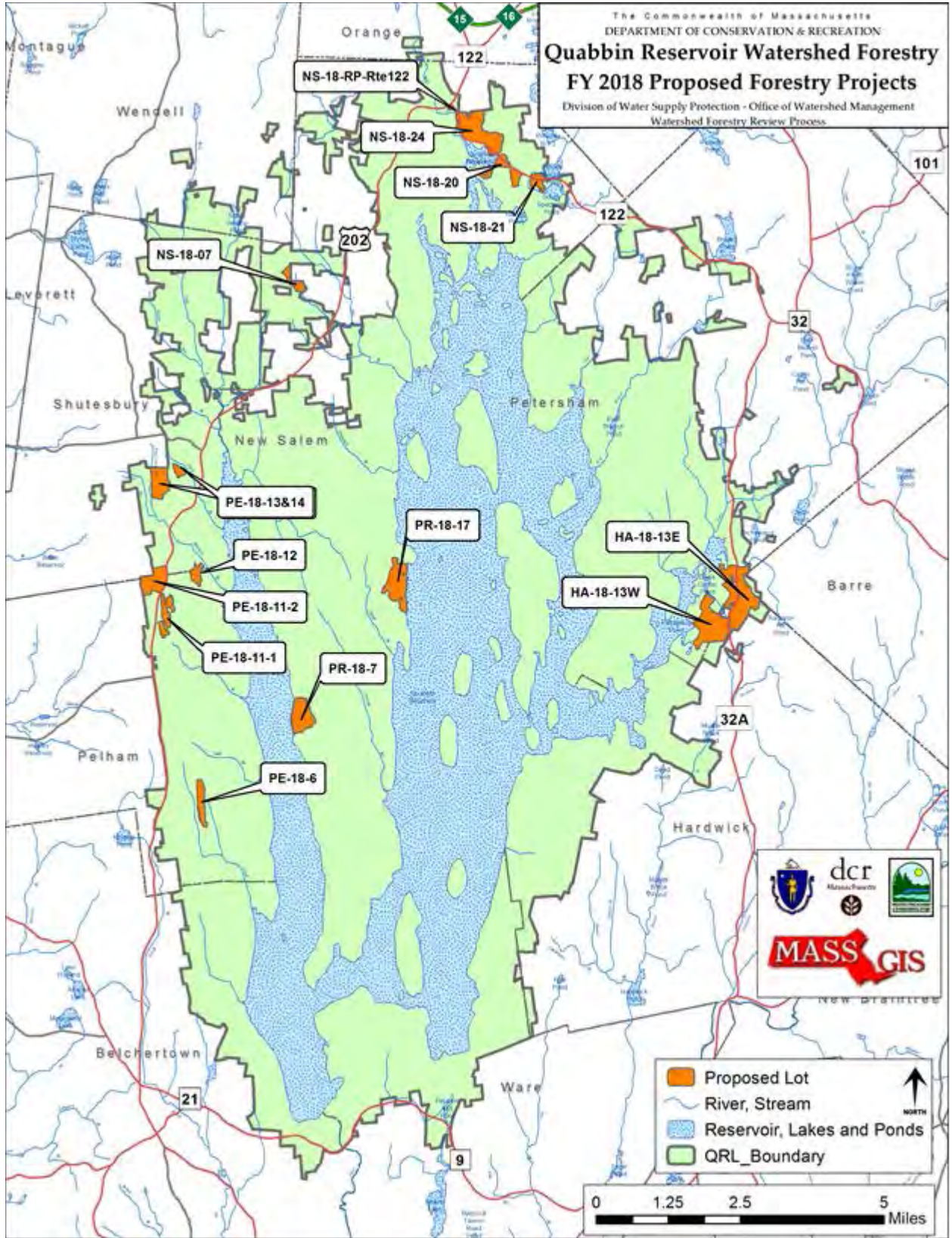




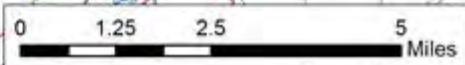


The Commonwealth of Massachusetts
 DEPARTMENT OF CONSERVATION & RECREATION
Quabbin Reservoir Watershed Forestry
FY 2018 Proposed Forestry Projects
 Division of Water Supply Protection - Office of Watershed Management
 Watershed Forestry Review Process



-  Proposed Lot
-  River, Stream
-  Reservoir, Lakes and Ponds
-  QRL_Boundary



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: HA-18-13

Site Information

Watershed: Quabbin	Town(s): Hardwick and Petersham
Acres: 465.6	Nearest Road: Route 32A
Natural Heritage Atlas overlap? Yes	
Forest Types: White pine; white pine/hardwood; Red pine; mixed hardwood; oak/hardwood; pine/hemlock	
Soils: 23% Hinckley and Merrimack (excessively drained); 77% Charlton, Chatfield-Hollis, Paxton, and Woodbridge (well-drained to moderately well-drained)	
Wetland Resources: Wetlands are present within and adjacent to the lot but will not be harvested; a total of 9 intermittent stream crossings and 5 short wetland crossings will be required to access this lot	
Vernal Pools: Several verified within and adjacent	

NARRATIVES

General Description/Forest Composition/History: The red pine plantations and the over stocked and/or poorly formed white pine and white pine/hardwood stands along with areas with hemlock are the stands that will be concentrated on. Additional work will be done in the adjoining sections of additional types mentioned above as is deemed prudent.

The red pine plantations are declining, most have some mortality from red pine scale or root rot already and all are susceptible. Past cutting intensity is variable and stocking levels range from low to fully stocked. Most of the stands have some white pine or hardwoods in the overstory and these will be favored for retention where needed. Some of the areas typed as white pine have a red pine component and these will be cut. All stands have a dense understory, mainly composed of white pine but on some it appears the black and occasionally white birch dominated and understory is now mainly sapling to pole sized birch. Where these are vigorous and well formed they will be protected as much as possible.

The white pine and white pine/hardwood stands on the west side were cut last in 1999 and 2000. These cuts were group shelterwood harvests typical of the time. Some openings up to around an acre were created, but most were under ½ acre. Overstory here is mostly white pine with scattered red and sugar maple, mainly red but also white and black oak, ash, white and black birch, and occasional black cherry. Most of the red pine plantations graduated into a red and white pine mix but these were typed as white pine on the type map. On the richer soils the amount of hardwoods tends to increase and the form and vigor is generally average to good. On the east side of 32A the stands were partially thinned in 1980 and 1984. The form and vigor of overstory is generally much poorer on this side, partially due to only having had one treatment in last 40 years. The sites are generally better were a pine hardwood mix is present. A harvest should improve the overall vigor, form and composition of the stand here. It is expected these areas will regenerate to white pine/hardwoods but the hardwoods should express dominance, if not heavily browsed, resulting in a more diverse overstory in the future.

The areas with hemlock are typed as white pine/hemlock or hemlock/hardwood on type map but on the ground would now call them white pine or white pine/hardwood as the white pine and hardwoods have out competed the hemlock which is now mainly in a suppressed or intermediate crown position. The hemlock appears to be fairly healthy now so it isn't clear if this is from past adelgid infestation or just natural differences in growth rates. Other species present in overstory are red oak, black and white oak, red maple and black birch.

Regeneration condition can be summarized into 3 fairly uniform groups. The old red pine plantations along Carter Road which were cut in fall 1994 and then storm damaged and salvaged in winter 1996/97. The regeneration here is mostly dense white pine with some emerging black birch.

The second condition is sapling and pole sized predominately black birch, with some white birch plus scattered individuals and pockets of mostly shorter suppressed white pine with some mixed hardwoods- mainly black birch, red maple and oak. This condition occurs mainly from west of Carter Road up to 32A. These originated from cuts around 1970 and were partially released by additional cuts in mid to late 90's.

The remaining area is the section east of 32A. This section only had a few areas cut in the late 60's and early 80's. These areas now have an understory comprised mainly of sapling and pole sized black birch or a diverse mix of most native hardwoods with white pine and hemlock. This side of 32A is open to hunting which might partially explain the increased understory species diversity. On the areas that haven't been cut since the 60's a typical, mainly suppressed, mix of black birch, red maple, white pine and hemlock exists with most of the white pine occurring on the drier sites.

Some of the non-tree species present in the understory are low and high bush blueberry, dogwood, hawthorn, princess pine, running cedar, common clubmoss, grapevine, witch hazel, poison ivy and a variety of ferns and forbs.

Invasives are present in multiple areas, mainly around old foundations and many of the landings. The southernmost landing on the west side of 32A is especially heavily infested but hopefully using that landing can be avoided. Honeysuckle, Japanese barberry, bittersweet and multiflora rose were all seen, and the red pine stand west of that southern landing has a lot of winged Euonymus. Away from the foundations and heavily disturbed areas the invasives thin out fairly quickly although some barberry is found scattered around, especially near wetlands. Some widely scattered winged Euonymus and rose were also seen. These scattered patches are not expected to have much impact on regeneration. The heavier infestations around the landings are a concern but most of these areas are also where the red pine is and are going to be released when the red pine dies anyway. If herbicide use becomes an option the landing areas and other heavily infested areas should be sprayed before any logging. Until then cutting or possibly pulling the smaller ones on the worst areas, particularly the bittersweet, in early spring should slow the spread and will at least lessen the seed dispersal.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because of the amount of declining red pine and general lack of diversity of age, structure and healthy overstory species.

Silvicultural Objectives: Regenerate about 110 acres in openings; apply preparatory/establishment cuts on about 100 acres. Due to the presence of red pine scale and root rot most of the upland red pine areas will be cut. Previous harvests ranged from shelterwood to large patches with groups retained. A couple of stands on the east side had no or only light thinning so the silviculture will range from large group selection (up to 5 acre openings), to 1/3 to 2 ac small openings to shelterwood overstory removal. Additional thinning around openings will occur where appropriate.

Most of the red pine stands have been cut twice before so there is already dense regeneration under these. The highway department will be approached about removing all the red pine in the road buffer in a few areas where the dying red pine is a safety concern along the road. Established acceptable regeneration will be protected as much as possible but some of this has gotten stagnant and some has been storm damaged or is so whippy that will be susceptible to future damage. These areas will be considered unacceptable regeneration.

The white pine, white pine hardwood and hardwood stands will be regenerated by the creation of openings mainly 1/3-2 acres in size. Openings will be irregularly shaped other than where a stone wall is an edge. 5-20 ft² of basal area will be retained in openings over 0.5 ac. Most of the openings will have some thinning done around the edges. Most of the stands in these types have been previously cut. An effort will be made to place openings where groups of vigorous regeneration was established previously. Due to sub-watershed restrictions and time constraints about 40 acres of the white pine/white pine-hardwood type across the central portion of the western section won't be treated.

There are a couple of stands with hemlock, mainly sub-canopy. These will be treated by single tree selection and small opening up to 1/2 acre in an effort to promote the hemlock which appears to be mostly healthy but losing out to competition by mainly white pine.

Many of the dead snags and any trees with stick nests, dens or unusual wildlife habitat characteristics will be retained. For the most part areas to be thinned will be left fully stocked with residual basal area of 60-90 depending on amount of white pine (areas of mainly white pine will have the higher BA).

Cultural Resources: There are numerous cellar holes and foundations, stone walls, a couple of wells, a cistern and a couple of breached dams. All will be avoided and protected as per current management plan. Almost all the proposed area has been logged at least once during last 30 years and appears there are barways sufficiently wide to allow modern equipment access with minimal disturbance to them. In the event that such a barway doesn't exist the wall will be crossed where previously disturbed or at a section that is low and made of tossed stone. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Cavity trees and potential/existing nest trees will be retained if possible. Beavers are active in large wetland that the north end of Carter Road crosses and have caused erosion of road edge. Culverts all appeared to be functioning as of 3/1/2017. New beaver activity was also seen on and around the pond above the breached dam on the north edge of proposal, east side of 32A.

Coyote, bear, deer, raccoon, turkey and moose are some of the species known to inhabit this area. There was lots of evidence of deer on both sides of 32A and one set of moose tracks seen on the west side. Since the east side is open to hunting heavy browsing is not expected there. The west side has had more logging and appears that browsing has affected regeneration composition as it is mainly black

birch with some white pine. With the larger openings and amount of already established understory it is believed that browsing won't have a big impact on regeneration establishment though may still affect composition.

NHESP has determined that certain state-listed sensitive species or habitats may exist within the lot proposal area. To protect them from unnecessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

FIGURES

Figure 1. Forestry Lot Proposal Map.

