Vermont Agency of Natural Resources
Department of Environmental Conservation
Watershed Management Division

Class I Determination Rulemaking Decision
Issued Pursuant to Section 4.3 of the Vermont Wetland Rules

In the matter of:

Agency of Natural Resources
for the reclassification of Peacham Bog from Class II to Class I with a 500-foot buffer zone.
Groton State Forest, Peacham

File #:2017-009

The Secretary may, upon a petition or on his or her own motion, determine whether any wetland is a Class I wetland, pursuant to 29 V.S.A. § 410. The Secretary may establish the necessary width of a buffer zone of any Class I wetland as part of any wetland determination pursuant to the Vermont Wetland Rules (VWR), Section 4.2.

As required under 29 V.S.A. § 410 and Section 7 of the VWR, this wetland determination is based on an evaluation of the extent to which the wetland serves the functions and values identified in the VWR, is exceptional or irreplaceable in its contribution to Vermont's natural heritage and, therefore, merits the highest level of protection. Public notice of this wetland determination has been given in accordance with Section 8.3 of the VWR.

Summary

1. The State of Vermont's Wetlands Program initiated this determination process in June of 2017. The Wetlands Program, acting under its own motion, has gathered various documentation and data for a Wetland Determination. Because there was no petition submitted by a third party, no petition was placed on notice. A pre-rulemaking meeting was conducted with Vermont Forest Parks and Recreation on July 18, 2016, and contents of this determination and informational materials were sent to the Vermont Forest Parks and Recreation on July 14, 2016.

2. The subject wetland is approximately 300 acres and includes the principal bog area and its associated wetlands, located in Peacham, wholly within the 27,000+ acre Groton Management Unit (GMU), owned and managed by the VT Agency of Natural Resources. The Peacham Bog Natural Area is approximately 748 acres within the Groton State Forest portion of the GMU; managed by the Forests, Parks and Recreation Department (FPR). A map showing the approximate location of the proposed Class I wetland is attached. The FPR Department will update the natural area boundaries of their management plan in the future to reflect the Class I wetland and associated 500-ft buffer boundary.

3. Julie Foley, Shannon Morrison, Danielle Owczarski, District Wetland Ecologists and Bob Zaino, State Lands Ecologist, conducted a site visit on June 5, 2013. Zapata Courage, District Wetland Ecologist and Charlie Hohn, Wetlands Program Bioassessment Technician, conducted a site visit to Peacham Bog on May 25, 2017 and again with Haleigh Simmons, Wetlands Program Bioassessment Summer Intern, on July 24, 2017.

4. The wetland in question is currently identified as a Class II wetland on the Vermont Significant Wetlands Inventory (VSWI) map. The proposal is to reclassify this wetland from Class II to Class I, and to update the VSWI map to define the general location of the Class I wetland complex.

   The proposal is to also alter the buffer zone width from the default 100-foot buffer zone established under Section 4.2 of the VWR to 500 feet. This buffer width encompasses approximately 485 acres and incorporates approximately 65% of the undisturbed watershed for the Peacham Bog wetland complex including the associated beaver influenced wetlands to the north, and approximately 90% of the watershed for the primary bog area.

5. The Peacham Bog wetland complex and its upland edge contains a diversity of the best examples of rare state-significant natural communities including Dwarf Shrub Bog, Black Spruce Woodland Bog, Black Spruce Swamp, Poor Fen, Red Spruce-Cinnamon Fern Swamp, Spruce-Fir-Tamarack Swamp and Lowland Spruce-Fir Forest. It also provides habitat for fourteen individual rare, threatened, endangered (RTE) or uncommon species. The principal bog area is Vermont's second largest open peatland and the only documented "raised bog" in Vermont, with the peat surface in the center of the bog slightly raised above the margins of the peatland. The peat and living vegetation in the wetland provide important storm and flood water storage as well as long-term carbon storage, playing an important role in mitigating climate change.

   The wetland complex, inclusive of the bog and associated wetlands is identified as a Highly Sensitive Area within the GMU Long Range Management Plan (2008) which established primary and secondary buffers around the complex. These buffers are managed to protect the ecological integrity of the complex; “primary buffers are 200 feet from the bog and associated wetlands; no vegetative management activities should occur. Secondary buffer zone is from 200-500 feet; no road construction should occur. Single tree and small group timber harvesting only. This silvicultural method will allow some harvesting to take place while minimizing soil and water impacts and providing protection for the bog natural community.”

