Quabbin Harvest Proposal PE-22-03

Proposal Update, May 2024:

This forestry proposal was originally approved through the public process in 2021. The project was 'paused' along with most other state lands forestry projects as part of the EEA Forests as Climate Solutions Initiative. Following the close of the work of the Climate Forestry Committee, DWSP determined the activities in this proposal align with EEA climate considerations developed from the recommendations in the CFC report. The proposal language and mapping below are preserved unchanged from that presented to the public in 2021 in ArcGIS Online Story Map format.

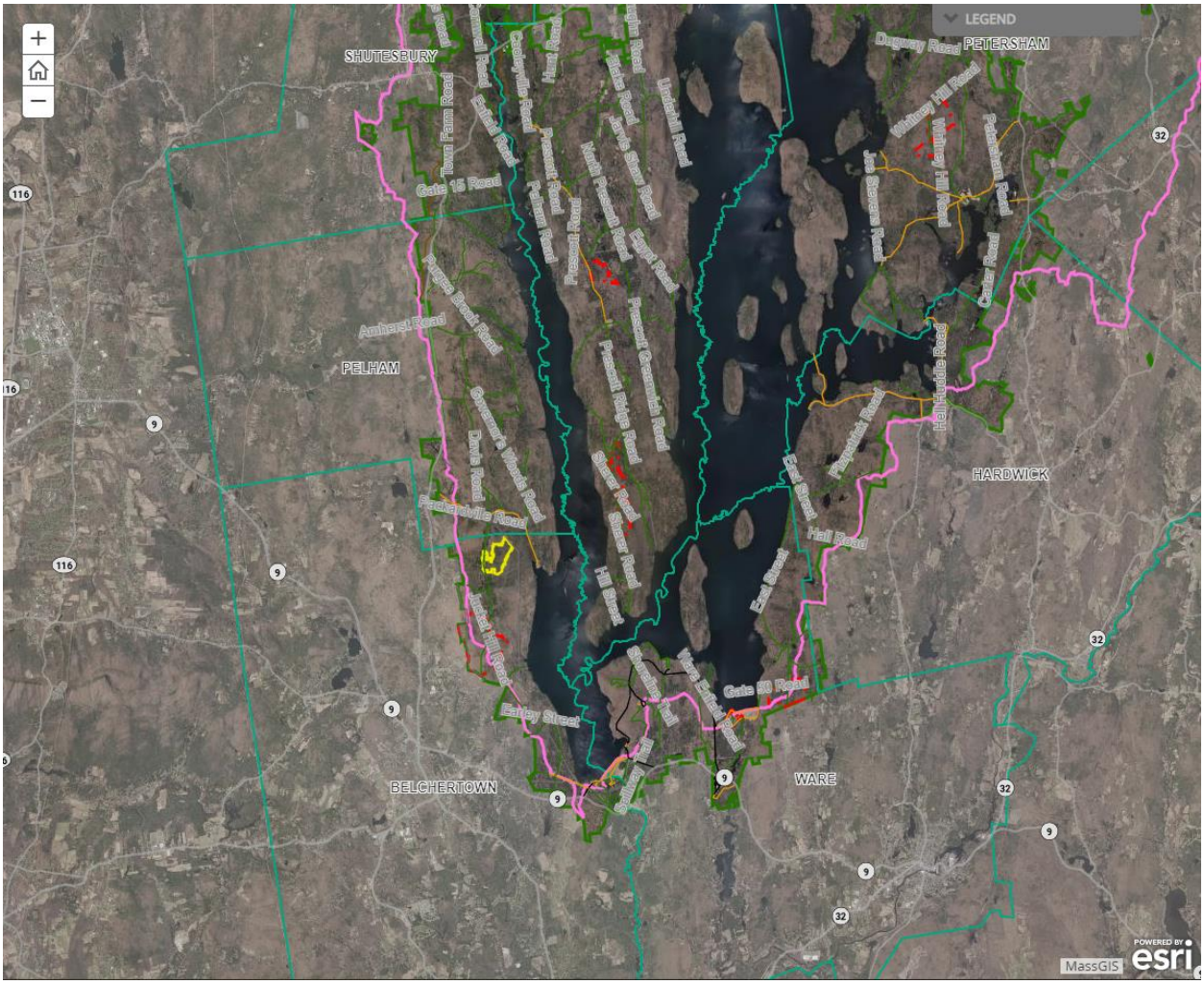
Proposal Goals

The proposed area holds a regionally and locally uncommon Ridgetop Chestnut Oak Forest/Woodland community that is transitioning to a white pine / red maple composition, the most common forest type in Massachusetts. Ridgetop Chestnut Oak Forest/Woodlands are a fire adapted and dependent community. This proposal seeks to maintain and regenerate this uncommon community by applying prescribed fire.