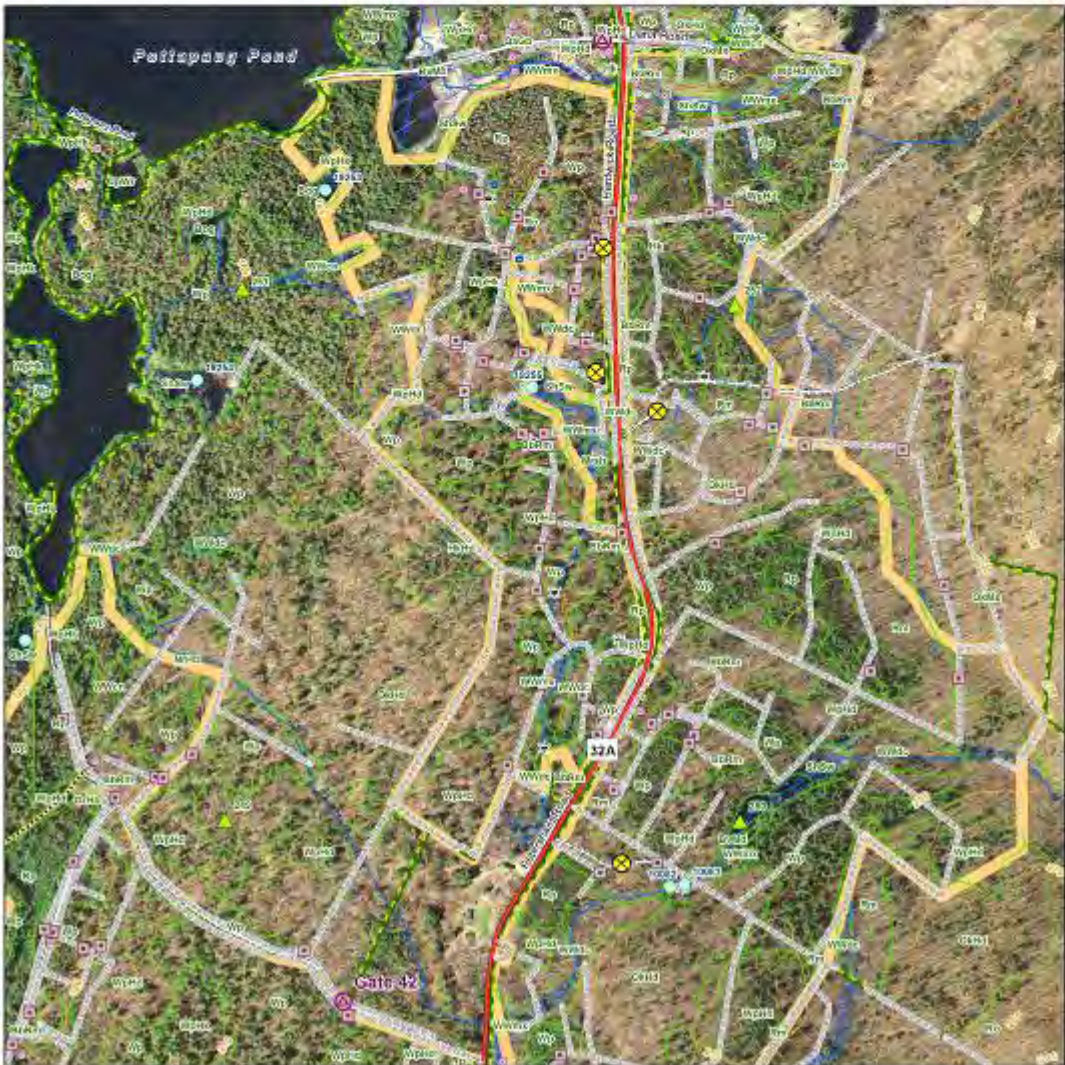
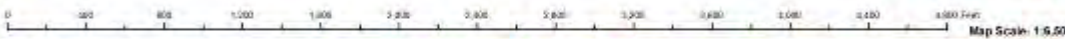
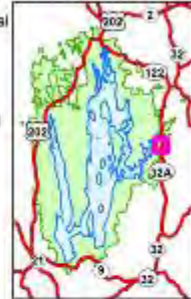


FY2018 Proposed Forestry Project HA-18-13E/W (North Section)

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



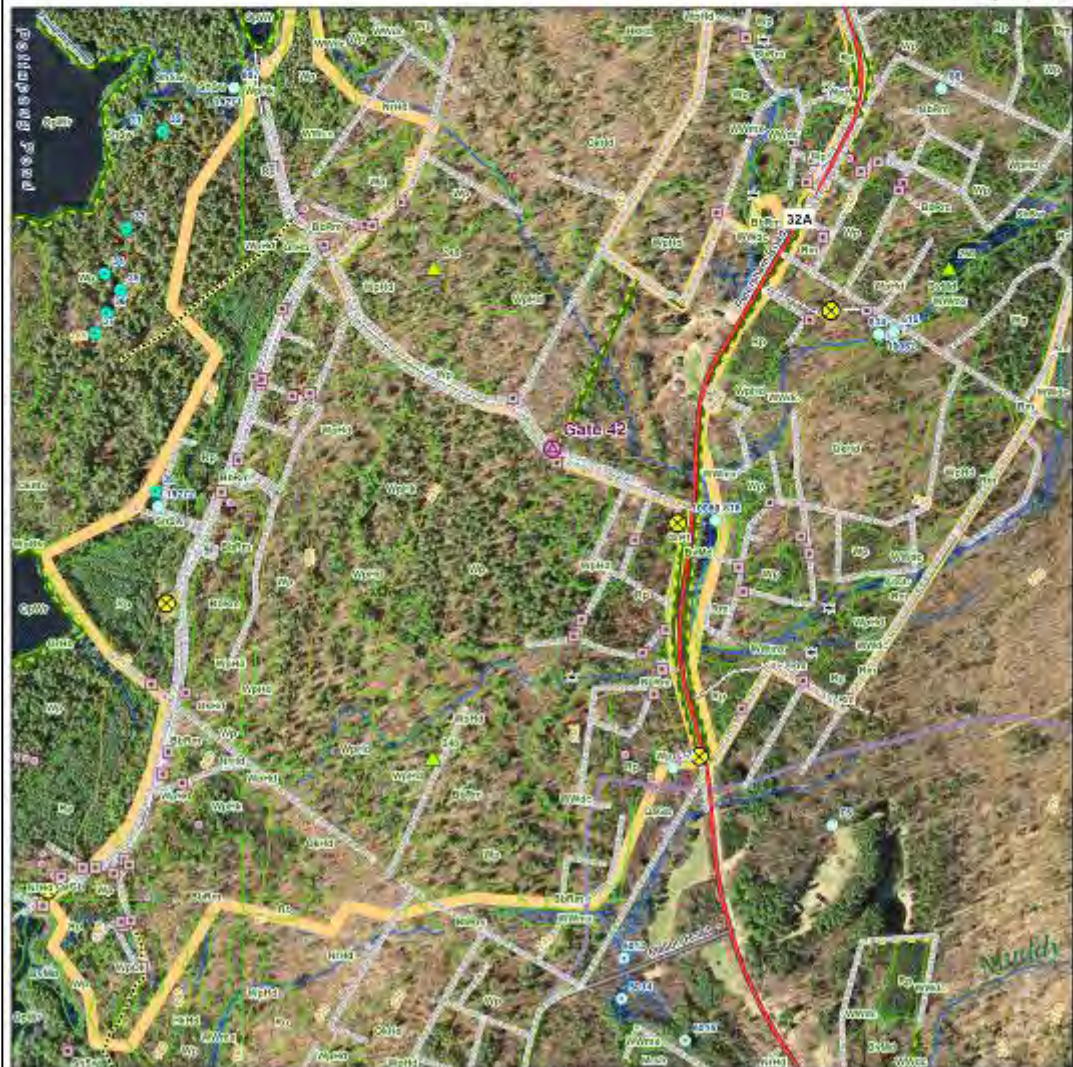
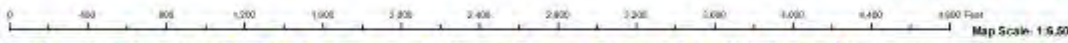
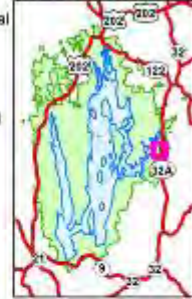


FY2018 Proposed Forestry Project HA-18-13E/W (South Section)

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: NS-18-7
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Site Information

Watershed: Quabbin	Town(s): New Salem
Acres: 38.1	Nearest Road: West Street
Natural Heritage Atlas overlap? No	
Forest Types: Hemlock/hardwood; White pine; Northern red oak	
Soils: 11% Hinckley (excessively drained); 79% Hennicker and Chichester (well-drained); 8% Newfields (moderately well-drained); 2% Whitman (poorly drained)	
Wetland Resources: Wetlands are present within the lot but will not be harvested; one stream crossing will be required to access this lot from West Street, and possibly another if landing on Macedonia Road to the west	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: The northernmost portion of the lot, closest to Macedonia Road, is a two aged hardwood stand. The overstory consists primarily of widely spaced red oak sawlogs, with occasional white and black oak and black birch. Form is variable, from sweepy stump sprouts to straight clear individual stems. The midstory is denser and more diverse, dominated by pole- and small sawlog-sized red maple and black birch, but also containing significant components of paper birch, black and red oak, hemlock and beech. Nectria canker is common on black birch of all sizes. Beech bark disease is present but many of the beech trees show some degree of resistance. The understory is mostly open, with occasional mountain laurel and widely scattered hemlock, white pine, black birch and beech seedlings and saplings. Some low bush blueberry is present, particularly near the east boundary line.

Hemlock becomes more common in all size classes as one goes south, with white pine as an occasional associate. Hemlock crowns are thin, probably due to hemlock wooly adelgid and/or hemlock elongate scale; form is variable but generally fair. Near the stream northern hardwood species come in as well, particularly yellow birch and white ash.

At the southernmost end of the lot near West Street the overstory is dominated by sawlog-sized white pine, a few with good form but much of it badly weevilled, with multiple forks, lots of sweep, and numerous large branches. Density is variable; where the overstory is most crowded crowns tend to be narrow and white pine snags testify to intense resource competition. The midstory is more diverse, with pole- and small sawlog-sized black birch, paper birch, red maple, white pine, and hemlock. Lower on the slope there is some white ash and yellow birch of variable health and vigor.

Regeneration in the red oak and hemlock-hardwood stands is very limited, consisting primarily of scattered hemlock, white pine, and black birch seedlings and saplings. There is some mountain laurel, but not enough to significantly inhibit regeneration in this area. Regeneration is sparse except in and around a half acre area once was cleared for a house that was never built. Primary seedling and sapling species are white pine, hemlock and black birch, with scattered oaks, red maple, white ash, and yellow birch. The herbaceous layer contains hay scented fern, wood ferns and wintergreen.

The northern half of this lot received a shelterwood prep cut in 1989. There have been no harvests by DWSP in the southern and eastern half of the lot. This area was marked in 2009 for a harvest (Lot 3127) that was not completed due to the moratorium on DWSP forest management.

A few scattered Japanese barberry plants were found at the south end of the white pine area near West Street. There were also a few small bittersweet vines. These will be cut or uprooted prior to the harvest.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because of the badly weevilled white pine at the south end, and declining hemlock, necrotic infected black birch, and lack of age class diversity to the north.

Silvicultural Objectives: Primarily small group/patch selection, with some intermediate thinning along skid roads. Openings will be a maximum of 2 acres, averaging less than 1 acre, totaling about 12 acres. Openings will be irregular in shape, and will be located where there are clusters of trees that are diseased, declining, or have poor stem structure. Where possible, healthy, well-formed advance regeneration that is suited to the site will be released. Five to ten square feet per acre of basal area of sawlog- and pole-sized trees will be retained in openings over 0.5 acre. Trees on the perimeter of openings will have large, healthy crowns (hence strong seed bearing potential), stable stem structure, and will be either vertical or leaning away from the openings so that they will not damage regeneration in the opening if they fall or are cut in the future.

Weevilled white pine, necrotic infected black birch, and declining hemlock and ash are the primary targets for removal. However, the healthiest individuals of these and all other species will be retained, with particular attention to preserving species that are uncommon locally or regionally. Den trees, potential den trees, snags, large logs, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) will be retained wherever possible as valuable wildlife habitat.

The red oak stand in the northern part of the lot will receive minimal treatment, focused mainly on removing unhealthy or poorly formed trees near skid roads. There will be fewer openings in this area, and none over 1 acre. Healthy, structurally sound red oak will be preserved and protected throughout the lot as much as possible.

Cultural Resources: There are a few thrown stone walls on this lot, primarily in and around the white pine stand near West Street and along the northwest lot boundary. Skid roads will go through existing barways or broken portions of walls where it is not possible to avoid them altogether. Loggers will be directed to protect walls as much as possible. If the harvest takes place in winter, walls will be flagged to make them easy to identify even with snow cover. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Regeneration in the openings will result in small patches of early successional habitat. There are no known rare or endangered species or habitats in this proposal area.