   The Peacham Bog wetland complex provides all ten of the functions and values that have been identified for wetlands and their role on the landscape at a significant level, providing a variety of watershed and water quality protections, unique habitat features, and societal, educational, and/or cultural benefits. The wetland complex is considered irreplaceable for the natural communities and the rare, threatened or endangered species habitat it contains as well as for the educational and research opportunities it has and does provide. It has been described within the Vermont Fish & Wildlife Department (VFWD), Vermont Natural Heritage Inventory Element Occurrence Reports (VNHI; EO Report) as “… the jewel of Groton State Forest [and] this bog and all of its associated wetlands are one of Vermont's

most significant natural areas, officially designated as Peacham Bog Natural Area in the mid-1980s."

Findings

As required by 10 V.S.A. § 914 and Section 8 of the VWR, this wetland determination is based on an evaluation of the functions and values of the subject wetland as described in Section 5 of the VWR. Section 5 provides that in evaluating whether a wetland is a Class II or a Class I wetland, the Secretary shall evaluate the functions that the wetland serves both as a discrete wetland and in conjunction with other wetlands by considering detailed functional criteria. Consideration shall be given to the number of and/or extent to which protected functions and values are provided by a wetland or wetland complex.

1. The protected functions of the subject wetland include the following: water storage for flood water and storm runoff as described in Section 5.1 of the VWR; surface and groundwater protection (Section 5.2); fisheries habitat (Section 5.3); wildlife and migratory bird habitat (Section 5.4); exemplary wetland natural community (Section 5.5); rare, threatened and endangered species habitat (Section 5.6); education and research in natural science (Section 5.7); recreational value and economic benefits (Section 5.8); recreational values or economic benefits (Section 5.9), and erosion control (Section 5.10).

2. The following protected functions are considered exemplary or irreplaceable: exemplary wetland natural community (Section 5.5); rare, threatened and endangered species habitat (Section 5.6); education and research in natural science (Section 5.7).

3. Water Storage for Flood Water and Storm Runoff
Wetlands that provide for the temporary storage of floodwater or stormwater runoff to the extent that they make an important contribution to reducing risks to public safety, reducing damage to public or private property reducing downstream erosion or enhancing the stability of habitat for aquatic life are significant wetlands.

The wetland is significant for the water storage for flood water and storm runoff function as confirmed through a site visit by Agency staff. The wetland has a constricted outlet and physical space for floodwater expansion, coupled with emergent vegetation that slows down flood waters or stormwater runoff during peak flows and facilitates water removal by evaporation and transpiration. Peacham Bog drains into both the Coldwater and Red Brooks. Beaver (*Castor canadensis*) activity has provided natural damming to hold back water from storms and snow melt. The deep peaty muck and surrounding wetlands allow for the absorption and slow release of water which reduces flooding potential downstream and helps to off-set or delay drought conditions.

4. Surface and Ground Water Protection
Wetlands that make an important contribution to the protection or enhancement of the quality of surface or of ground water are significant wetlands.

The wetland is significant for the surface and ground water function as confirmed through a site visit by Agency staff. Physical and vegetative characteristics that indicate the wetland provides this function include: the wetland has a constricted outlet, low water velocity through dense, persistent vegetation, and a hydroperiod that is permanently saturated. The wetland complex contains a high amount of microtopography that helps slow and filter surface water. The wetland is adjacent to surface waters, specifically towards the north. The slow release of water during times of drought also helps to protect downstream waters and aquatic biota.

5. Fish Habitat

Wetlands that are important for providing fish habitat are significant wetlands.

Shrub, emergent and forested wetlands lie adjacent to tributaries that drain into Coldwater Brook which contains a wild self-sustaining population of brook trout, and Red Brook which is one of the largest tributaries to the Wells River which supports a large diversity of fish species. The shade from overhanging vegetation along tributaries provide shading, shelter and food sources for fish populations in those brooks and provides a rich source of food for that larger fishery in Wells River. The wetland complex is significant for the fish habitat function.

6. Wildlife Habitat

Wetlands that support a significant number of breeding waterfowl, including all species of ducks, geese and swans, or broods of waterfowl or that provide important habitat for other wildlife and migratory birds are significant wetlands.