Proposal Location

To the west this proposal is bounded by Juckett Hill Road. To the north the proposal is bounded by a north aspect northern hardwoods stand and red oak stand. To the east and south the proposal is bounded by steep slopes. South and southwest of the proposal are an area of wet oak hardwoods, and an old harvest regenerating to white pine.

Total Acres: 102



General Description

	Overstory Type(s)	Acres
Dominant	White pine - oak	57
Secondary	White pine	19
Other	Chestnut oak	16

	Understory Type(s)
Dominant	Dry site - blueberry/huckleberry
Secondary	Mountain laurel prevalent

Description of forest composition/condition:

Stand One is the focus stand of this proposal, a 16.3 acre chestnut oak dominated stand with a dense highbush blueberry and black huckleberry heath understory (Vaccinium corymbosum; Gaylussacia baccata). This habitat type is both regionally rare and rare within the Quabbin reservation. While the overstory basal area majority is a combination of chestnut oak (41 ft² acre-1; all basal area and trees per acre values represent the stand mean value), eastern white pine (17 ft² acre-1) and northern red oak (8 ft² acre-1), smaller size classes are slight majority red maple and white pine (51 % of trees < 10 " dbh, while only comprising 34.6% of total basal area). Chestnut oak saplings are present but are being browsed down, and red maple and eastern white pine saplings are quickly outpacing and overtopping them. At present the stand is positioned to transition to a more generalist red maple and white pine stand. The understory is predominantly high bush blueberry / black huckleberry heath, with pockets of tall dense mountain laurel (Kalmia latifolia). The stand also contains some ledge and surface bolder, which will require careful operation during treatment. Firewood thinning occurred in the western half of the stand in harvests in 1992 (Quabbin lot 0612).

Stand 2 is an eastern white pine/oak forest, 35 acres, at the southern end of the proposal. Growing on well drained Canton fine sandy loam. This stand is composed primarily eastern white pine (39 ft² acre-1) and northern red oak (24 ft² acre-1), with minor components of red maple, black birch, chestnut oak, black oak, white oak, and yellow birch. Stocking for the stand follows an inverse J curve, but like much of the region northern red oak is a minor component of the smaller size classes with generalist eastern white pine, and red maple making up most of the smaller size classes. The stand stretches from Juckett Hill Rd. In the west to steep south east facing slopes in the east and is bordered to the south by oak-hardwood forest and previous harvests regenerating to white pine along the road. To the north, the stand is bordered by the two white pine stands included in this proposal (Four, Six) and the chestnut oak stand (One) to the northeast. Most of the chestnut oak in Stand 2 is clustered adjacent to the chestnut oak stand (One). The understory transitions from low density woody vegetation with red maple and black birch seedlings to higher density blueberry and black huckleberry heath adjacent to the chestnut oak/heath stand (Three). Most of the stand was thinned in the 1980's (Quabbin lots 0385, 0485, 0492A) but has not had any regenerative silviculture. This stand has most of the stone walls present in this proposal.

Stand Three covers 22 acres, at the northeastern corner of the proposal. The stand is composed of eastern white pine (57 ft² acre-1), chestnut oak (17 ft² acre-1), northern red oak (10 ft² acre-1), and minor components of red maple, and black oak. It is similarly growing on well drained Canton fine sandy loam, but this stand is primarily growing on the east by southeast facing slopes of the proposal, with a third of the stand occupying the ridge top. The stand is bordered by steep slopes to the southeast, a utility right-of-way to the northeast, oak/hardwood forest to the

northwest, and the eastern white pine hardwood stand (Five) and chestnut oak stand (One) to the southwest. Chestnut oak is a stronger component throughout the easterly slopes than in Stand 2, with a reduced presence on the ridgetop. Similarly, the understory composition is a dense blueberry and huckleberry heath on the slopes, with pockets of dense mountain laurel, transitioning to a dispersed heath on the ridgetop. The sapling/seedling composition is primarily chestnut oak, white pine, and red maple on the slopes, with chestnut oak seedlings reducing but still present on the ridgetop and black birch seedlings picking up. This stand has not been harvested since the establishment of the Quabbin Reservation.