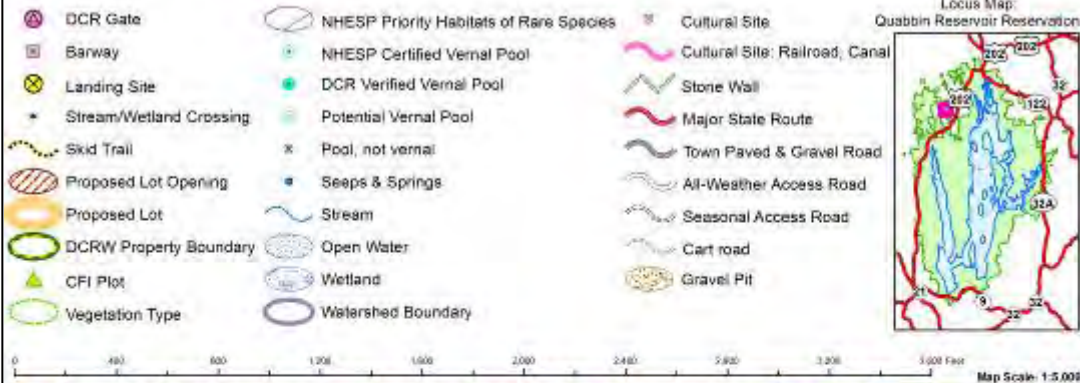
FIGURES

Figure 1. Forestry Lot Proposal Map.



FY2018 Proposed Forestry Project NS-18-7

Quabbin Reservoir Reservation Proposed Forestry Lot Review



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: NS-18-20

Site Information

Watershed: Quabbin	Town(s): New Salem
Acres: 61	Nearest Road: Route 122
Natural Heritage Atlas overlap? Yes	
Forest Types: White pine; White pine/oak; Red pine	
Soils: 44% Hinckley and Windsor (excessively drained); 32% Canton (well-drained); 8% Deerfield (moderately well-drained); 16% Walpole (poorly drained)	
Wetland Resources: Wetlands adjacent include South Spectacle Pond and McLoughlin Pond, some small interior wetlands and streams. All crossings over existing culverts.	
Vernal Pools: Three verified	

NARRATIVES

General Description/Forest Composition/History: Red pine is the dominant species along Route 122 between DWSP Gates 32 and NS 14, extending to the south boundary of the lot. It is also present to the east and west along Route 122, interspersed with white pine and hardwoods. Red pine scale (*Matsucoccus resinosae*) does not seem to have infected this lot yet, but it is present nearby and can be expected to move into the proposed area in the near future. When it does, it is expected to cause near 100% mortality of red pine within a few years.

White pine is the dominant species both east and west of the red pine, mixed increasingly with oaks and other hardwoods as one moves upslope. The white pine is of variable quality depending on current and past growing conditions. In areas where white pine has had low competition, such as in mixed species stands or where harvesting or wind events opened up the canopy, the white pine is often weevilled, forked, or has numerous large branches. In the areas with dense white pine, such as near the fishing area, intense competition has resulted in a wide range of crown classes, from vigorous co-dominants to low vigor intermediate and suppressed trees. White pine form is generally good in denser stands, with straight stems, smaller branches, and less weevil damage.

Red, black, scarlet and white oak mix increasingly with pine as one moves upslope. Less common species include hemlock, red maple, black birch, paper birch, beech and black cherry, mostly in the pole size class. There are occasional pitch pines near the fishing area. Overall hardwood form and vigor is fair to good. Nectria canker is present on much of the black birch, but the few beech trees observed seemed to be resistant to beech bark disease. Much of the hemlock is in notably good condition, with dense, full crowns.

Dense white pine seedlings, saplings and poles are present throughout the proposed area wherever there has been regeneration harvesting. Mirroring the overstory, there tends to be more species diversity as one moves upslope, with increasing amounts of oak, birch, red maple, and hemlock. White pine regeneration is often weevilled, particularly in larger openings.

Wintergreen, partridge berry, sheep laurel, clubmoss, and high and low bush blueberry are present in the understory, as well as mountain laurel and bracken fern near the cable line.

The red pine on this lot has been harvested numerous times, including a thinning in 1986, a selection harvest in 1995, and most recently a seed tree harvest in 2007. The area from Quabbin Gate 31 to Gate NS 14 has had a single group selection harvest with 3.9 acres of openings in 2007. The area west of the Gate 31 access road has had three light treatments, including a thinning in 1983 and two selection harvests completed by the Quabbin crew in 1990 and 2001.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen primarily because red pine scale is advancing quickly through the region, and is expected to cause 100% red pine mortality. A secondary objective is to promote the health and vigor of the white pine near the fishing area.

Silvicultural Objectives: Regenerate about 28 acres in openings; intermediate thinning will occur on up to about 10 acres.

The primary objective for this harvest is red pine removal. This will be accomplished in part through small group/patch selection, and in part through completion of the 2007 seed tree cut by removing the red pine portion of the overstory. Maximum opening size will be 4.5 acres for removal of pure stands of red pine. In the seed tree cut, removal of red pine overstory trees will only take place where damage to regeneration can be minimized. All other species in the overstory will be retained as legacy trees.

For all other circumstances, including mixed forest types where red pine is present along with other species, maximum opening size will be 2 acres, and average opening size will be 1 acre. Openings will be irregular in shape, and will be located where there are clusters of trees that are diseased, declining, or have poor stem structure. Where possible, healthy, well-formed advance regeneration that is suited to the site will be released.

Five to ten square feet per acre of basal area of sawlog- and pole-sized trees will be retained in all openings greater than 0.5 acre. Trees on the perimeter of openings will have large, healthy crowns (hence strong seed bearing potential), stable stem structure, and will be either vertical or leaning away from the openings to minimize damage to regeneration if they fall or are cut in the future. Oaks will be preferred as perimeter trees in order to increase their chances of seedling into openings.

The intermediate cuts on this lot will be limited to the dense white pine stand between the Fishing Area, O'Loughlin Pond, and Gate 31 access road. Thinning in this area will increase vigor of the residual stand, and reduce its vulnerability to the fungal diseases associated with white pine needle drop.

Other than red pine, all tree species will be retained, and uncommon tree species will be protected and released. Den trees, potential den trees, snags, large logs, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) will be retained wherever possible as valuable wildlife habitat.

All water bodies will be protected by filter strips. Filter strips will be 100 feet wide for vernal pools, 50 feet wide for off-reservation streams and wetlands, and variable width based on slope for the Quabbin

Reservoir and its tributaries. Fifty percent of well distributed basal area will be retained throughout filter strips, and harvesting in filter strips will be limited to removal of red pine. No equipment will be allowed within 50 feet of any water body, except at approved culvert crossings on Quabbin access roads.

In the 50 foot road buffer along Route 122, all species other than red pine will be retained unless they also present a public safety hazard due to poor health, unstable structure, or very poor vigor. Where red pine is the dominant species, residual basal area will be less than 50%. Full removal of red pine and other hazard trees within striking distance of the highway is supported by 304 CMR 11.05 (1) (c), which states that aesthetic buffer strips are required “unless public safety along the road requires a different standard.” Nonetheless, the retained trees will provide a partial visual buffer, which will be augmented by protection and release of seedlings and saplings. This advance regeneration will ensure the rapid restoration of a fully forested roadside buffer.

Cultural Resources: No cultural resources were found in this lot. A number of pre-Contact sites are located within a mile of the proposed project area. Any cultural resource features located before or during the forestry project will be protected according to guidelines set forth in the current DWSP Land Management Plan and indicated on harvest maps accordingly. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Regeneration in the openings will result in small patches of early successional habitat. There are three verified vernal pools on the lot.

NHESP has determined that certain state-listed sensitive species or habitats may exist within the lot proposal area. To protect them from any necessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

This area was historically a barrens, and is being considered by DWSP Natural Resources as a possible site for the restoration of oak/pitch pine barrens habitat as well as for creation of large patches of early successional habitat. The level of harvest suggested in this proposal is less than recommended for barren restoration, but would be beneficial nonetheless, and would not impede heavier cuts if approved in the future.

FIGURES

Figure 1. Forestry Lot Proposal Map.

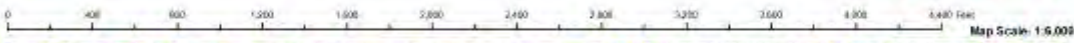
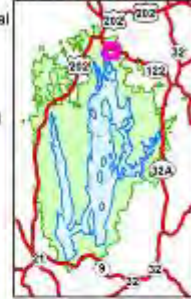


FY2018 Proposed Forestry Project NS-18-20

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: NS-18-21

Site Information

Watershed: Quabbin	Town(s): New Salem
Acres: 39.6	Nearest Road: Route 122
Natural Heritage Atlas overlap? Yes	
Forest Types: White pine /hemlock; Red pine	
Soils: 100% Merrimac and Windsor (excessively drained)	
Wetland Resources: Wetlands adjacent include North and South Spectacle Ponds, and Bow Brook connecting the ponds. One crossing over non-regulated roadside drainage swale.	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: Strips of red pine about 75 feet deep line both sides of Route 122. Regeneration in this strip is diverse, including hemlock, white pine, oak, black birch, and red maple seedlings and saplings. The understory also wintergreen, partridge berry, low bush blueberry, and sheep laurel.

Behind this strip to the north is a hemlock-white pine stand with an oak-hardwood midstory. Hemlock is more dominant than pine in the overstory. The midstory is dominated by pole sized oaks (red, black and white), along with black birch, hemlock, white pine, and occasional paper birch and beech. Much of forest floor is bare due to the dense hemlock overstory.

To the south the reverse is true: the overstory is dominated by white pine with scattered hemlock. The same mix of hardwoods is present as to the north of Route 122. There is also a dense stratum of hemlock saplings and poles in many areas to the south of the highway. Regeneration includes hemlock, white pine, black birch and red maple seedlings and saplings. Hemlock and white pine regeneration is dense and vigorous in some areas. Wintergreen, partridge berry and blueberry are present here as to the north, as well as cinnamon/interrupted fern. As in the northern part of this lot, some areas have virtually nothing on the forest floor.

Red pine scale (*Matsucoccus resinosae*) does not seem to have infected this lot yet, but it is present nearby and can be expected to move into the proposed area in the near future. When it does, it is expected to cause near 100% mortality of red pine within a few years. The white pine is of variable quality, sometimes straight with large vigorous crowns and few, small branches, and other times branchy, weevilled, or lacking vigor. White pine crowns are sometimes narrow even in the absence of intense competition, possibly due to water stress on this dry site. Most hemlocks have good form and vigorous crowns. Oak form and vigor is variable but generally only fair. The little black birch that is present tends to be infected by nectria, but the beech appears to be disease resistant.

The terrain in this lot is mostly flat to the north of Route 122, rolling to the south. Around the entire perimeter of the lot the ground slopes steeply down to the ponds and wetlands. This steep perimeter will be protected by filter strips, and will have little or no harvesting.

Past DWSP harvests in this area include 16 acres of selection on both sides of Route 122 in 1999, and two salvage cuts south of Route 122 in 1986 and 1993.

No terrestrial invasive plants occur on the lot.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because red pine scale is advancing quickly through the region, and is expected to cause 100% red pine mortality.

Silvicultural Objectives: Regenerate about 10 acres in openings through small group/patch selection; intermediate thinning will occur on up to about 5 acres.

The primary objective for this harvest is removal of red pine along the north and south sides of the road will create partial openings of about 2.6 and 2.0 acres, respectively, for a combined area of 4.5 acres. All trees other than red pine will be retained unless they also present a public safety hazard due to poor health, unstable structure, or very poor vigor. The trees to be retained are somewhat clustered and constitute more than the 5-10 square feet of total basal area usually retained in DWSP openings, but less than the 50% of well distributed basal area normally required for aesthetic roadside buffers.

Full removal of red pine and other hazard trees within striking distance of the highway is supported by 304 CMR 11.05 (1) (c), which states that aesthetic buffer strips are required “unless public safety along the road requires a different standard.” Nonetheless, the retained trees will provide a partial visual buffer, which will be augmented by at least 100 feet of intact forest (i.e. a strip with no openings) behind the red pine stand. Additional aesthetic buffering will be provided by protection and release of seedlings and saplings. This advance regeneration will ensure the rapid restoration of a fully forested roadside buffer.

In the rest of the proposed area, openings will be a maximum of 2 acres, averaging 1 acre or less. There will be a small amount of intermediate harvesting, focused mainly on releasing quality oak trees to improve their vigor.

Openings will be irregular in shape, and will be located where there are clusters of trees that are diseased, declining, or have poor stem structure. Where possible, healthy, well formed advance regeneration that is suited to the site will be released. Five to ten square feet per acre of basal area of sawlog- and pole-sized trees will be retained in openings greater than one half acre. Trees on the perimeter of openings will have large, healthy crowns (hence strong seed bearing potential), stable stem structure, and will be either vertical or leaning away from the openings to minimize damage to regeneration if they fall or are cut in the future. Oaks will be preferred as perimeter trees in order to increase their chances of seedling into openings.

Other than red pine, all tree species will be retained, and uncommon tree species will be protected and released. Den trees, potential den trees, snags, large logs, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) will be retained wherever possible as valuable wildlife habitat.