The Peacham Bog wetland complex is significant for the wildlife habitat function as confirmed through a site visit by Agency staff and by reports generated for and by the Department of Fish and Wildlife. The wetland contains a variety of habitats including beaver influenced wetland areas and has habitat to support otter (*Lontra canadensis*) and mink (*Neovison vison*). Species such as American woodcock (*Scolopax minor),* hooded merganser (*Lophodytes cucullatus*), black bear (*Ursus americanus*), moose (*Alces alces*), white-tailed deer (*Odocoileus virginianus*), and a variety of reptiles and amphibians utilize these wetlands complexes throughout their lives. The bog area is home to an S1/S2 dragonfly species, one of five locations it has been found in the state. The bog also provides habitat for eight other threatened, rare or uncommon wildlife species. The wetland is important for a variety of migratory birds, including the palm warbler (*Setophaga palmarum*) that use the wetlands for feeding, breeding, and resting, and a Northern harrier nest has been recorded in the wetland. The wetland complex supports other species more commonly found in true boreal habitats.

7. Exemplary Wetland Natural Community

Wetlands that make an important contribution to Vermont's natural heritage are significant wetlands. These include wetlands that are identified as high-quality examples of one of Vermont's recognized natural community types as described within the VNHI EO Reports. The information contained within the EO Reports may contain sensitive information. They are not for distribution or public display, so the reports have not been attached as an appendix

nor have specific RTE or uncommon plant species been disclosed. However, information on the natural communities have been paraphrased or described below.

As a general description of Peacham Bog within the EO Reports, “Peacham Bog is Vermont's second largest open peatland and the only documented "raised bog" in Vermont, with the peat surface in the center of the bog slightly raised above the margins of the peatland, peat depths in the basin range up to 13 feet. This bog and all of its associated wetlands are one of Vermont's most significant natural areas and the area was officially designated as Peacham Bog Natural Area in the mid-1980s. The Peacham Bog wetland complex includes high quality examples of Dwarf Shrub Bog, Black Spruce Woodland Bog, Black Spruce Swamp, Red Spruce-Cinnamon Fern Swamp, and Poor Fen.” The wetland complex is also bordered by a narrow band of Lowland Spruce-Fir Forest. The wetland complex is of an exemplary quality and is surrounded by the intact forested landscape of Groton State Forest, further adding to the exemplary quality of the wetland.

The majority (~ 104 acres) of this wetland is considered an A-ranked Dwarf Shrub Bog (S2) by the VNHI in accordance with their wetland natural community classification system as published in Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont, and revised classification lists by VFWD. This may also be one of the largest, if not the largest example, of this community within the state.

The Dwarf Shrub Bog is interspersed with the rare A-ranked Black Spruce Woodland Bog (S2) natural community. These areas occupy ~ 40 acres of the peatland surface. Black Spruce Woodland Bog typically forms the transition between the open bog mat and Black Spruce Swamp. There are nearly 27 acres of rare A-ranked Black Spruce Swamp (S2) occurring within the complex. Both natural communities support a rare and very small parasitic shrub which grows on branches of black spruce. The Black Spruce Swamp within this complex often transitions to a Spruce-Fir-Tamarack Swamp community. Spruce-Fir-Tamarack Swamp is one of Vermont’s boreal swamp types occurring within the colder regions of the state. This community provides habitat for two of the rare or uncommon species documented in this wetland complex.

The wetland complex also contains a perimeter of Poor Fen around the Dwarf Shrub Bog. Poor Fen is a rare natural community in Vermont. The A-ranked Poor Fen occupies ~30 acres within the Peacham Bog complex. It is wetter than the interior Dwarf Shrub Bog and supports two of the rare plant species found within the wetland complex as well as a different vegetative composition than other areas of the wetland complex. The bryophyte cover is near 100 percent (%) while the shrub and tree layer is variable. Sedges are abundant. A Poor Fen is a transitional community type between Dwarf Shrub Bog and Intermediate Fen; sharing characteristics of both types within this natural community.

The series of beaver wetlands and swamps at the north of the wetland complex has more mineral enrichment from groundwater or surface runoff than is found in the main Peacham Bog basin. This change in hydrology and mineral enrichment supports the A-ranked uncommon S3 natural community of Red Spruce-Cinnamon Fern Swamp. This natural community provides the habitat for an uncommon shrub species.

Lastly, there are areas of the A-ranked uncommon S3 Lowland Spruce-Fir Forest, especially along the southern end and western side of the wetland complex that occur within the immediate transition from wetland to upland providing both examples of the wet and well-drained examples of this natural community type. Serving as part of the upland buffer to this area of the wetland complex, the Lowland Spruce-Fir Forest is not only a state significant natural community type but it is also an important aspect to the wetlands protection and high quality. This natural community is found in the colder regions of the state and like the Black Spruce Swamp, this natural community provides habitat for a rare woodpecker to breed.