Stand Four is an 11.5 acre white pine stand, growing on well drained Canton fine sandy loam at the top of the ridge. This stand would have recently been better classified as a white pine / hemlock type, but the majority of the large diameter hemlock stems have succumbed to hemlock woolly adelgid (Adelges tsugae) leaving the stand dominated by larger diameter (> 16 " dbh) eastern white pine (70 ft^2 acre-1), with minor components of northern red oak, red maple, chestnut oak, black oak, white oak, and black birch. Aside from patches of eastern white pine seedlings, often collocated with hemlock snags, much of the stand is pine/hemlock duff with little regeneration. This stand is bordered to the west by northern hardwoods (outside of proposal) to the west and north by oak / white pine (Stand Five), to the west by chestnut oak (Stand One), and to the south by white pine oak (Stand Two). This Stand was part of the previously mentioned 1992 firewood thinning.

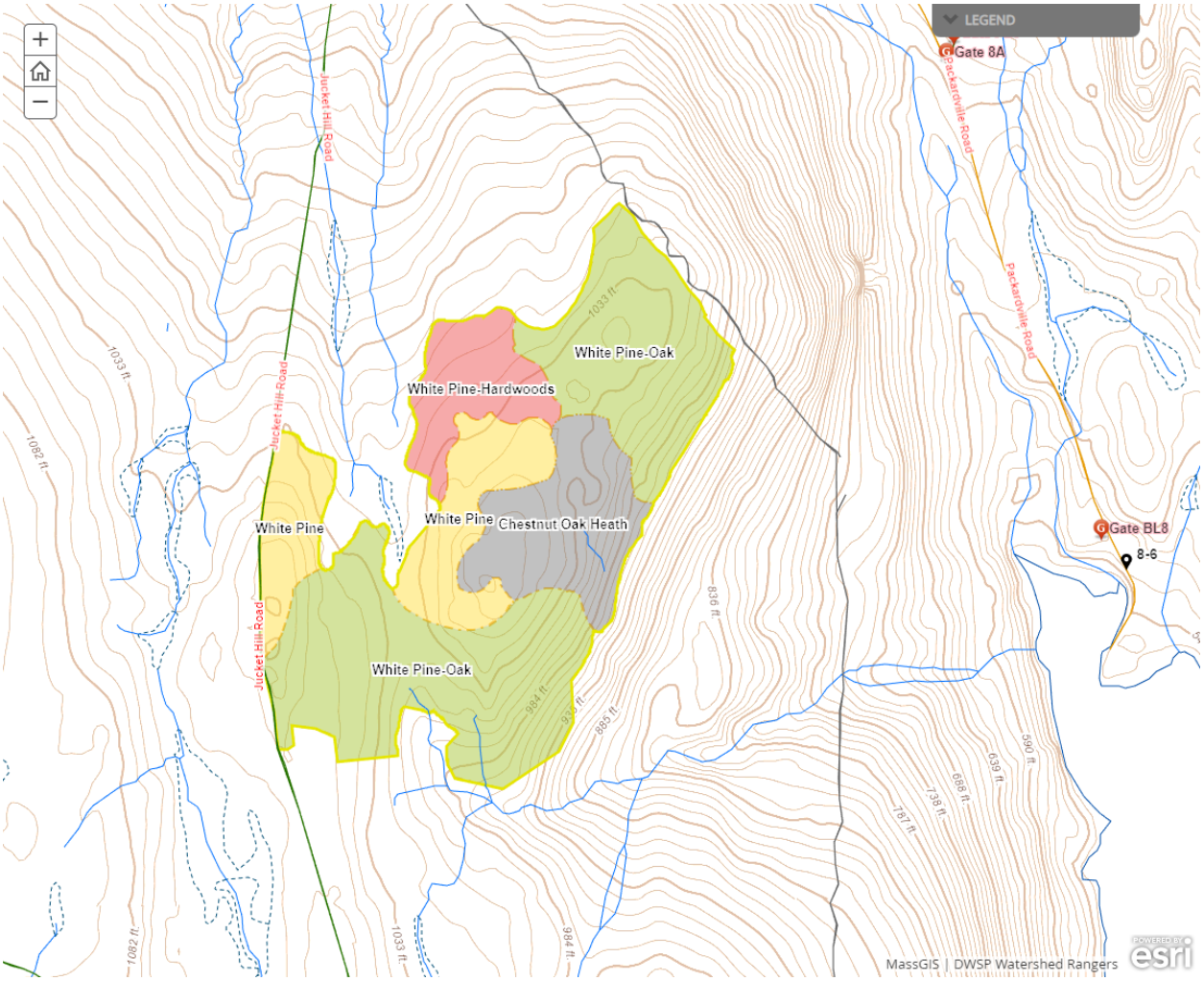
Stand Five has an oak / white pine overstory sitting at the top the ridgeline, covering 10.3 acres. It's differentiated from the rest of the proposal by it's ridgetop to north facing aspect, and a majority of the stand is growing on moderately well drained Scituate fine sandy loam, and the rest on the well drained Canton fine sandy loam. The stand is oak dominated (northern red oak, 25 ft^2 acre-1; black oak, 13 ft^2 acre-1; chestnut oak, 5 ft^2 acre-1), eastern white pine (15 ft^2 acre-1), and red maple (12 ft^2 acre-1), with minor components of hemlock, black, and yellow birch. The stand is species diverse across merchantable size classes. Red maple and eastern white pine are a large component of the smaller size classes, but pole sized oak are well represented. Seedlings are dominated by white pine, red maple, and black birch; there are some scattered oak seedlings but browse is a problem. Within this stand there are larger patches (0.5-0.75 acres) of dense mountain laurel preventing regeneration beneath them. This stand is bordered to the west by northern hardwoods (outside of this proposal), to the north by a red oak stand (outside of this proposal), to the east by the smaller white pine oak stand (Three), and to the south by white pine (Four). This stand was part of the previously mentioned 1992 firewood thinning.