All water bodies will be protected by filter strips. All water bodies will be protected by filter strips. There will be no harvesting and no skid trails in the filter strips for the regulated ponds and wetlands around the perimeter of the lot, except to remove 50% or less of red pine basal area near by the road on the west edge of the lot. For the unregulated water bodies in the interior, harvesting will be limited to 50% of basal area, and there will be no skid roads within 50 feet except at the above mentioned crossing.

Cultural Resources: No cultural resources were found in this lot. A pre-Contact site is located within a mile of the proposed project area. Any cultural resource features located before or during the forestry project will be protected according to guidelines set forth in the current DWSP Land Management Plan and indicated on harvest maps accordingly. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Regeneration in the openings will result in small patches of early successional habitat. There are three verified vernal pools on the lot.

NHESP has determined that certain state-listed sensitive species or habitats may exist within the lot proposal area. To protect them from any necessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

There are no rare, unique or exemplary natural communities on this lot, but adjacent to this lot on South Spectacle Pond there's a "wetland on peat," an acidic wetland with low nutrient availability. Organic matter in this type of wetland is often perched in a floating mat that stretches from the shoreline out onto open water.

FIGURES

Figure 1. Forestry Lot Proposal Map.

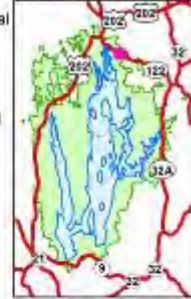


FY2018 Proposed Forestry Project NS-18-21

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



0 100 200 300 400 500 Feet
Map Scale: 1:3,000



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: NS-18-24

Site Information

Watershed: Quabbin	Town(s): New Salem
Acres: 187.8	Nearest Road: Route 122
Natural Heritage Atlas overlap? Yes	
Forest Types: White pine /oak; mixed oak; hemlock/hardwood; red pine	
Soils: 17% Hinckley and Windsor (excessively drained); 53% Canton-Chatfield-Hollis and Montauk (well-drained); 19% Deefield, Sudbury, and Scituate (moderately well-drained); 11% Walpole, Ridgebury, and Swansea (poorly to very-poorly drained)	
Wetland Resources: Wetland adjacent is Blackington Swamp; interior there is a stream/wetland complex straddling the access road. One crossing over existing culvert location in the access road; culvert needs replacement.	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: Most of the lot is dominated by white pine variably mixed with red pine, hemlock, mixed oak, red maple and black birch. The white pine is of variable quality, sometimes straight with large vigorous crowns and few, small branches, and other times branchy, weevilled, or overcrowded and lacking vigor. White pine needle drop is present in the region but does not seem to be a significant problem on this lot at this time, perhaps because drought has set back this suite of fungal diseases.

Most of the red pine is in the area north of the gravel pit, but it is also present as a minor element within the other types on the lower slopes along Route 122. Red pine scale (*Matsucoccus resinosae*) does not seem to have infected this lot yet, but it is present on the opposite side of Route 122 and can be expected to move into the proposed area in the near future. When it arrives it is likely to cause 100% mortality within a few years.

The hemlock/hardwood type is most common near Blackington Swamp and on the west summit of Adams Hills. Hemlock size class range is broad, from seedlings and saplings to large sawlogs. On average the sawlogs are in good condition, with straight clear stems and relatively healthy crowns compared to hemlock elsewhere on the Quabbin watershed.

Gays Hill is dominated by oaks mixed with red maple and other hardwoods. Oak species diversity is high, with red, black and white oak on the lower slopes transitioning to scarlet and chestnut oak on higher, drier terrain. White pine is common on the lower slopes, along with lesser numbers of hemlock and red and pitch pine. All of these conifers become less common as one ascends, almost dropping out completely on the summit.

Red maple is common throughout the lot, and black birch is common on Adams Hills. Pitch pine is a minor but significant element, particularly between the gravel pit and Blackington Swamp, where it is mixed with both red and white pine. The pitch pine appears to be healthy at this time, although southern pine beetle is a looming threat. Other tree species present include small numbers of hickory,

ash, beech, black cherry, paper birch and poplar. Most hardwoods are pole to small sawlog sized, with form ranging from poor to good.

There is moderately dense mountain laurel on the high steep slopes of Adams Hills. Small patches are present elsewhere on the lot. The herbaceous layer includes wintergreen, clubmoss, low bush blueberry, bracken fern, and hay scented fern. High bush blueberry is present on the lowest terrain near the swamp and streams. Japanese barberry is present near the stream and wetlands both west and east of the access road that cuts through the lot. A very small amount of bittersweet is present in this area as well.

Past DWSP harvests in this area include:

- a 49 acre combination selection/salvage cut in 2001
- 13 acres of selection along Route 122 in the southeast corner of the lot in 1998
- 26 acres of selection in 1994
- a 3 acre shelterwood prep cut in the northeast corner of the lot along Route 122 in 1984
- 10 acres of thinning on the west slopes of Adams Hills in 1981
- 35 acres of shelterwood prep, mostly along the northern border, in the mid-1970s

Most of these harvests were concentrated on Adams Hills and between the gravel pit and Blackington Swamp. Much of Gays Hill has never been harvested by DWSP.

This area also has a history of wildfire, the most recent being in the mid-twentieth century. The dominance of oaks and unusually high presence of pitch pine indicates that fire has likely been an important part of this ecosystem for many centuries.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen primarily because red pine scale is advancing quickly through the region, and is expected to cause 100% red pine mortality. The harvest area was expanded beyond the areas containing red pine as a preliminary step in promoting barrens habitat that has historically been present in this area.

Silvicultural Objectives: Regenerate about 40 acres in openings through small group/patch selection, particularly targeting red pine; intermediate thinning will occur on up to about 35 acres. Openings will be a maximum of 2 acres, averaging 1 acre, except in red pine stands where openings may be as large as 4.5 acres. Openings will be irregular in shape, and will be located where there are clusters of red pine and/or trees that are diseased, declining, or have poor stem structure. Trees on the perimeter of openings will have large, healthy crowns (hence strong seed bearing potential), stable stem structure, and will be either vertical or leaning away from the openings to minimize damage to regeneration if they fall or are cut in the future. Oaks and pitch pines will be preferred as perimeter trees in order to increase their chances of seedling into openings.

Where possible, healthy, well formed advance regeneration that is suited to the site will be released. Five to ten square feet per acre of basal area of sawlog- and pole-sized trees will be retained in openings greater than 0.5 acre.

Red pine will be particularly targeted for removal, along with low quality white pine (i.e. trees with narrow crowns, forks, sweep, or large branches). Pitch pines and all other regionally uncommon tree species will be retained and released. Intermediate treatments will focus on releasing the healthiest, most vigorous overstory trees, especially oaks and pitch pine, as recommended by DWSP Natural Resources and NHESP/Mass. Wildlife biologists. Den trees, potential den trees, snags, large logs, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) will be retained wherever possible as valuable wildlife habitat.

Regeneration is present throughout the lot but generally not adequate in density. White pine seedlings and small saplings are most numerous, especially in the areas that received a selection cut in 1998. White pine regeneration in the latter area is often badly weevilled. There is an unusually strong presence of oak regeneration throughout the lot, especially on higher terrain. Hemlock seedlings and saplings are present in a wide range of sizes, probably as a result of being released in various harvests over the years. Red maple stump sprouts are also common where there has been past harvesting. Black birch seedlings and saplings are present, particularly in the western half of the lot, but less common than in other places at the Quabbin. Hardwood regeneration is most diverse in low areas near streams, where there is paper birch, hickory, and aspen.

About 11 acres of this lot have been labeled inoperable. It is possible that this number should be higher based on modern logging equipment. An attempt will be made to refine this data at the time of the harvest.

Cultural Resources: There are a two intersecting “thrown” stone walls in the southeast corner of this lot. One of the walls seems to have functioned as a small causeway where it crosses the brook. There is a fieldstone just south of an iron pipe on the north side of Gays Hill. These features will be flagged and protected. Skid roads will go through existing barways or broken portions of walls when it is not possible to avoid them altogether. Loggers will be directed to protect cultural features as much as possible. A number of pre-Contact sites are located within a mile of the proposed project area. Any cultural resource features located before or during the forestry project will be protected according to guidelines set forth in the current DWSP Land Management Plan and indicated on harvest maps accordingly. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Regeneration in the openings will result in small patches of early successional habitat. There are three verified vernal pools on the lot.

NHESP has determined that certain state-listed sensitive species or habitats may exist within the lot proposal area. To protect them from any necessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

According to the wildlife biologists at Mass. Wildlife, this area was historically a barrens, a type of ecosystem that is declining in Massachusetts due to suppression of fire and other disturbances. To

counter habitat degradation, they recommend heavy harvesting, targeting white pine, hemlock and red maple for removal and protecting oak and pitch pine.

Accordingly, this area is being considered by DWSP Natural Resources as a possible site for the creation of large patches of barrens and early successional habitat. The level of harvest suggested in this proposal is less than recommended for barren restoration, but would be beneficial nonetheless, and would not impede heavier cuts if approved in the future.

Blackington Swamp, which is just to the north of the lot, is mapped as a rare, unique and exemplary natural community, containing both blackgum (*Nyssa sylvatica*) and black spruce (*Picea mariana*). However, these communities are described as “marginal” and “scattered” at the east end of the Swamp, on the opposite side from this lot.

FIGURES

Figure 1. Forestry Lot Proposal Map.

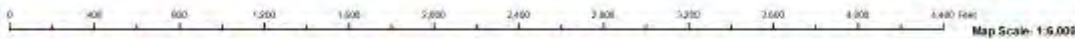
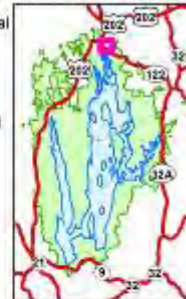


FY2018 Proposed Forestry Project NS-18-24

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: NS-18-RP-Rt122

Site Information

Watershed: Quabbin	Town(s): New Salem
Acres: 34.4	Nearest Road: Route 122
Natural Heritage Atlas overlap? Yes	
Forest Types: White pine; red pine; white pine/hardwood	
Soils: 54% Hinckley and Windsor (excessively drained); 4% Canton (well-drained); 14% Sudbury (moderately well-drained); 17% Walpole (poorly drained); 11% Freetown and Scarboro (very-poorly drained)	
Wetland Resources: Swift River, O'Loughlin Pond, and Blackington Swamp border the lot proposal area. No stream or wetland crossings required for access.	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: The primary focus of this proposal is removal of red pine, which is mostly concentrated in strips ranging from 50 to 150 deep along Route 122, including all of Section B. The white pine type is primarily found in Section A, and the white pine-hardwood type in Section C.

Red pine is being targeted due to concern about red pine scale (*Matsucoccus matsumurae*), an invasive insect first introduced in Easton, CT in 1946. This insect has been moving swiftly through red pine stands in southern Quabbin, causing 100% mortality within a few years of infection.

In Section A the red pine and white pine types alternate along the highway. The overstory in the interior of this section also contains scattered hemlock, red oak and other hardwoods. The midstory is more diverse, including pole sized hemlock, red, black and white oak, red maple, black birch, and black cherry. The scattered regeneration in this section includes seedlings and saplings of white pine, black birch, red maple, and hemlock, and occasional oaks. The understory contains wintergreen, dewberry, partridge berry, low and high bush blueberry, bracken fern, and cinnamon / interrupted fern. Mountain laurel is sometimes dense at the south end.

This area is showing early signs of infestation by red pine scale, as evidenced by browning lower branches. Weevil damage is common on white pine. Some of the red oak has excellent form and vigor, but overall hardwood quality is variable.

Red pine extends throughout Section B, all the way to O'Loughlin Pond as well as along Route 122. White pine is the primary overstory associate, much of it damaged by white pine weevil. Where white pine is densest, crowns are thin and compressed due to intense competition. The younger age classes are more diverse, including seedling, sapling and pole sized white pine, hemlock, black birch, red maple, mixed oak, and occasional pole sized pitch pines. Mountain laurel, low bush blueberry, and cinnamon fern are present in the understory; however, in many areas the forest floor is bare.

In Section C red pine is concentrated in a very narrow strip along the highway. It blends with the white pine-hardwood type to the northeast, which is the primary forest type in this Section. Diverse

hardwood species are present, including red, white, and black oaks, red maple, black birch and black cherry. White pine emergents overtop the hardwoods. Occasional large hemlocks are present, particularly at the east end. The midstory includes sapling and pole sized oaks, red maple, and other hardwoods, as well as white pine and hemlock. Regeneration is patchy, and includes white pine, hemlock, red maple and black birch seedlings and saplings. Wintergreen, club moss, partridge berry, sheep laurel, and low and high bush blueberry are present in the understory; however, in many areas the forest floor is bare.

Red pine scale does not appear to be present in Sections B and C, but it is expected to arrive within a few years.

