix color directly below the thick and dark A-horizon is chroma 2 and value 4 or higher, other indicators of saturation need to be present in the soil directly below the A-horizon. In uncommon situations, it may be necessary to dig deeper to evaluate colors below the A-horizon.
(d) Spodosols/Evergreen forest soils. Sandy soils in Falmouth dominated by evergreen trees may possess gray colored E-horizons just beneath the surface. These colors are not necessarily the result of saturation or inundation, but form as a result of the leaching of organic material and aluminum and iron oxides by organic acids. These soils are called spodosols and the gray layer that forms below the surface is known as the E-horizon. Organic material and aluminum and iron oxides are deposited in a layer below the E-horizon called the spodic horizon. Hydric indicators in spodosols include a combination of two or more of the following features, with one occurring within the upper 12 inches of the soil surface and others documented below the soil surface:

1. a thick, black, sandy surface layer;
2. organic streaking in the E-horizon;
3. mottles within the E-horizon;
4. oxidized rhizospheres within the A or E-horizon;
5. iron concretions/nodules within the E-horizon or spodic horizon;
6. a partially or wholly cemented spodic horizon usually within 18 inches of the surface measured from the bottom of the 0-horizon; and mottling within the spodic horizon.

Non-hydric spodosols can be recognized by brightly colored soil material below the E-horizon and without mottles or other indicators of saturation.

FWR 10.80 Vegetative Analysis Methods

When determining the edge of the freshwater wetland, the plant community must be assessed and assigned a value based on the contribution of the wetland plants to the plant community. Three analysis techniques are recognized for this purpose. Because each vegetative analysis method can provide a "false negative" the applicant must use the method that provides the highest result for contribution of wetland plants in the plant community. A "false positive" for a freshwater wetland using vegetation is prevented by allowing for some other confirmation of saturated or inundated conditions.

FWR 10.81 Field Data Form Requirement

A field data form (*see* FWR 10.88) shall be used when delineating the boundary of a freshwater wetland. It shall be used whether the boundary is delineated by vegetation alone or by vegetation and other indicators of wetland hydrology. If detailed vegetative assessment is not necessary for the site, the applicant shall make a note on the data form and submit it. The field data form shall be submitted with a Request for Determination of Applicability or a Permit Application.

FWR 10.82 Additional Definitions for FWR 10.80 through FWR 10.89

The following definitions are in addition to FWR 10.04 and FWR 10.23 and are for terms used throughout FWR 10.80 through FWR 10.89:

(a) Vegetative Layers means separate strata within the vegetative communities are divided for analysis. Five layers are used in this assessment: ground cover, shrub, sapling, climbing woody vine, and tree.

(b) The ground cover layer includes woody vegetation less than 3 feet in height (seedlings), non-climbing woody vines less than 3 feet in height, and all nonwoody vegetation (herbs and mosses) of any height.

(c) Shrubs are woody vegetation greater than or equal to 3 feet, but less than 20 feet in height.

(d) The sapling layer includes woody vegetation over 20 feet in height with a diameter at breast height (dbh) greater than or equal to 0.4 inches to less than 5 inches. Diameter at breast height is measured 4.5 feet from the ground.

(e) Trees are woody plants with a dbh of 5 inches or greater and a height of 20 feet or more.

(f) Climbing woody vines are a separate vegetative layer.

(g) Percent cover is the percent of the ground surface that would be covered if the foliage from a particular species or layer were projected onto the ground, ignoring small gaps between the leaves and branches. Foliage from different individual plants in the same layer can overlap, and as a result, total percent cover may exceed 100 percent.

(h) Basal area is the cross-sectional area of a tree trunk at breast height (measured 4.5 feet from the ground).

FWR 10.83 Observation Plots

Observation plots are used for measuring or estimating plant abundance. The number of plots should be based on the complexity of the site. Plots generally should be located in vegetative communities that are not clearly wetland or upland. Plot locations should be chosen so that the vegetation within the plot is representative of the vegetation within the community as a whole. Circular plots with the following dimensions are recommended:

Ground cover:	5 foot radius
Shrubs:	15 foot radius
Saplings:	15 foot radius
Climbing woody vines:	30 foot radius
Trees:	30 foot radius

Plot size and shape may be varied when site conditions warrant. Plot locations shall be located to ensure that the vegetative layer being sampled is representative of the plant community in the study area. The location of all observation plots shall be shown on the site plan.