Stand Six is 7.3 acres of white pine overstory in a narrow north south oriented block along Juckett Hill Road. This stand is dominated by eastern white pine (108 ft^2 acre-1), with minor components of northern red oak (15 ft^2 acre-1), and red maple and black oak (< 10 ft^2 acre-1 each). Eastern white pine is distributed across all size classes and is the majority of both pole and

saw log sized stems. Eastern white pine seedlings are present in patches but much of the stand has little regeneration present. Northern red oak is only present in the canopy, and in very few scattered seedlings. Red maple in the stand is almost all in small pole sized suppressed stems. The stand is bounded by Juckett Hill Road to the west, a northern hardwood stand to the north and east (not a component of this proposal), and the larger white pine / oak stand (One) to the south. This stand is growing on the same Canton fine sandy loam as the majority of the other stands. A 1989 firewood thinning (lot 0492A) included all of this stand. There is a stone wall running along Juckett Hill Road at the western edge of this stand.

Assessment of Terrestrial Invasive Species:

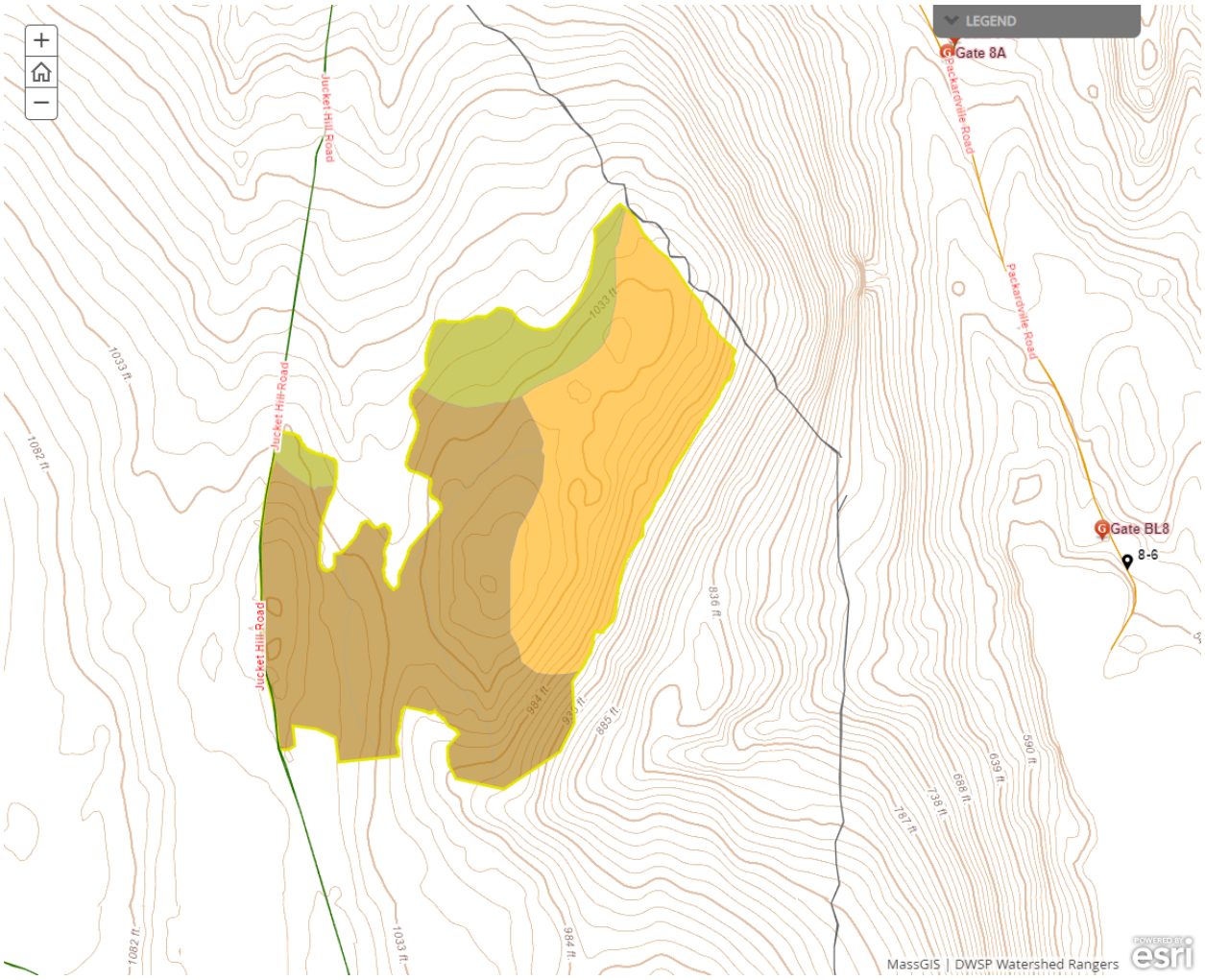
Japanese barberry is present along Juckett Hill Road near a foundation in the southwestern corner of the proposal. Other invasives were not observed during randomized sampling of the interior.



Soils

Drainage Class	%
Excessively Drained	0
Well Drained Thin	35
Well Drained Thick	53
Moderately Well Drained	12
Poorly to Very Poorly Drained	0