Section A has been harvested numerous times by DWSP, including:

- 4.5 acres of irregular shelterwood completed in 2005,
- 5 acres of selection in 1994,
- 2.3 acres of thinning completed in 1986,
- 4 acres of thinning in 1981, and
- 2 acres of shelterwood prep cutting in 1979.

For the most part these harvests covered different parts of Section A, except for a small area immediately south of Gate 30 that was included in the 1994, 1986 and 1981 harvests. Section B was treated with a selection harvest 1998, and Section C was thinned in 1985.

Regeneration is inconsistent throughout the proposal area, sometimes dense and other times non-existent. The most common species is white pine, with hemlock, red maple, black birch, and oak also present, although to a lesser degree. Mountain laurel is dense enough to obstruct regeneration to some degree in the southern half of Section A. In all three sections, there are areas where the forest floor is nearly completely bare. There are some small bittersweet vines along Route 122 in Sections A and C. Glossy buckthorn was found in Section A near the Swift River. These invasives will be released regardless of whether the red pine dies or is cut, and should be treated to prevent expansion.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because red pine scale is advancing quickly through the region, and is expected to cause 100% red pine mortality.

Silvicultural Objectives: Regenerate about 9 acres in openings; intermediate thinning will occur on up to about 6 acres. Small group/patch selection, particularly targeting red pine. Openings will be a maximum of 2 acres, averaging 1 acre, except in large areas of pure red pine, where maximum opening size will be 4.5 acres. Openings will be irregular in shape, and will be located where there are clusters of red pine and other trees that are diseased, declining, or have poor stem structure. Where possible, healthy, well formed advance regeneration that is suited to the site will be released. Trees on the perimeter of openings will have large, healthy crowns (hence strong seed bearing potential), stable stem structure, and will be either vertical or leaning away from the openings to minimize damage to

regeneration if they fall or are cut in the future. At least five to ten square feet of basal area of sawlog- and pole-sized trees will be retained in openings greater than half an acre.

In the aesthetic road buffers (i.e. within 50 feet of Routes 202 and 122), all trees other than red pine will be retained unless they present a public safety hazard due to poor health, unstable structure, or very poor vigor. In some places this will constitute less than the 50% of well distributed basal area normally required for roadside buffers. Full removal of red pine and other hazard trees within striking distance of the highway is supported by 304 CMR 11.05 (1) (c), which states that aesthetic buffer strips are required “unless public safety along the road requires a different standard.”

All tree species other than red pine will be retained, and uncommon tree species will be protected and released. Den trees, potential den trees, snags, large logs, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) will be retained wherever possible as valuable wildlife habitat.

There will be no harvesting and no skid roads in the filter strips in Sections A and C. In the filter strip for O’Loughlin Pond (Section B), harvesting will be limited to removal red pine, and at least 50% of well distributed basal area will be retained, preferably in species other than red pine. However, where red pine constitutes more than 50% of basal area in the in filter strip, it will be retained to the degree necessary to reach the 50% threshold.

Cultural Resources: Historical data indicates a former house site just north of Gate 30 in Section A, and two near Route 122 in Section C. No cellar holes or remnants of these structures were found. Should any become apparent during preparation for harvest, they will be flagged and avoided.

Two sawmills and a third former house site were located at the west border of Section A and the northeast border of Section C, respectively. All of these features are within filter strips and on or near sensitive soils, so there will be no skid roads and no harvesting in these areas.

The only stone wall found within the harvest area is a small thrown wall in Section A. If it is necessary to cross this wall, if possible the skid trail will be located where the wall was breached in the past. Loggers will be directed to protect this and all other cultural features as much as possible.

A number of pre-Contact sites are located within a mile of the proposed project area. Any cultural resource features located before or during the forestry project will be protected according to guidelines set forth in the current DWSP Land Management Plan and indicated on harvest maps accordingly. If applicable, DWSP will follow any additional recommendations from DCR’s Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Regeneration in the openings will result in small patches of early successional habitat. There are no vernal pools on the lot.

NHESP has determined that certain state-listed sensitive species or habitats may exist within the lot proposal area. To protect them from any necessary disturbance, detailed information regarding affected species and their locations is not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

Beaver are active near the Swift River in Section A. Since there will be no harvesting in the variable width filter strip in this Section, and since harvesting is likely to be limited to winter by NHESP, impacts on beaver will be negligible.

FIGURES

Figure 1. Forestry Lot Proposal Map.

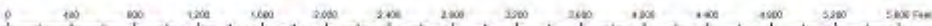
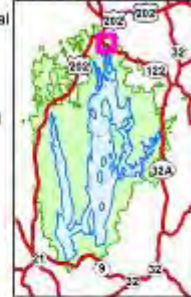


FY2018 Proposed Forestry Project NS-18-RP-Rte122

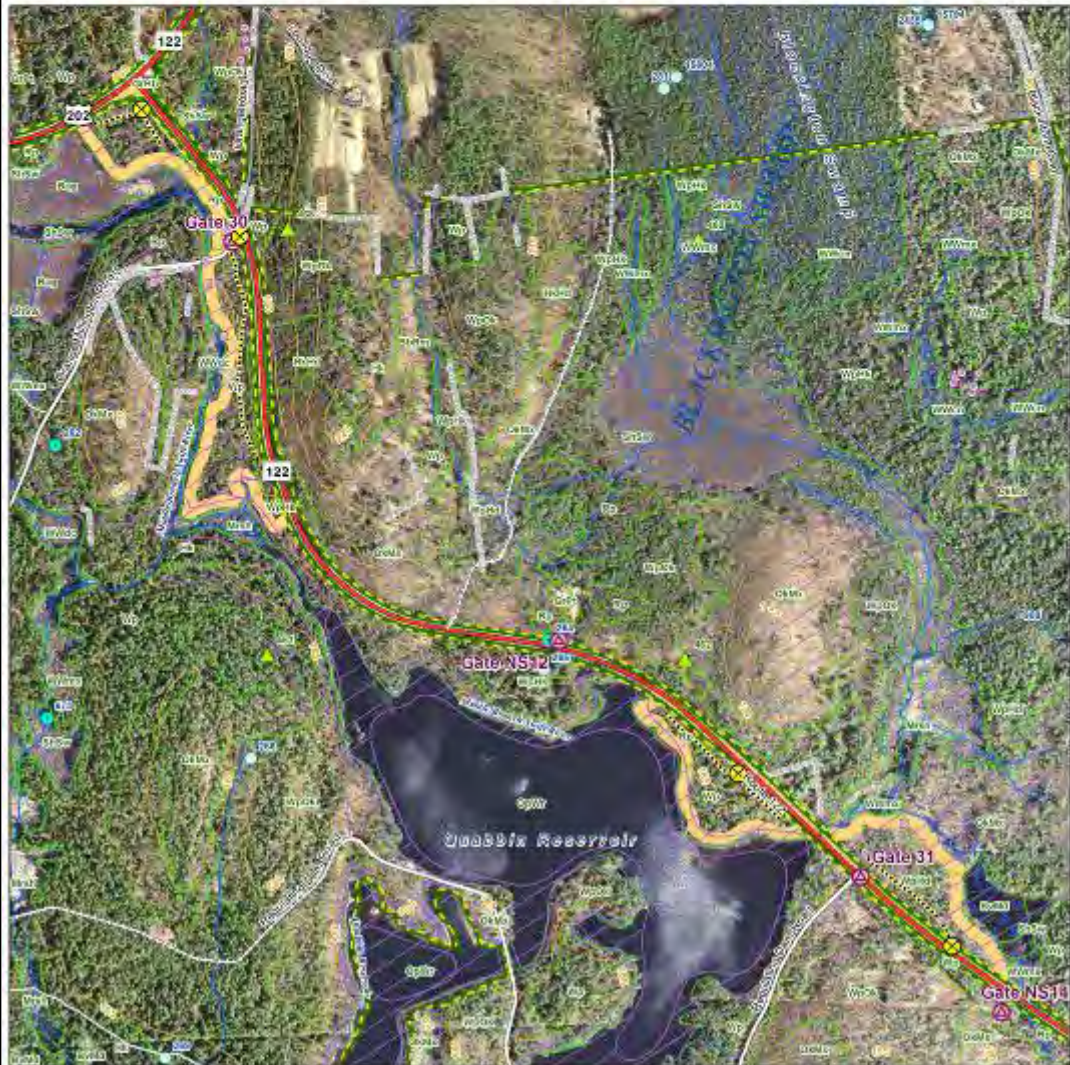
Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Map Scale: 1:8,000



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PE-18-6
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Site Information

Watershed: Quabbin	Town(s): Pelham
Acres: 58	Nearest Road: Davis Road, Gate 10
Natural Heritage Atlas overlap? No	
Forest Types: White pine; White pine/hardwood; mixed hardwood	
Soils: 11% Hinckley (excessively drained); 79% Hennicker and Chichester (well-drained); 8% Newfields (moderately well-drained); 2% Whitman (poorly drained)	
Wetland Resources: Wetlands are present within the lot but will not be harvested; one stream crossing will be required to access this lot from West Street, and possibly another if landing on Macedonia Road to the west	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: The north end of the proposed lot starts in white pine/hardwood and transitions to white pine dominated forest moving south. Stocking is 100 - 170 ft² / acre of mostly 8-20" dbh trees with several legacy pines greater than 30" dbh. There was a 1996 selection cut in the far north end of the proposed area, and a 1980 firewood sale across from the gate 9 road intersection with Davis Rd.

The central portion of the lot contains a 2001 red pine plantation conversion. The ideal landing for this proposal would take advantage of the existing landing and skid trails established during that 2001 harvest. The area is regenerating as thick black birch and white pine and, aside from skid trails, would be avoided during this harvest.

The eastern edge of the lot contains red maple and oak hardwood forest. Both areas contain some quality sawlog sized oaks and 8-12" dbh red maple.

The remainder of the lot south is dominated by white pine by both basal area and trees per acre (>50 % of an average 130 ft² / acre). Regeneration is highly varied with some areas containing sparsely distributed black birch and little else, and other areas dense with white pine saplings. Hardwood species present in the canopy include sugar and red maple and black birch. Where hardwood regeneration other than black birch was found, it was heavily browsed. The exception to the white pine cover is a section of typed northern hardwoods that, while containing many northern hardwood species, also includes shagbark hickory. There was a 1994 irregular shelterwood harvest in the south end of the lot. White pine in the southern section on the ridgeline and tope of dodge hill contains a large amount of past weevil damage.

The level of advanced regeneration varies widely throughout the lot, but where regeneration greater than 4.5 ' exists it is almost entirely white pine and black birch. In the middle of the lot are several acres with little to no regeneration aside from sparsely distributed black birch under 20 ft. In the white pine where hardwood species were present, existing regeneration has been heavily browsed. Japanese

barberry (*Berberis thunbergii*) was found near dwelling foundations in central and northern portion of the lot.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because it contained both areas with poor regeneration (by abundance and or diversity) in need of silvicultural treatment, and areas with opportunities to release diverse regeneration to canopy dominance.

Silvicultural Objectives: Regenerate about 13 acres in openings ranging in size up to 2 acres and averaging about 1 acre; about 4 acres of intermediate thinning will also occur. Given the varied age structure of the northern section of forest, and the restrictions of the potential vernal pool and intermittent stream this section will be treated with intermediate thinning to release the crowns of the healthiest formed individuals and promote the continuation of current canopy species distribution. Basal area will be reduced to up to 100 ft² / acre. Large legacy white pine will be retained.

As the canopy transitions to white pine dominated stands regeneration openings will be used to either release existing regeneration where present, or to allow for establishment of new regeneration. Larger openings (up to 2 acres) will be targeted at areas where regeneration is currently absent to attempt to allow for wind born seed to influence future composition and increase present species diversity. Other regeneration openings will target groups with unhealthy crowns or forms and areas that would release well formed advanced regeneration, or are adjacent to areas of greater canopy species diversity. Near the top of Dodge Hill openings will target release of existing sugar maples.

In the southern section that had an intermediate harvest performed in 1996, expanding gap silviculture will be performed to continue promotion of multi aged forest composition started in the previous harvest.

In openings larger than 0.5 ac., 5 - 10 ft² / ac of basal area of trees pole-sized and larger will be retained. Potential den trees, prominent snags, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) and other trees with signs of current wildlife use will be retained wherever possible as valuable wildlife habitat.

Cultural Resources: The foundation of the house, barn, and shed of William Cabot are present in the proposed area. Existing foundations and stone walls will be flagged and avoided during harvest. Only existing barways in the stone walls will be utilized for equipment crossing. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. There is one potential vernal pool at the north end of the lot, which will require additional monitoring to verify its status; until then it will be protected as if verified. Deer sign was observed throughout the winter and large amounts of browse damage are present in the regeneration. At the time of posting all available NHESP maps and data had been consulted and there were no Estimated or Priority Habitats for listed species found in the lot proposal area. Should new information become available DWSP will follow recommendations as needed.