FWR 10.84 Measuring Plant Abundance

(1) Percent Cover. Percent cover is a simple method for evaluating plant abundance and can be used for all layers (ground cover, shrub, sapling, climbing woody vine, and tree), when using the Dominance Test or the Wetland Site Index.

(a) Plant abundance should be estimated or measured for each layer where the total percent cover is 5 percent or greater. All vegetative layers present in an observation plot must be reported in the evaluation unless the total percent cover of a layer is less than 5 percent. Within each of those layers, estimate or measure plant abundance for each species. Any plant species with 1 percent cover or less should not be included.

(b) When estimating or measuring percent cover, include any foliage in the layer that occurs in the observation plot only

10.84: continued

if the stem or trunk of the plant originates within the plot.

(c) When estimating percent cover, use the following cover classes:

Cover Class	Cover Range	Ranges Midpoint
1	1-5%	3.0
2	6-15%	10.5
3	16-25%	20.5
4	26-50%	38.0
5	51-75%	63.0
6	76-95%	85.5
7	96-100%	98.0

(2) Measuring Basal Area

Basal area may be used to estimate percent dominance of trees for vegetative analysis.

(a) When using basal area to estimate abundance for the tree layer, include only those trees whose trunks originate within the plot.

(b) Trees with multiple trunks that originate below 4.5 feet should be counted as two or more trees (depending on the number of trunks). Each trunk of a multiple trunk tree should be counted separately when determining total basal area for a plant species.

(3) Sampling Grids.

Where more precise determinations of plant cover in the ground cover vegetative layer are required than are possible with the use of the estimation of percent cover using the cover classes specified in FWR 10.84((1), a sampling grid may be used.

FWR 10.85 Department of Environmental Protection Dominance Test

Details on the criteria for delineating a freshwater wetland boundary and the terminology used in this field data form are described in the handbook, *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act* (MA Department of Environmental Protection, Division of Wetlands and Waterways, 1995).

(a) The Dominance Test Procedure Summary[9]

1. Evaluate percent cover: For each observation plot do the following (basal area may be used for the tree layer):
   a. Determine how many of the vegetative layers (ground cover, shrub, sapling, climbing woody vine, tree) have a total percent cover of 5 percent or more within the observation plot. Only those layers with a total percent cover of 5 percent or greater are to be used.
   b. For each vegetative layer, estimate or measure percent cover for each plant species in the layer. Any plant species with 1 percent cover or less should not be included. If you know a plant species' name, list the name and its percent cover. If you do not recognize a plant or do not know a plant's name, call it a generic name (e.g. species x) and list its percent cover.
2. Determine percent dominance for plants in each layer: For those layers within the observation plot with 5 percent cover or more, determine percent dominance for each plant species as follows:
   a. Add up percent cover for all plant species in the layer to determine the total percent cover for the layer.
   b. Divide the percent cover for each plant species by the total percent cover for the layer, and multiply this by 100. This will yield percent dominance for each plant species in each layer.
3. Identify dominant plants: Within the observation plot, identify the dominant plants in each layer:
   a. Beginning with the most abundant species, list the plants in the layer until the cumulative total for percent dominance meets or exceeds 50 percent. In some cases, this will only be one species; in other cases, several species may be needed to meet the 50 percent threshold. These species are dominant plants for the layer.

b. Other species, not already listed in 3a., with a percent dominance of 20 percent or greater also are dominant plants and

[9]Use the Dominance Test delineation form in FWR 10.88.

10.85: continued

should be listed.

c. If additional species in the layer have the same percent dominance as any species already listed in 3a. and b., those species also are dominant plants and should be listed.

d. Those plants that meet a., b., and c. above are dominant plants for the layer. Identify the scientific name and indicator category for all dominant plants. The indicator category is taken from the most recent edition of National List of Plant Species That Occur in Wetlands for the Falmouth area.

4. Determine whether the plant community is wetland or upland:

a. List the dominant plants (from 3.a., b., and c. above) for all layers being evaluated. A given species may appear more than once on this list, if it is a dominant plant in more than one layer.

b. Determine how many of the dominant plants are wetland indicator plants according to FWR 10.55(2)(c).

c. Determine total number of wetland indicator plants and total number of non-wetland indicator plants.

d. If the number of wetland indicator plants is equal to or greater than the number of nonwetland indicator plants, the wetland vegetation criterion has been met. If vegetation alone is presumed adequate for the delineation, the plot is in a freshwater wetland. If vegetation alone is not presumed adequate or to overcome the presumption, other indicators of hydrology (*see* FWR 10.70) also should be used to delineate the freshwater wetland boundary.