The Peacham Bog wetland complex is significant and irreplaceable for the exemplary wetland natural community function as confirmed through a site visit by Agency staff, by reports generated for and by the VFWD, as well as, identified by the FPR within their GMU Long Range Plan (2008).

8. Rare, Threatened, and Endangered Species Habitat

Wetlands that contain rare, threatened, or endangered (RTE) species of plants or animals are significant wetlands.

Nine rare (S2), threatened and endangered (S1) species and five uncommon (S3) species live in this wetland according to VFWD's Natural Heritage Inventory, in addition to the RTE or uncommon natural communities that occur within the wetland complex (see above for exemplary wetland natural community descriptions). Specific species of RTE's include, three species of S2 plants and one S2/S3 plant, one S1B bird and one S2 bird species, two S1/S2 and one S2/S3 dragonfly. Uncommon species (S3) include two birds, one dragonfly and one damselfly, and one plant species. The information contained within the VT Fish and Wildlife Reports may contain sensitive information. They are not for distribution or public display, so names of most RTE or uncommon species have not been included within this document nor are the reports attached as an appendix.

The wetland is significant and exemplary for the rare, threatened and endangered species habitat function as confirmed through a site visit by Agency staff and by reports generated for and by the VFWD.

9. Education and Research in Natural Sciences

Wetlands that provide, or are likely to provide valuable resources for education or scientific research are significant wetlands.

The wetland is significant for the education and research in natural sciences function as confirmed by Agency staff. The wetland is open to the public and its trails and boardwalk are used by many people for educational outings, with signage at the end of the boardwalk providing education material. In addition, the GMU Long-Range Management Plan (2008) encourages and supports education and research within the overall area. There has been historic use of study and research. The raised bog surface was documented by Dr. David Foster and his students in 1987, while bird surveys, plant inventories, natural community classification and wetland bioassessment data have been collected over the years. The deep

peatlands associated with the site, in addition to the diversity of habitats and wetlands types found within this wetland complex provide characteristics that make this wetland complex valuable and irreplaceable for education and research.

10. Recreational Value and Economic Benefits

Wetlands that provide substantial recreational values or economic benefits are significant wetlands.

The wetland complex is open to the public by the FPR Department. The Groton Nature Center Trail Head which leads to the Peacham Bog Loop Trail are used by many people for outings with a boardwalk constructed within the bog area to improve access and minimize impact. In addition, a cross-country skiing and snow-shoeing trail is established across the bog area, which provides excellent winter access, under frozen conditions. The wetland and buffer provides birding, hiking, and photography opportunities. The wetland complex is significant for the recreational value and economic benefits function as confirmed through a site visit by Agency staff and identified within the GMU Long-Range Management Plan (2008). A short description of the hiking trail is outlined in the Groton State Forest Summer Trails Guide, inclusive of a map (03/2010).

11. Open Space and Aesthetics

Wetlands that contribute substantially to the open-space and aesthetic character of the landscape are significant wetlands.

Although the wetland complex is not readily seen from a major thoroughfare, it has been identified as a place to visit for the aesthetic qualities of the site in regional and state plans. The wetland is significant for the open space and aesthetics as demonstrated in the State's GMU Long-Range Management Plan (2008), identifying the watershed and aesthetics of Peacham Bog as the primary management priority and confirmed through a site visit by Agency staff.

12. Erosion Control through Binding and Stabilizing Soil

Wetlands that are important for erosion control are significant wetlands. Such wetlands are typically located along stream, river, pond or lake shorelines, where erosive forces are present.

The wetland complex is significant for the erosion control through binding and stabilizing soil function as confirmed through a site visit by Agency staff. Good interspersion of persistent emergent vegetation and water is present along the course of the streams within the beaver influenced wetland areas of the complex which provide an erosion control function.

13. The Secretary shall also determine whether the wetland is exceptional or irreplaceable based on an evaluation of the extent to which the wetland contributes to Vermont's natural heritage. In determining whether a wetland is exceptional and/or irreplaceable in its contribution to Vermont's natural heritage the Secretary shall, at a minimum, consider the whether the wetland is categorized as one or more of the following: Representative Example of Wetland

Type; Rare Community Type; Community Assemblage/Wetland Complex; and Landscape Association.

14. The exceptional or irreplaceable characteristics of the wetland include the following: Representative Example of Wetland Type, Rare Community Type and Landscape Association.

15. Representative Example of Wetland Type

Wetlands that are considered exceptional for this criteria exhibit a reference condition for the wetland type(s) with minimal evidence of human disturbance. Based on size, condition, quality and function, these wetlands represent a reference condition for wetland type, and are therefore exceptional.