FIGURES

Figure 1. Forestry Lot Proposal Map.

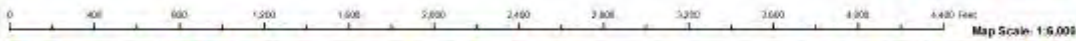


FY2018 Proposed Forestry Project PE-18-6

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PE-18-11-1

Site Information

Watershed: Quabbin	Town(s): Pelham
Acres: 68.6	Nearest Road: Gate 13 (Town Farm Road) off Rt. 202
Natural Heritage Atlas overlap? No	
Forest Types: White pine/hardwood; northern hardwoods; red pine	
Soils: 100% Chatfield-Hollis or Charlton-Hollis (well-drained, very stony with outcrops)	
Wetland Resources: No wetlands are present within the lot; streams present along the northeast boundary and across the road forming the southern boundary	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: The proposed lot is predominately white pine/hardwood with some small sections of northern hardwood, oak/hardwood, red pine and hemlock stands. On the map, areas typed as white pine/hemlock are currently better classified as white pine/hardwood.

White pine/hardwood cover is distributed throughout the three sections and is well to densely stocked (~110 ft² sawlog / ac average). Quality varies in the different sections with poorest quality individuals in the northern half of the central section, and higher quality individuals in the eastern and western sections. Hardwood species diversity is dominated by small sawlog sized red maple and medium sawlog sized red oak, with some sugar maple, assorted birch, and hickory. The eastern section also contains a small amount of densely stocked hemlock acreage (> 200 ft² sawlog / acre). The forest here is > 50 % hemlock and includes the most sugar maple found in the proposed area.

The central section contains white pine/hardwood, northern hardwood, oak hardwood, and all of the proposal's red pine. The 3 acres of red pine appear to have been left unthinned from their original planting in the 1930's or 1940's (160 ft² / ac; 12" mean dbh). The oak hardwood stand (80 ft² / ac) is dominated by large diameter red oak and small sawlog sugar maple. The northern hardwood section (95 ft² / ac) is dominated by medium diameter red oak followed by white ash, red and sugar maple, white and black oak and birch species.

In addition to the white pine/hardwood, the western section contains northern hardwood and oak/hardwood. The northern hardwood areas contain sugar maple, yellow birch and white ash.

Prior harvests include a roadside cut of Gate 13 Rd in 2009; a cordwood selective cutting of the northern half of the central section in 1980, and a selective cutting of the whole area in 1966.

Regeneration is limited in white pine/hardwood areas, predominately white pine and black birch individuals 10 ft and shorter. Regeneration in the northern hardwood areas is similarly limited. Both cover types have extensive browse damage in the regeneration layer. Regeneration in the red pine stand is composed of white pine ~ 10 ft tall, and is currently suppressed by the existing red pine. Some barberry (*Berberis thunbergii*) present at either end of Gate 13 Rd near stone walls and foundations.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because of the presence of red pine, which is currently dying across the Quabbin from infestation by red pine scale (*Matsucoccus matsumarae*). In addition to the red pine, the site contains extensive areas with inadequate regeneration (by both abundance and diversity) for accomplishing watershed forest management goals.

Silvicultural Objectives: Regenerate about 10 acres in openings ranging in size up to 2 acres and averaging about 1 acre; about 4 acres of intermediate thinning will also occur. The southern section will house a test of mechanical treatment of mountain laurel. Two 2 acre openings will be cut in the dense mountain laurel areas and the mountain laurel mechanically treated. In the late spring/early summer of the first growing season after the harvest one of the openings will be revisited and receive a second mechanical treatment. In the second growing season after half of the mechanically treated area will receive an additional treatment for mountain laurel. Regeneration and recruitment at each opening will then be monitored for efficacy. 5-10 sq ft/ ac basal area will be retained, targeted towards long lived or underrepresented species.

Silviculture in the central portion, approaching and including the top of the hill, will focus on releasing advanced regeneration and promoting canopy species diversity. Openings will range 0.5-1.0 acre in size and will target unhealthy and poorly formed individuals or individuals whose removal would release desirable advanced regeneration. Thinning will be performed in areas with existing canopy diversity or along skid trails where appropriate for achieving age and species diversity goals.

In the hemlock stand in the north, at the time of marking, trees will be surveyed for health and presence of hemlock woolly adelgid. The hemlock will be treated according to the health of the stand and the current management practices for hemlock forest.

In openings larger than 0.5 ac. 5 - 10 ft² / ac of basal area of trees pole-sized and larger will be retained. Potential den trees, prominent snags, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) and other trees with signs of current wildlife use will be retained wherever possible as valuable wildlife habitat.

A forwarder will be required to protect the existing road. If the central section (or central and eastern sections without the planned use of the stream crossing) are sold separately no existing roads would be used and the forwarder requirement may not be included in the sale.

Cultural Resources: Existing cultural resources, including the foundations of homes and barns for Charles Jones, Etta Cook, and Frank Cadwell, as well as the remains of the Pitman Mill dam, will be flagged and avoided during harvest, and only existing barways in the stone walls will be utilized for equipment crossing. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. There is abundant striped maple partial browsing on Gate 13 Rd. Frequent moose and deer sign throughout the winter and large amounts of browse damage present in the regeneration. Beaver

activity is located in the wetlands just south of Gate 13 road, and in the pond on the south east of the proposed lot. The Pelham block was included in Quabbin Hunt this past year. At the time of posting all available NHESP maps and data had been consulted and there were no Estimated or Priority Habitats for listed species found in the lot proposal area. Should new information become available DWSP will follow recommendations as needed.

FIGURES

Figure 1. Forestry Lot Proposal Map.

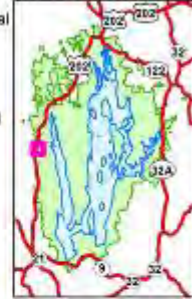


FY2018 Proposed Forestry Project PE-18-11-1

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PE-18-11-2

Site Information

Watershed: Quabbin	Town(s): Pelham and Shutesbury
Acres: 100	Nearest Road: Rt. 202, gates PL8 and SH1
Natural Heritage Atlas overlap? No	
Forest Types: White pine/hardwood; oak/hardwoods; mixed hardwoods	
Soils: 50% Chatfield-Hollis or Charlton-Hollis (well-drained); 50% Scituate (moderately well-drained)	
Wetland Resources: Wetlands are present within the lot; intermittent streams present within lot will require at least two crossings, both planned at unculverted locations on an existing cart road	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: Proposed site can be split into a northern section at the town line, a central section west of the red maple, a western section at the top of the hill, and a section between Route 202 and the gate PL8 road. The northern section is gradual to steeply sloping northern hardwoods and oak hardwoods. The slope in this section starts gradually near the town line and increases into a section that would be considered steep slopes and either difficult to operate in or unmanageable. It was last harvested in 1983 with an intermediate thinning.

The oak/hardwood in the central section of the lot is composed of primarily red oak with a second age class of mostly black birch and red maple. Approximately 40 canopy dominant oaks over 10 acres were blown down, likely in the summer of 2016. This has left a younger, low diversity, black birch/red maple forest behind. Oak/hardwood east of the wetland and in the southern section of the property wasn't in the path of the blow down and larger oaks are still standing. This section was last harvested in 1982, likely a selective thinning or small group selection cut of hardwood saw logs and cordwood.

Forest in the western section on the slope to the top of the hill is white pine/hardwood or hemlock/hardwood; much of the white pine is larger than 20", but with a history of weevil damage, and open growth. The hemlock is in definite decline from observed hemlock woolly adelgid (*Adelges tsugae*), and hemlock borer (*Melanophila fulvoguttata*), and likely elongate hemlock scale (*Fiorinia externa*). Regeneration is light, but hemlock and white pine saplings are present. There appears to be heavy browse pressure on the regenerating hemlock.

The section abutting Rte. 202 is mostly white pine/hardwood with large multi stemmed white pines and mixed hardwoods including canopy and regenerating members. There are several large white pines roadside of Rte. 202 that have the potential to be safety hazards for passing traffic.

Mapped wetlands in the southwest corner of the lot will not be operated in. Sections of the wet red maple stand that demonstrate wetland characteristics will also be avoided. There are also two potential wetland areas in the central and western section of the proposed lot that will be delineated before the lot is marked for sale.

The New England Scenic Trail runs through this compartment. It enters the proposed area near gate PL8, runs down Old Town Rd, until leaving the road just north of the old forest road, heading northwest towards the northern hardwoods stand and then north into compartment 13.

Regeneration in the central area of oak blow down is inadequate, mostly hardwood, and predominately black birch. Regeneration in the west section of Hemlock/White Pine/Hardwood is predominately white pine, some likely related to the 1983 cut in larger patches. Large patches of heavily browsed hemlock regeneration creating a carpet of hemlock regeneration browse. Sections of sub canopy white pine are present in dense patches. The section abutting Rte. 202 has some advance white pine regeneration and a mixture of hardwood species regen as you move north. Few exotic invasive present, some Japanese barberry (*Berberis thunbergii*) observed near Rte 202.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because it contains areas with inadequate regeneration to meet our watershed forestry goals, among them several acres of low regeneration species diversity that have lost their canopy dominant trees to wind storms.

Silvicultural Objectives: Regenerate about 30 acres in openings ranging in size up to 2 acres and averaging about 1 acre; about 10 acres of intermediate thinning will also occur. Silviculture in the northern section will be primarily intermediate thinning and up to 0.25 acre regeneration openings to promote regeneration of long lived, shade tolerate, northern hardwoods on this northern aspect slope. Certain considerations will be made towards retaining trees adjacent to the New England Scenic Trail where possible and appropriate. Approximately 10 ac. at the northern edge of the property are considered steep slopes, so management there will be limited.

Where operational, large unhealthy and poorly formed white pine will be thinned from the side of Rte 202 to prevent future safety hazards. In the section between Route 202 and PL8 Gate Road, 0.5 - 1 ac. openings will be located near preferred seed sources, to promote species diversity, and existing advanced regeneration to promote stratified age classes. Within a 50' buffer along Rte. 202 > 50 % of basal area will be retained, with the possible exception where large white pines present a hazard to Rte. 202. MassDOT will be contacted to request coordination of identifying and removing potentially hazardous roadside trees.

In the central hardwood sections with the oak blow down, regeneration openings up to 2 ac. will be created to prevent the establishment of a low diversity black birch/red maple dominant forest. Retention will target diversity and surviving oak. Areas of dense mountain laurel will be avoided to prevent conversion to shrub cover. Fallen oak will be utilized where and if appropriate at the time of harvest. A portion of blown down stems with complete contact with the ground will be retained to increase large coarse woody debris and associated ecosystem services.

In the western sections of white pine/hemlock/hardwood, diseased and unhealthy hemlock will be targeted. Openings will be placed to try and maximize light on released hemlock regeneration to test recent literature findings on increasing light levels to combat hemlock wooly adelgid in hemlock regeneration. Further openings will be located to help release existing advanced regeneration and

intermediate thinning will be applied where appropriate to maintain healthy growth of advanced regeneration.

In openings larger than 0.5 ac. 5 - 10 ft² / ac of basal area of pole-sized and larger trees will be retained. Due to use of existing forest roads for transporting wood to landing, forwarders will be required.

Cultural Resources: Aside from stone walls, no cultural resources are mapped for the property and none were found while scouting. The stone walls include a double walled lane that was the old Town Road (now PL8 gate road), and two fenced in areas. Existing stone walls will be flagged and avoided during harvest, and only existing barways in the stone walls will be utilized for equipment crossing. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Potential den trees, prominent snags, trees with stick nests, and potential nest trees (i.e. those with 3- way forks or similar canopy structures) and other trees with signs of current wildlife use will be retained wherever possible as valuable wildlife habitat. Frequent moose and deer sign throughout the winter and large amounts of browse damage present in the regeneration. Signs of turkey forage in the fall. Hunter(s) present this past year. At the time of posting all available NHESP maps and data had been consulted and there were no Estimated or Priority Habitats for listed species found in the lot proposal area. Should new information become available DWSP will follow recommendations as needed.

FIGURES

Figure 1. Forestry Lot Proposal Map.

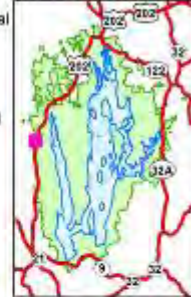


FY2018 Proposed Forestry Project PE-18-11-2

Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Map Scale: 1:4,000



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PE-18-12

Site Information

Watershed: Quabbin	Town(s): Pelham and Shutesbury
Acres: 35	Nearest Road: Gate 15 road off of Route 202
Natural Heritage Atlas overlap? No	
Forest Types: White pine/hardwood; hemlock	
Soils: 100% Chatfield-Hollis or Charlton-Hollis (well-drained, very stony with outcrops)	
Wetland Resources: No wetlands are present within the lot; streams present along the northeast boundary and across the road forming the southern boundary	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: The proposed area is almost entirely white pine/hardwood with prevalent mountain laurel understory. The southern section was harvested in 1999 as an intermediate treatment which appears to have regenerated with dense mountain laurel understory. The mountain laurel diminishes towards the center of the proposal (the top of a hill) and the forest understory has more, though still sparse, white pine and mixed hardwood regeneration. The central portion of the proposal has continuous canopy of white pine, with oaks and red maple. A small portion was harvested as salvage in 1988. The northern section of the proposed area is a near monoculture hemlock stand approaching Atherton Brook and a drainage from the west. The hemlock there appears to be mostly healthy at the time of writing, however some isolated hemlock in other sections of the proposed area, and in adjacent forest has been found with drastic crown thinning and/or suffering extensive hemlock borer damage. What little regeneration is present is low growth hemlock.