FWR 10.86 Wetland Site Index

The Wetland Site Index (WSI)was developed by Dr. Martin C. Michener in 1983.

The WSI Procedure Summary:[10]

1. Determine plot area. The wetland flag is the center of the plot. The boundaries of the plot are the radius of the plot and the wetland edge.
2. List all species in the ground cover in the study plot. Determine then record the % aerial coverage for each species.
3. List all species in the tree layer in the study plot (30 ft. radius). Determine then record the % aerial coverage for each species.
4. Repeat Step 3 for climbing woody vines.
5. In the sapling layer, list all species in the study plot (15 ft. radius). Determine then record the % aerial coverage for each species.
6. Repeat Step 5 for the shrub layer.
7. Record the USFWS indicator status for each entry.
8. Based on cover class, establish the abundance factor for each entry.
9. Establish the sum of abundance factors for each USFWS category.
10. Multiply the sum of the abundance factor for each USFWS category by the computed value for that USFWS category to establish a product for each USFWS category.
11. Add all the products to establish a total product.
12. Add all the abundance factors to establish a total abundance.
13. Establish the WSI by dividing the total product by the total abundance.
14. If WSI < .45 then site is presumed upland. If WSI is $\geq$ .45, and < .67, check soils. If WSI is $\geq$ .67, you may presume the site is wetland.

FWR 10.87 Relative Dominance of Wetland Species by Layering

Relative Dominance of Wetland Species by Layering (RDL) determines the percent wetland plant community composition by the relative dominance of wetland species by layers. The RDL method built upon vegetation mapping practices that had been in use since the turn of the century.

[10]Use the WSI delineation form in FWR 10.88.

10.87: continued

The RDL Procedure Summary:[11]

1. Determine plot area. This should be performed in the same manner as the Dominance test (*see* FWR 10.84).
2. List all upland species, then all wetland species in the ground cover in a 5' radius along the plot boundary centered on flag location. Determine, then record % aerial coverage for each group. Note if a sampling grid is used.
3. List all upland species present in the tree layer, then all wetland species, in a 30' radius along the plot boundary. Determine, then record, the % basal area (based on dbh) or % aerial coverage of upland and wetland species relative to each other.
4. Repeat Step 3 for climbing woody vines.
5. In the sapling layer, list all upland species, then all wetland species, in the shrub layer in a 15' radius along the plot boundary. Determine by visual estimate and record % aerial coverage for each group.
6. Repeat Step 5 for the shrub layer.
7. Calculate the mean of the % coverage of wetland species from the results of each vegetative layer.
8. If using other than the defaults for the different vegetative layers as defined in FWR 10.82, note that difference on the RDL form.

FWR 10.88 Delineation Forms

[11]Use the RDL form in FWR 10.88.

FWR 10.88

Freshwater Wetland Determination - Relative Dominance by Layers

Location_____ Site:_____

Date:_____ Flag No:_____ UPGRADIENT/DOWNGRADIENT

Data collected by:_____

Trees: % Aerial Coverage/Basal Area (circle one)
Saplings: % Aerial Coverage
Shrubs: % Aerial Coverage
Herbaceous: % Sampling Grid Used/Not Used (circle one)

Total: %/____ = _____% wetland plants

SPECIES LIST_____

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

INSTRUCTIONS:
If any one vegetative layer has less than 5% absolute cover of the study plot, do not use that layer to calculate the mean wetland plant contribution.

1. Determine plot area.

2. List all upland species present in the tree layer, then all wetland species, in a 30' radius along the plot boundary. Determine, then record, the % basal area (based on dbh) or % aerial coverage of upland and wetland species.

3. Repeat Step 2 for climbing woody vines.

4. In the sapling layer, list all upland species, then all wetland species, in a 15' radius along the plot boundary. Determine by visual estimate and record % aerial coverage for each group.

5. Repeat Step 4 for the shrub layer.

6. List all upland species, then all wetland species in the ground cover in a 5' radius along the plot boundary centered on flag location. Note if sampling grid is used.

7. Calculate the mean of the % coverage of wetland species from the results of each vegetative layer.

Notes:

TREES: greater than _____ft.

SAPLINGS: >_____ ft. & < 5" dbh

SHRUBS: woody vegetation > _____ ft.