The Peacham Bog wetland complex contains numerous A-ranked reference condition wetland natural community types, each representative of the community type based on species present and other habitat components. In addition, the northern portion of the wetland complex contains a series of beaver influenced wetland areas. The Peacham Bog wetland complex with its wetland types and natural communities that occur within or immediately adjacent to it are exceptional because of their overall size and due to the protection afforded the Peacham Bog Natural Area, they have experienced little to no human disturbance.

The 104-acre Dwarf Shrub Bog is the largest community in the Peacham Bog complex containing peat depths of over 13 ft. It is dominated by short shrubs. Leatherleaf (*Chamaedaphne calyculata*) is the most abundant low shrub, along with sheep laurel (*Kalmia angustifolia*), bog laurel (*Kalmia polifolia*), Labrador tea (*Ledum groenlandicum*), bog rosemary (*Andromeda glaucophylla*), and small cranberry (*Vaccinium oxycoccus*). Herb cover is low in most areas and although there are few species, at least two are RTE. Some herb species include the three-seeded sedge (*Carex trisperma*), few-flowered sedge (*Carex pauciflora*), hare's-tail cottongrass (*Eriophorum vaginatum*), and three-leaved false Solomon's seal (*Smilacina trifolia*). Bryophytes (mosses) carpet the 2.5-foot high hummocks and moister hollows, with *Sphagnum fuscum* most abundant although at least four other bryophytes are present. Dwarf Shrub Bogs often grade into Black Spruce Woodland Bogs within the cooler regions of Vermont and this is exemplified within Peacham Bog.

The Black Spruce Woodland Bog areas within the wetland complex occupy ~ 40 acres, primarily towards the interior and northern half of the main bog basin. As described in the EO Report, the Black Spruce Woodland Bog contains "stunted black spruce (*Picea mariana*) and tamarack (*Larix Laricina*) [which] make up a canopy cover from 25 to 60 % that reaches heights up to 20 feet. Few of these stunted trees attain diameters greater than four inches, but cores reveal they are from 75 to 100 years old…under the open and stunted canopy, the shrub, herb, and bryophyte vegetation is very similar to the nearby Dwarf Shrub Bog." The Black Spruce Woodland Bog typically forms the transition between the open bog mat and Black Spruce Swamp within this wetland complex.

There are nearly 27 acres of Black Spruce Swamp within Peacham Bog, primarily occurring at the far southern and most northern portions of the principal Peacham Bog basin. There are slight differences in vegetative community between the two areas; however, as described in the EO Report, "in general most of the Black Spruce Swamp has an open canopy (65 to 80 % cover) dominated by black spruce with scattered tamarack. Cored spruce trees revealed ages from 86 to 112 years old, which is only about half the life-expectancy of this species. Mountain holly (*Nemopanthus mucronatus*) is the most abundant tall shrub along with northern wild raisin (*Viburnum cassinoides*) and regeneration of black spruce and tamarack. Some of the black spruce regeneration is by "layering", a process by which lower branches of a tree that are in contact with the moist ground take root and form a new tree. Short shrub cover is typically near 50 %, herb cover is sparse, and Bryophyte cover is typically 90 % or more. Moose browse and moose dung are abundant in the Black Spruce Swamp, and for the rare moose-dung moss (*Splachnum luteum*), this is prime habitat." Peat depth was measured at 6.9 feet.

The Black Spruce Swamp within this complex often transitions into a Spruce-Fir-Tamarack Swamp community, which is also one of Vermont's boreal swamp types occurring within the colder regions of the state. There is ~ 25 acres of Spruce-Fir-Tamarack Swamp occurring within Peacham Bog. A Spruce-Fir-Tamarack Swamp will typically form and are found within topographic basins, like Peacham Bog, that have little surface water movement. As described in the Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont, "Spruce-Fir-Tamarack Swamps have organic peat soils that are generally saturated throughout the year due to impeded drainage from the basin. These swamps are acidic, but may receive some mineral enrichment from surface water runoff or from groundwater seepage near the swamp margins. Spruce-Fir-Tamarack Swamps commonly grade into Black Spruce Swamps as peat becomes deeper, and there is greater isolation from surface runoff and the underlying mineral soils. The relative abundance of tamarack and red spruce (*Picea rubens*) in these swamps is likely related to the degree of mineral enrichment, with abundant tamarack indicative of more mineral enrichment. The interiors of Spruce-Fir-Tamarack Swamps have a distinct structure. The straight, vertical trunks of red and/or black spruce, balsam fir (*Abies balsamea*), and tamarack dominate the relatively closed canopy." There is a well-developed tall shrub community and a sparser low shrub layer. Bryophytes carpet the ground with a scattered mix of herbs in combination with ferns on the hummocks. The Spruce-Fir-Tamarack Swamp community within Peacham Bog is typically found in isolated pockets or along the edge of the complex consistent with their ecology and physical requirements, resulting in the distinct vegetative structure and species composition representative of this natural community.