Advance regeneration in the southern section has been shaded out by dense mountain laurel. In the center of the proposed area sparse sapling to mid canopy hardwood and white pine regeneration is present. In the northern hemlock stand regeneration is almost entirely low growing hemlock with evidence of browsing. No invasive plants present in this lot.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because mountain laurel cover repressing forest regeneration is a common problem for watershed forestry at the Quabbin and this site provided an opportunity to attempt to accomplish our regeneration goals while also testing the ability of mechanical treatment to reduce mountain laurel cover after harvest.

Silvicultural Objectives: Regenerate about 10 acres in openings ranging in size up to 2 acres and averaging about 1 acre; about 4 acres of intermediate thinning will also occur. The southern section will house a test of mechanical treatment of mountain laurel. Two 2 acre openings will be cut in the dense

mountain laurel areas and the mountain laurel mechanically treated. In the late spring/early summer of the first growing season after the harvest one of the openings will be revisited and receive a second mechanical treatment. In the second growing season after half of the mechanically treated area will receive an additional treatment for mountain laurel. Regeneration and recruitment at each opening will then be monitored for efficacy. 5-10 sq ft/ ac basal area will be retained, targeted towards long lived or underrepresented species.

Silviculture in the central portion, approaching and including the top of the hill, will focus on releasing advanced regeneration and promoting canopy species diversity. Openings will range 0.5-1.0 acre in size and will target unhealthy and poorly formed individuals or individuals whose removal would release desirable advanced regeneration. Thinning will be performed in areas with existing canopy diversity or along skid trails where appropriate for achieving age and species diversity goals.

In the hemlock stand in the north, at the time of marking trees will be surveyed for health and presence of hemlock woolly adelgid. According to current hemlock policies if less than 50% of the hemlock is infested it will not be treated at this time. If greater than 50% are infected harvest will target obviously unhealthy or heavily infested individuals with intermediate thinning.

In openings larger than 0.5 ac. 5 - 10 ft² / ac of basal area of trees pole-sized and larger will be retained. Potential den trees, prominent snags, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) and other trees with signs of current wildlife use will be retained wherever possible as valuable wildlife habitat.

Cultural Resources: There are no mapped cultural resources within the proposed area and none were discovered during scouting of this area for proposal. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Frequent moose and deer sign throughout the winter and large amounts of browse damage present in the regeneration. At the time of posting all available NHESP maps and data had been consulted and there were no Estimated or Priority Habitats for listed species found in the lot proposal area. Should new information become available DWSP will follow recommendations as needed.

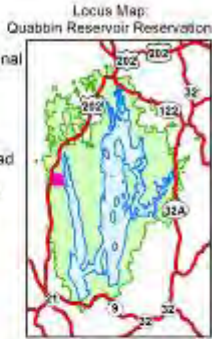
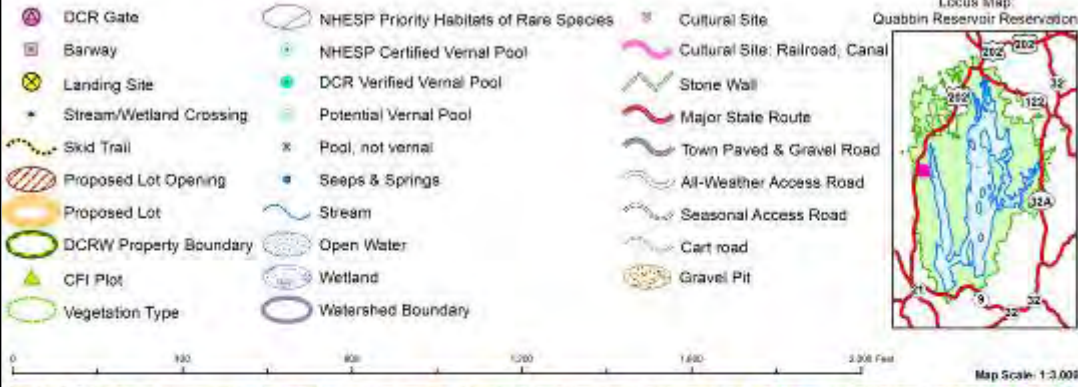
FIGURES

Figure 1. Forestry Lot Proposal Map.



FY2018 Proposed Forestry Project PE-18-12

Quabbin Reservoir Reservation Proposed Forestry Lot Review



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PE-18-13&14
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Site Information

Watershed: Quabbin	Town(s): Shutesbury
Acres: 114	Nearest Road: Town Farm Road, gates SH3-SH5
Natural Heritage Atlas overlap? No	
Forest Types: White pine/hardwood; oak/hardwood; red pine	
Soils: 100% Hennifer/Montauk fine sandy loam (well-drained, very stony)	
Wetland Resources: No wetlands are present within the lot; stream crossing the road leading into the southern boundary of the western section	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History: Both sections of the proposed area contain stands of red pine which originated as part of Shutesbury Town Forest and were likely planted in the 1910's – 1920's, but don't appear to have ever been thinned. During the time of writing the red pine here appeared to be relatively healthy, especially compared to red pine found elsewhere at the Quabbin. It is densely stocked but slightly smaller in diameter (12-17" dbh) than might be expected given its age. The eastern section contains two stands of red pine (1.3 and 2.1 ac.) and the western section one stand (3.8 ac.).

The remainder of the eastern section of the proposal is white pine hardwood and oak hardwood within common stone walls. The area is moderately stocked with canopy established individuals. White pine is of mixed quality with some past weevil damage, hardwoods are mostly red oak and red maple of saw log size. Oak in the oak hardwood is of moderate to good quality. There is very little regeneration present, and sparse mid canopy hardwoods of red maple and black birch. If this section was harvested in the past, it was only in the northern margins.

The western section is primarily white pine hardwood with some oak hardwood acreage towards the top of the hill. From the top of the hill west to the old forest road there are pockets to large swaths of tall and dense mountain laurel. The mountain laurel largely exists under established forest canopy and has suppressed regeneration. White pine quality and density is varied and hardwood species present include several northern hardwood species, especially on the mid to lower slope. The white pine hardwood transitions to near monoculture hemlock in the northeast corner and along the banks of Town Farm Brook. The hill was last harvested in 1973 in a selective hardwood cut, and small pockets west of the old woods road were harvested in 1976.

Regeneration in the white pine hardwood stands is mixed and composed of white pine, red maple, and some northern hardwood species. Oak regeneration is very limited. Old skid roads in the western section are now dense with hemlock regeneration. There are several 0.5 ac areas of tall dense mountain laurel on the top and western slope of the hill in the western section shading out regeneration. The proposal area is open to year round hunting. No invasive plants present in this lot.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

This particular site was chosen because red pine across the Quabbin reservation is dying from infestation by red pine scale. This proposed site contains several acres of standing red pine that could be harvested before the red pine scale degrades the stand. In addition to the targeted red pine the remainder of the proposed area contains white pine or white pine/hardwood stands with low species diversity in the regeneration that may benefit from active management.

Silvicultural Objectives: Regenerate about 28 acres in openings ranging in size up to 2 acres and averaging about 1 acre; about 10 acres of intermediate thinning will also occur. Red pine stands will be harvested through restorative silviculture as described in 'From Here Forward' creating approximately 1.3, 2.1 and 3.8 acre openings. Remaining silviculture in the eastern section will consist of small (up to 0.5 ac) regeneration openings in the white pine hardwood stands and intermediate thinning in the oak hardwood. Regeneration openings will target removal of unhealthy or poorly formed white pine and the release/regeneration of existing hardwoods. Intermediate thinning will focus on releasing the crowns of healthiest individuals and removal of unhealthy or poorly formed stems.

In the western section, starting at the top of the hill, mountain laurel will be targeted with large openings (≤ 2 ac.) and mechanically treated to prevent its dominance after harvest. Oak hardwood in this section will be treated with intermediate thinning similarly to oak hardwood in the eastern section. Sections of hemlock monoculture will be evaluated for health and the presence of hemlock wood adelgid (*Adelges tsugae*). In stands of hemlock near Town Farm Brook, trees will only be marked for harvest if more than 50 % of individuals are infested. In the acreage of upland hemlock diseased and unhealthy individuals will be harvested with individual or small group thinning to attempt to promote regeneration of shade tolerant hemlock. Diseased and distressed individuals will be targeted for harvest. Where northern hardwood species are present up to 0.5 ac regeneration openings will be used to promote regeneration of shade tolerant northern hardwoods.

In openings larger than 0.5 ac. 5 - 10 ft² / ac of basal area of trees pole-sized and larger will be retained. Potential den trees, prominent snags, trees with stick nests, and potential nest trees (i.e. those with 3-way forks or similar canopy structures) and other trees with signs of current wildlife use will be retained wherever possible as valuable wildlife habitat.

Harvested wood will require forwarding on existing roads. Town Farm Road also currently hosts a portion of the New England Scenic Trail. To protect the road/trail a forwarder will be required.

Cultural Resources: The northern section of the lot includes the mapped foundation of the Tilson dwelling, well and barn foundation. The existing landing to the south is adjacent to the Hanifin dwelling and school foundations. Existing foundations and stone walls will be flagged and avoided during harvest. Only existing barways in the stone walls will be utilized for equipment crossing. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs.

Moose and deer sign were observed throughout the winter. Browse damage is less obvious here than in many other locations on the Quabbin. The area is definitely regularly visited by at least one dog. At the time of posting all available NHESP maps and data had been consulted and there were no Estimated or Priority Habitats for listed species found in the lot proposal area. Should new information become available DWSP will follow recommendations as needed.

FIGURES

Figure 1. Forestry Lot Proposal Map.

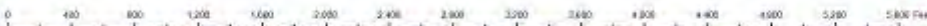


FY2018 Proposed Forestry Project PE-18-13&14

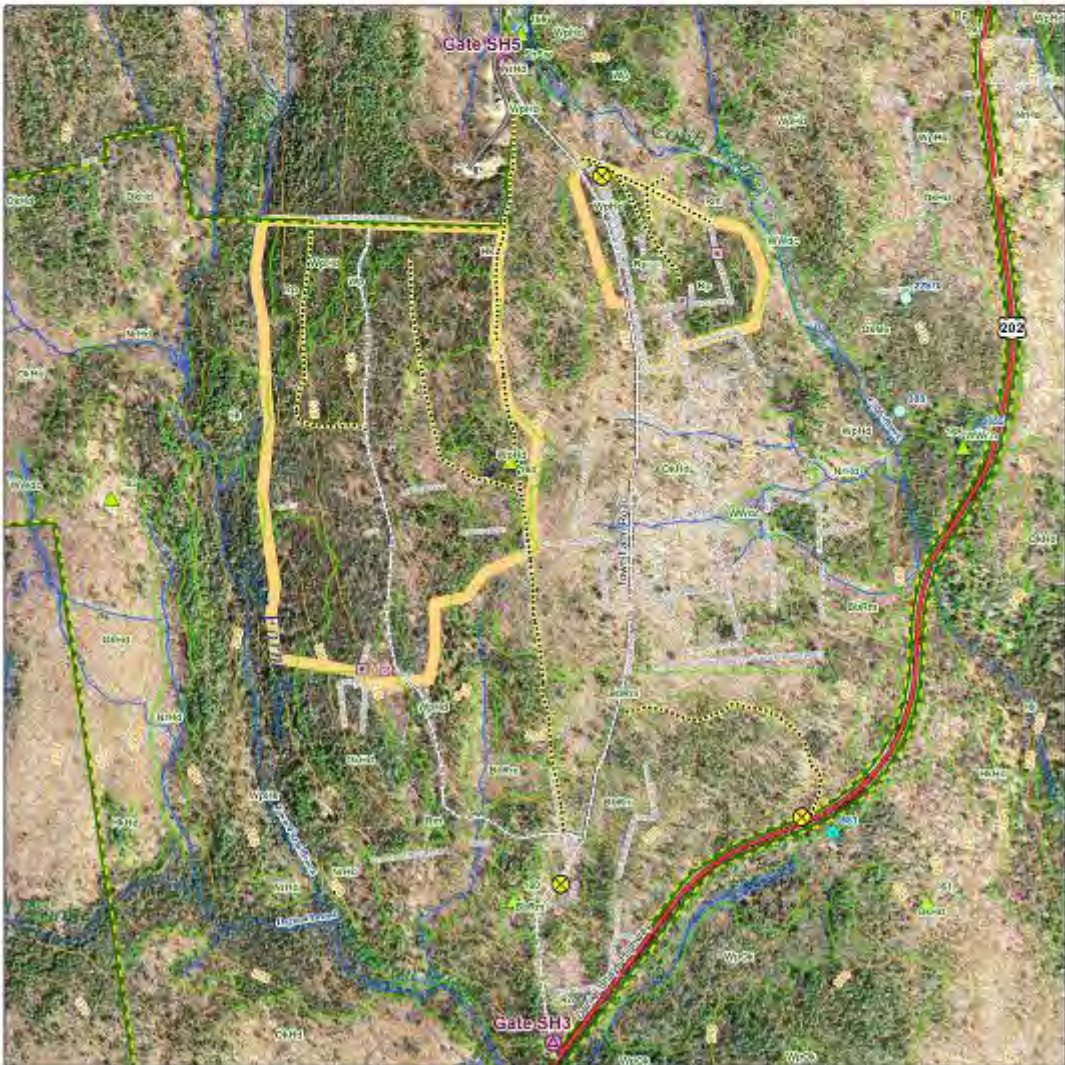
Quabbin Reservoir Reservation Proposed Forestry Lot Review

- | | | |
|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Map Scale: 1:8,000



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PR-18-7
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Site Information

Watershed: Quabbin	Town(s): New Salem: Prescott Peninsula
Acres: 110	Nearest Road: Prescott-Pelham Road
Natural Heritage Atlas overlap? Yes	
Forest Types: Mixed oak; oak/hardwood	
Soils: 75% Chatfield-Hollis (well-drained thin); 25% Canton (well-drained thick)	
Wetland Resources: Wetlands are not present within the lot; one stream crossing will be required to access this lot from intersection 17-10	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History:

Basal Area per acre: 126 sqr. ft.