NON-TEXT PAGE

Freshwater Wetland Determination - Wetland Site Index

Date:_____ Location:_____

Site:_____ Flag No:_____

Data collected by:_____ Downgradient/Upgradient (circle one)

LAYER	SPECIES	USFWS INDICATOR	COVER CLASS	ABUNDANCE

USFWS INDICATOR	TOTAL ABUNDANCE	X	COMPUTED VALUE	PRODUCT
Obligated Wetland		x	1.00	
Facultative W+		x	.94	
Facultative Wetland		x	.83	
Facultative W-		x	.72	
Facultative +		x	.61	
Facultative		x	.50	
Facultative -		x	.39	
Facultative Up+		x	.28	
Facultative Upland		x	.17	
Facultative Up -		x	.06	
Upland		x	00	

Total Abundance:_____ Total Product:_____

Wetland Site Index = Total Product/Total Abundance_____

If Wetland Site Index ≥0.45, then site is vegetative wetland If Wetland Site Index is >0.67 may presume vegetation is correct.

% Coverage	**1-5%**	**5-15%**	**15-25%**	**25-50%**	**50-75%**	**75-95%**	**95-100%**
Cover Class	1	2	3	4	5	6	7
Abundance Factor	1	3	7	12	21	28	32

Layer Code: **T**-Trees **SA**-Saplings **SH**-Shrubs **G**-Ground Cover **V**-Vines

% Coverage	**1-5%**	**5-15%**	**15-25%**	**25-50%**	**50-75%**	**75-95%**	**95-100%**
Cover Class	1	2	3	4	5	6	7
Abundance Factor	1	3	7	12	21	28	32

Layer Code: **T**-Trees **SA**-Saplings **SH**-Shrubs **G**-Ground Cover **V**-Vines

LAYER	SPECIES	USFWS INDICATOR	COVER CLASS	ABUNDANCE

Freshwater Wetland Determination - DEP Dominance Test

Applicant:_____ Prepared by:_____ Project location:_____ File #:_____

Check all that apply:

[ ] Vegetation alone presumed adequate to delineate freshwater wetland boundary: fill out Section I only

[ ] Vegetation and other indicators of hydrology used to delineate freshwater wetland boundary: fill out Sections I and II.

Section 1. Vegetation Observation Plot Number: Transect Number: Date of Delineation:

A. Sample Layer and Plant Species (by common/scientific name)	B. Percent Cover (or basal area)	C. Percent Dominance	D. Dominant Plant (yes or no)	E. Wetland Indicator Category*

* Use an asterisk to mark wetland indicator plants: plant species listed in the Wetlands Protection Act (MGL c.131, s.40); plants in the genus *Sphagnum;* plants listed as FAC, FAC+, FACW-, FACW, FACW+, or OBL; or plants with physiological or morphological adaptations. If any plants are identified as wetland indicator plants due to physiological or morphological adaptations, describe the adaptation next to the asterisk.

Vegetation conclusion:

Number of dominant wetland Indicator plants: **Number of dominant non-wetland Indicator plants:**

Is the number of dominant wetland plants equal to or greater than the number of dominant non-wetland plants? yes no

If vegetation alone is presumed adequate to delineate the freshwater wetland boundary, submit this form with the Request for Determination of Applicability or Permit Application.

Section II. Indicators of Hydrology

Hydric Soil Interpretation

1. Soil Survey

Is there a published soil survey for this site? yes no

title/date:

map number:

soil type mapped:

hydric soil inclusions:

Are field observations consistent with soil survey? yes no

Remarks:

2. Soil Description

Horizon	Depth	Matrix Color	Mottles Color

Remarks:

3. Other:

Conclusion: Is soil hydric? yes no

Other Indicators of Hydrology: (check all that apply and describe)

[ ] Site inundated:_____

[ ] Depth to free water in observation hole:_____

[ ] Depth to soil saturation in observation hole:_____

[ ] Water marks:_____

[ ] Drift lines:_____

[ ] Sediment deposits:_____

[ ] Drainage patterns in wetland:_____

[ ] Oxidized rhizospheres:_____

[ ] Water-stained leaves:_____

[ ] Recorded data (stream, lake, or tidal gauge; aerial photo; other):_____

[ ] Other:_____

Vegetation and Hydrology Conclusion

	yes	no
Number of wetland indicator plants ≥ number of non-wetland indicator plants	[ ]	[ ]
Wetland hydrology present:		
hydric soil present	[ ]	[ ]
other indicators of hydrology present	[ ]	[ ]
Sample location is in a freshwater wetland wetland	[ ]	[ ]

Submit this form with the Request for Determination of Applicability or Permit Application.