The wetland complex also contains an ~ 30-acre perimeter of A-ranked Poor Fen around the Dwarf Shrub Bog. Poor Fen is wetter than the interior Dwarf Shrub Bog and as described in the EO Report "some of the open peatland, especially on its edges, experiences some minor nutrient input and thus supports Poor Fen instead of Dwarf Shrub Bog. The Poor Fen is a transitional community type from Dwarf Shrub Bog and its vegetative composition typifies this transition. The vegetation and its abundance in a given area is variable within this natural community, with hummocks of small trees and shrubs, and other areas with sedge lawns.

The bryophyte cover is near 100%. Herb cover in one plot was measured at 40% but in other areas it was much greater and includes at least one RTE species. Total shrub cover was measured at 50% in one area, but was variable throughout the natural community type. The few small stunted trees species include black spruce and tamarack. Short shrubs are more abundant with a similar species composition found within the Dwarf Shrub Bog. Sedges are abundant and include rich woods sedge (*Carex oligocarpa*), few-flowered sedge (*Carex pauciflora*), and in some areas meager sedge (*Carex exilis*). Other herbs are present at lower concentrations including tawny cottonsedge (*Eriophorum virginicum*), tussock cottonsedge (*Eriophorum vaginatum*), three-leaved false Solomon's seal (*Smilacina trifolia*), round-leaved sundew ((*Drosera rotundifolia*), horned bladderwort (*Utricularia cornuta*), and purple pitcherplant (*Sarracenia purpurea*).

The A-ranked uncommon natural community of Red Spruce-Cinnamon Fern Swamp occurs primarily along the series of beaver influenced wetland areas reflecting the increased mineral enrichment compared to the principal bog basin. The VNHI EO Report describes this natural community as follows, "red spruce and balsam fir dominate the canopy of these swamps and there is little or no black spruce or tamarack. Black ash (*Fraxinus nigra*) is present in low abundance, but is a strong indicator of enrichment. Speckled alder (*Alnus incana*) is the dominant tall shrub, with winterberry holly (*Ilex verticillata*), mountain holly, and tree regeneration present. Short shrubs are abundant and there is high species richness: alder, dwarf blackberry (*Rubus pubescens*), alder-leaved buckthorn (*Rhamnus alnifolia*), winterberry holly, velvet-leaf blueberry (*Vaccinium myrtilloides*), sheep laurel, wild raisin, and the uncommon mountain fly honeysuckle (*Lonicera villosa*). Three-seeded sedge dominates the herb layer, but 18 other species were observed in a 400-square meter plot; a much greater species richness than is found in Black Spruce Swamps. Other species include the suite of boreal herbs, wild sarsaparilla (*Aralia nudicaulis*), cinnamon fern (*Osmunda cinnamomea*), common wood-sorrel (*Oxalis acetosella*), Indian pipes (*Monotropa uniflora*), drooping woodreed (*Cinna latifolia*), and Jack-in-the-pulpit (*Arisaema triphyllum*). Bryophyte species richness is also high, with 19 species observed in the same plot."

Immediately along the western and southern edges of the wetland complex, the Lowland Spruce-Fir Forest is found. It can be both a moist wetland or drier community type. The VNHI EO Report describes two areas of this natural community. "One area along the trail west of the main complex contains areas of dense (~60 % cover) red spruce that are large and about 65 ft. tall with balsam fir regeneration that is about 20 feet tall. The subcanopy inclusive of shorter trees, a tall shrub layer, and a short shrub layer is composed primarily of red spruce and balsam fir with occasional red maple (*Acer rubrum*), American beech (*Fagus grandifolia*) and hobblebush (*Viburnum lantanoides*) present. The southern community of Lowland Spruce-Fir Forest of Peacham Bog is a great example of the community type, with a multi-aged canopy, big trees, hummocks, and mosses."

The entire wetland complex is 300 acres, comprised mostly of the different state significant natural community types. It ranks "high" on the Vermont Rapid Assessment Method (VRAM) and has experienced very little human disturbance. In addition, the surrounding

landscape is the intact Groton State Forest located within the greater 27,000+ acre Groton Management Unit.