Trees per Acre: 116

Average DBH: 14"

The proposal area is dominated by oak. Red oak leads at 57% followed by chestnut oak (16%) and black/white/scarlet all around 5% respectively. The remaining 10% is captured by white pine, red maple, black birch, sugar maple, white ash, hickory and hemlock. Given the high percentage, red oak is found throughout. Site index declines with ascending slope. Concentration of chestnut oak increases with ascending slope. Black/white/scarlet oaks have fairly even distribution. White pine is scattered and large, and are likely survivors following the hurricane of 1938. Sugar maple and ash are confined to the toe of the slope (mesic site; northwest portion of area).

Understory is dominated by suppressed white pine saplings. Secondary component are seedling oaks. Pockets of vigorous growth composed of sapling black birch, white pine, red maple and oak are the result of an in-house crew selection harvest completed in 2000. Herbaceous/shrub layer is composed of pockets of which hazel on lower slope and fairly dense huckleberry on mid and upper slopes. There is also a scattering of mountain laurel on upper slopes.

Forestry records indicate most of the lower slope and portions of the mid and upper slopes where treated with an early stage shelterwood type harvest in 1965. The 2000 harvest covered 20 acres on the east side of East Valley Road beginning just south of the old road leading to Daniel Shays homestead. Residual basal area is around 60 sqr. ft. per acre of fairly large to large better quality red oak sawtimber.

A number of trees on the drier mid/upper slopes have basal scaring consistent with fire.

The area is generally invasive free. Barberry, Honeysuckle and multiflora rose were found in/along brook that forms the south boundary. Frequency of these invasives increased with ascending slope (along main skid road) to the gate 17 road (intersection 17-10). Based on field observation regeneration

levels are greater than 2000 stems per acre; lead by sapling size white pine and followed by seedling red oak, chestnut oak and sapling black birch (highest concentration of black birch in year 2000 selection harvest). With the exception of the year 2000 harvest area all regeneration is fairly suppressed due to close to 100% canopy closure. Light to no browsing observed.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

Specifically, this site was selected due to a lack of diversity. Primarily structural diversity; where current composition is mainly uniform, high canopy, larger diameter forest. Creating a more dynamic/diverse forest composition should reduce mortality risk from extreme environmental conditions (hurricanes) and pest/disease outbreaks (red pine scale). Continual recruitment of a younger forest age class should ensure watershed land's ability to filter and store drinking water for generations to come.

Silvicultural Objectives: Regenerate about 22 acres in openings. Other than the 20 acre 2000 timber harvest, the area is fully stocked with high canopy forest. Regeneration is adequate but not particularly vigorous (excluding the 2000 harvest area). Rebalancing the current structure by recruiting a vigorous forest understory is the primary harvest goal. This would be accomplished by sighting various size openings ranging from a quarter to 2 acres, averaging about 1 acre. Priority would be given to areas of advanced regeneration, particularly oak. Generally, smaller openings would be planned along the reservoir and streams and the larger on mid/upper slope. Second priority would be releasing established understory spurred from the 2000 harvest; specifically selecting overstory that can be removed with minimal damage to regeneration. The project would also target protection of biodiversity such as coarse woody debris and wildlife habitat (live/dead snags and den trees). A successful project would result in fostering a diverse and vigorous understory that included a strong oak component.

Cultural Resources: There are stone walls in the southwestern corner of the area associated with an old homestead that is underwater (reservoir). There is also the remains of a fire pit/chimney and foundation in the southeastern corner of the lot. These will be flagged and protected during the harvesting operation. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. Regeneration in the openings will result in small patches of early successional habitat. No known rare or endangered species or habitats in this proposal area.

The proposal area falls within sensitive species and/or habitats as determined by the MA Natural Heritage and Endanger Species program. For their protection, their specific location(s) are not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

FIGURES

Figure 1. Forestry Lot Proposal Map.



FY2018 Proposed Forestry Project PR-18-7

Quabbin Reservoir Reservation Proposed Forestry Lot Review

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|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
| Barway | NHESP Certified Vernal Pool | Cultural Site: Railroad, Canal |
| Landing Site | DCR Verified Vernal Pool | Stone Wall |
| Stream/Wetland Crossing | Potential Vernal Pool | Major State Route |
| Skid Trail | Pool, not vernal | Town Paved & Gravel Road |
| Proposed Lot Opening | Seeps & Springs | All-Weather Access Road |
| Proposed Lot | Stream | Seasonal Access Road |
| DCRW Property Boundary | Open Water | Cart road |
| CFI Plot | Wetland | Gravel Pit |
| Vegetation Type | Watershed Boundary | |

Locus Map:
Quabbin Reservoir Reservation



Massachusetts Department of Conservation and Recreation
Division of Water Supply Protection, Office of Watershed Management
Forest Management Project Proposal Summary

DWSP Lot Proposal Number: PR-18-17

Site Information

Watershed: Quabbin	Town(s): New Salem: Prescott Peninsula
Acres: 153	Nearest Road: Clifford Road
Natural Heritage Atlas overlap? Yes	
Forest Types: Northern red oak; white pine	
Soils: 5% excessively drained; 95% well-drained	
Wetland Resources: Wetlands are present within the lot but will not be crossed or harvested; at least seven stream crossings will be required to access this lot, but not all simultaneously	
Vernal Pools: None	

NARRATIVES

General Description/Forest Composition/History:

Basal Area per acre: 144 sqr. ft.

Trees per Acre: 120

Average DBH: 14"

At 94% of total basal area, dense high canopy red oak is the dominant forest cover. Black birch and red maple compose the mid story. Stocking of black birch and red maple increase from north to south. The southeastern corner of the area is home to inholdings of sawtimber size white pine and sugar maple being 9 acres and 2 acres respectively. Most of the sugar maple is concentrated along an old road and surrounding an adjacent old farmstead. The white pine encompasses the sugar maple and likely seeded an area used for pasture prior to state taking. Not easily accessible, the area does not appear to have experienced any forest management since state acquisition.

Although suppressed there are pockets of white pine regeneration mostly found beneath white pine overstory. In the more mesic oak sections are pockets of red maple and sugar maple and black birch seedlings. The absence of forestry has not left the area static. An agent of noticeable change via a severe weather event struck in late May 2010 causing random pockets (0.1 to .25 acres in size) of blowdown mostly effecting the oak but also a portion of the white pine. In total, within the proposal area, this severe weather event caused roughly six acres of blowdown. The blowdown pockets are home to an understory of mostly black birch, striped maple and red maple.

More recently (2015 and 2016) there have been moderate to severe outbreaks of gypsy moth that have lead to noticeable oak defoliation and in some areas white pine defoliation. Currently defoliation has not lead to notable tree mortality. However, 2017 could be another year of moderate to severe gypsy moth defoliation given the last notable infestation in the early 1980s lasted about six years.

Most abundant ground cover is hay scented fern followed by cinnamon, christmas and royal ferns and highbush blueberry in wetter areas; huckleberry, bracken fern and sheep laurel in drier areas.

Given the high canopy closure most regeneration was in the seedling size class. Exceptions to this are within blowdown areas and the very south end within the old farmstead which is home to a thick layer of suppressed white pine saplings. The inventory estimates a total of 1400 stems per acre with about 33% being white pine and 25% being black birch. As mentioned above, most of the white pine is concentrated in the south end. Remaining composition is rounded out with seedling size red maple at 15% and red oak at 10%. About 5% of regeneration is sugar maple seedlings found in mesic pockets. The blowdown areas are home to black birch, red maple and striped maple and exhibit moderate to severe browsing. Regeneration with closed canopy appear to exhibit low to no browsing.

Invasives are present in and around the homestead (cellar holes) located at the southern end of the proposal area and also within an old improved pasture (now growing white pine sawtimber) at the north end of the area along the reservoir shoreline. The usual invasives; barberry, honeysuckle, bittersweet also follow the intermittent drainages. Presence seems to decrease/disappear with ascending slope, where drier stony soils prevail. Important to note that Amur cork tree was found on the main skid road leading to the proposal area. Overall, the invasive concern here is moderate.

Site Selection: The primary goal of the watershed forest management program is to create and maintain a forest that provides high quality drinking water to current users and future generations. DWSP recognizes that wildlife habitat management and restoration of rare habitats are important secondary goals, where they are compatible with maintaining high quality drinking water.

Specifically, this site was selected due to a lack of diversity. Primarily structural diversity; where current composition is mainly uniform, high canopy, larger diameter forest. Creating a more dynamic/diverse forest composition should reduce mortality risk from extreme environmental conditions (hurricanes) and pest/disease outbreaks (Gypsy Moth caterpillar). Thoughtful, continuous recruitment of younger forest should ensure the watershed land's ability to filter and store drinking water for current and future generations.

Silvicultural Objectives: Regenerate about 25 acres in openings. This would be accomplished by sighting various size openings ranging from a quarter to 2 acres, averaging about 1 acre. The forest within the proposal area lacks structural/age class diversity given no forest management has occurred here while under state ownership.

With at least six intermittent drainages, sites vary between mesic and xeric. Generally, the xeric portions are up slope. Soil conditions will be an important silvicultural consideration with experience suggesting regeneration is generally more rapid and diverse within well drained more xeric soil types. Regeneration work will occur on mesic sites, but will be secondary to xeric locales. There will also be opportunities to expand upon regeneration triggered by the 2010 severe weather event. With varying surface stone micro topography, treating sections that are accessible, but rocky, will be a priority so that a greater portion of less rocky sections are available for future silviculture. The primary goal of the regeneration treatment is triggering an understory of oak. This is a difficult task, so timing harvesting activity during a strong acorn seed year and during non frozen ground conditions for maximum scarification is ideal. Preparatory silviculture is likely within filter strips along the reservoir and drainages.

Cultural Resources: There are stone walls, a lane, and cellar holes in the southeastern corner of the area associated with an old homestead. These, as well as a spring located at the toe of the slope, will be flagged and protected during the harvesting operation. If applicable, DWSP will follow any additional recommendations from DCR's Archeologist regarding protection of sensitive sites.

Wildlife/Rare or Endangered Species: Wildlife habitat features will be protected wherever possible, including stick nests, high quality potential nest trees, and large diameter snags, cavity trees and logs. The proposal area falls within sensitive species and/or habitats as determined by the MA Natural Heritage and Endangered Species program. For their protection, their specific location(s) are not included in this report. DWSP will coordinate with NHESP and follow recommendations to protect these species during the proposed activity.

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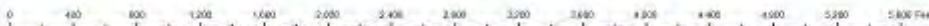
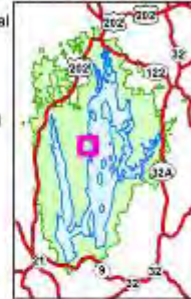


FY2018 Proposed Forestry Project PR-18-17

Quabbin Reservoir Reservation Proposed Forestry Lot Review

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|-------------------------|---|--------------------------------|
| DCR Gate | NHESP Priority Habitats of Rare Species | Cultural Site |
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Locus Map:
Quabbin Reservoir Reservation



Map Scale: 1:8,000