16. Rare Community Type

Wetlands that are considered irreplaceable for this criteria contain unique or rare wetland community type(s) which may be slow-forming or near the extent of its natural range.

As discussed above, multiple rare wetland community types are present within the Peacham Bog wetland complex and it is the only raised bog in Vermont. Vermont's peatlands have been forming over the last 13,500 years, since the retreat of the glaciers. The formation of peat is a slow process, accumulating thin layers each year. Peat depths in the principal bog area of the complex measure up to 13 feet. Most of the natural communities (Dwarf Shrub Bog, Black Spruce Woodland Bog, Black Spruce Swamp, and Spruce-Fir-Tamarack Swamp) present within the wetland complex contain peat at varying depths and are Vermont's boreal wetland types occurring within the colder regions of the state. Individually and as a complex, the Vermont Rapid Assessment Method (VRAM) scores are high and the complex has very little human disturbance.

17. Landscape Association

Wetlands can be irreplaceable because of the critical nature of their landscape position, and the corresponding functions in that landscape. They are often exceptional because of their size, function and value.

The Peacham Bog Wetland complex is a large and unique wetland within the Groton State Forest. Given its location, it provides for a variety of recreational and educational opportunities as managed for by the FPR Department. The principal bog area and its associated wetlands result in approximately 300 acres of wetland, made up primarily by state-significant natural communities, surrounded by intact forest. The complex offers habitat for 14 RTE or uncommon species and supports a variety of wildlife species. A large wetland complex within a primarily hardwood forest offers irreplaceable functions for habitat diversity and breeding refuge. Given its landscape position, it also serves as a headwater for some tributaries that flow into the Coldwater and Red Brooks; helping to maintain high water quality for these brooks and overall Wells River watershed they are a part of. Lastly, due to the nature of the topography and geology, the formation of the large Dwarf Shrub Bog and its sensitivity to disturbance on adjacent lands, direct impacts by human activities, such as trampling and compaction, it truly is irreplaceable within the immediate landscape and also for the State's natural heritage and broader landscape implications.

18. In addition to the above criteria, when determining whether a wetland is exceptional and/or irreplaceable in its contribution to Vermont's natural heritage the Secretary may also consider the following qualities that would contribute to a wetland being exceptional and irreplaceable: undisturbed condition, intact landscape and connectivity.

The exceptional or irreplaceable characteristics of the Peacham Bog wetland complex includes the following:

Undisturbed Condition: Those wetlands in a relatively undisturbed condition.
Intact Landscape: Those wetlands that are part of an intact and unfragmented landscape.

The wetland and buffer zone is undisturbed or minimally disturbed as demonstrated by the VRAM score. The wetland complex and surrounding buffer which is inclusive of the majority of its watershed has been deemed a Natural Area and managed by the FPR Department to minimize impacts to the system. The surrounding landscape is the intact Groton State Forest within the larger Groton Management Unit composed of over 27,000 acres. Most of the area surrounding the GMU is heavily forested, private land. There are several larger private land holdings adjacent to the forest and many smaller privately-owned parcels. Development is mostly concentrated on the lakeshores surrounding Lake Groton, Peacham Pond, Ricker Pond, and Martins Pond.

Determination of Wetland Classification

Based on information gathered by the Wetlands Program, input from The Vermont Forest, Parks and Recreation Department, and information from the Nongame Natural Heritage Program of the Vermont Department of Fish and Wildlife, the Secretary has determined that the wetland under consideration is a Class I wetland.

Buffer Zone

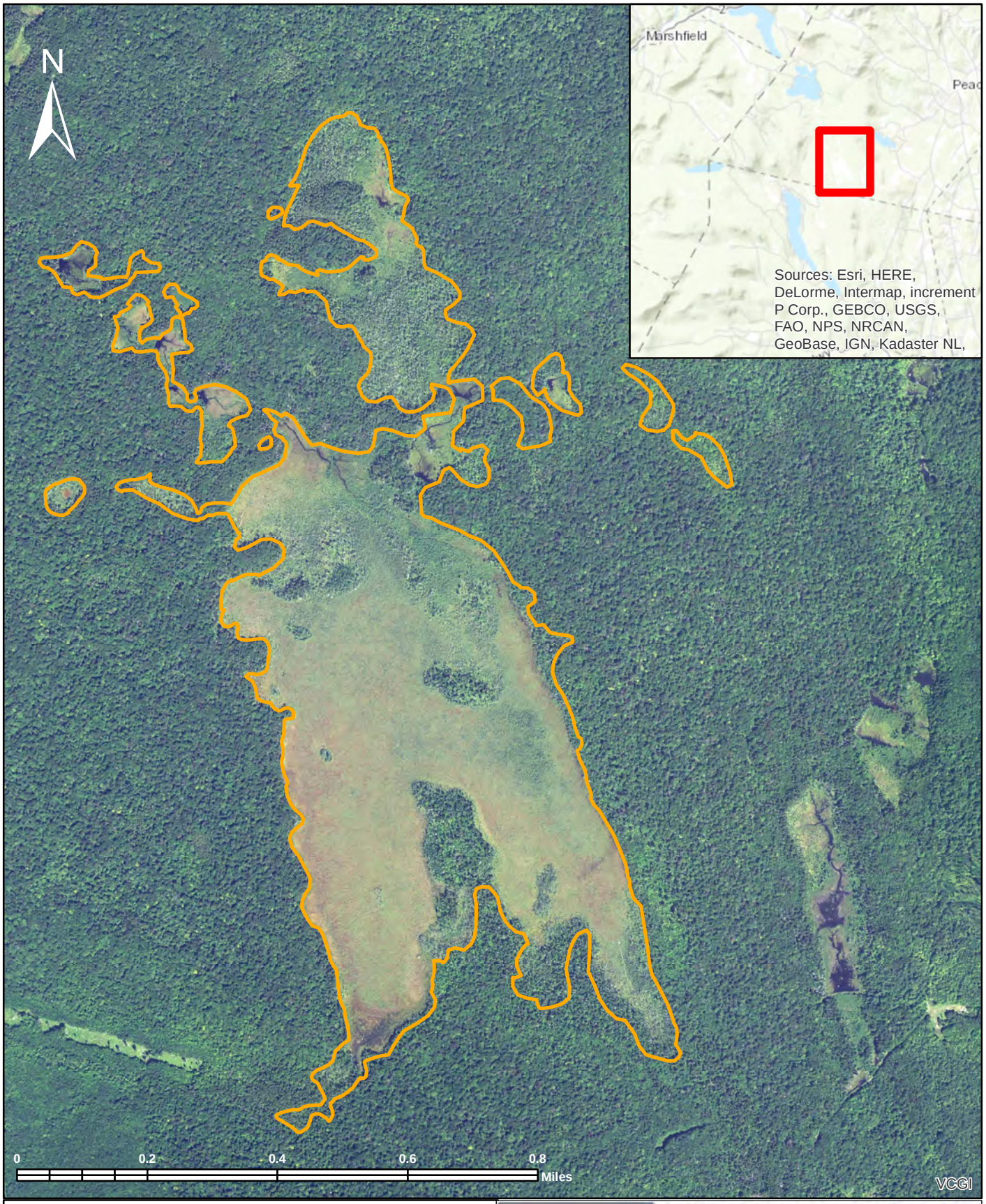
The Peacham Bog Natural Area within the Groton State Forest portion of the GMU is managed by the Forests, Parks and Recreation Department (FPR). The FPR Department has been managing this natural area with a 500-ft buffer. In most cases the natural area 500-ft buffer corresponds to the proposed 500-ft wetland buffer, which has served to protect Peacham Bog's functions and values. In order to continue protect the functions that make the wetland exceptional or irreplaceable, the Secretary has determined that a 500-ft wetland buffer zone is appropriate.

The reference condition of the wetland complex is due largely to the undisturbed condition of the surrounding watershed. " The integrity of bog communit[ies] can be threatened by significant changes in land use that result in increases in runoff and changes in water quality, such as development and clear-cutting… and Poor Fens are threatened with land use changes that occur within both their immediate watersheds and within their groundwater recharge zones. Protecting the quality and quantity of ground water that discharges into a fen is critical to maintaining the hydrology and the vegetation structure and composition of the community (Thompson and Sorenson, 2005)." A 500-ft wetland buffer will encompass approximately 65% of the intact watershed of the wetland complex (~485 acres) with 90% of the principal bog area's watershed hydrologic inputs protected.

Effect of Class I Wetland Determination

Activity in a Class I wetland or its associated buffer zone is prohibited unless it is an allowed use under the VWR, or unless it is authorized by a permit, conditional use determination or order issued by the Secretary. The Secretary may impose any permit conditions as necessary to achieve the purposes of the VWR. Section 9.1 of the VWR. This Determination does not relieve the petitioner or any other person of the responsibility to comply with all other applicable federal, state or local laws.

Date: December 22, 2017



Proposed Mapping of Class I Wetland
Peacham Bog, Peacham Vermont

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION
WETLANDS PROGRAM

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