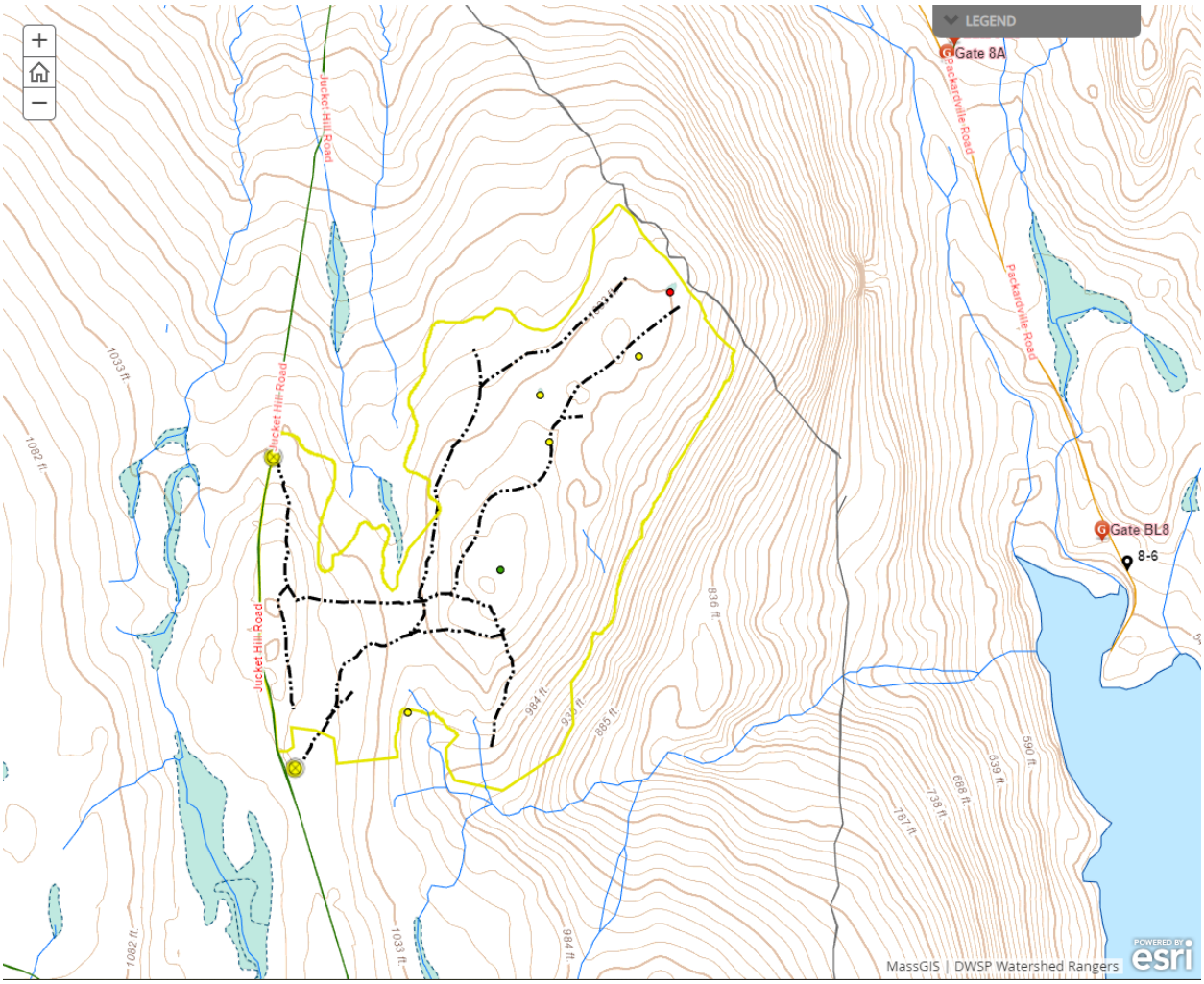
Soils of the south eastern facing slopes are well drained thin Charlton-Hollis-Rock outcrop complex with several areas or prominently exposed rock. The majority of the remaining area is Canton fine sandy loam.



Wetlands

- Wetlands present? - **No**
- Streams present? - **Yes**
- Vernal pools present? - **Yes**
- Seeps present? - **Yes**
- Are stream crossings required? - **No**
- Are wetland crossings required? - **No**
- Is logging in filter strips planned? - **No**(Riparian Zone Mgt)
- Is logging in wetlands planned? - **No**

Wetlands are not present in this largely ridgetop and sloped area. There are several potential vernal pools in depressions on the ridgetop. The only streams present are intermittent to ephemeral meltpaths and drainages, crossings will not be necessary.



Silviculture

Acres in Intermediate cuts: **0**

Acres in prep/establishment cuts: **51**

Acres in Regeneration cuts: **22**

Average regen opening size: **1**

Maximum regen opening size: **2**

Description of advance regeneration in proposal area:

Described by stand in forest composition/condition section above.

General comments on silviculture proposed:

Desired Conditions:

To achieve the management goal of greater species diversity across our forested landscape we will be seeking to promote chestnut oak, a regionally rare species. Stand One is a chestnut oak forest which and can serve as a seed source/reserve for the surrounding area. With climate change chestnut oak is a species expected to do well in our area, and an area of source/ reserve will improve overall forest resilience into the future. Unfortunately, regeneration in this stand is dominated by eastern white pine and red maple, and if left unmanaged the site is likely to transition to a white pine-hardwood stand with chestnut oak as a much smaller component. Our target for this stand is to continue the current chestnut oak overstory dominance and improve relative abundance of the chestnut oak regeneration. After treatment chestnut oak should retain its relative dominance of overstory basal area, and chestnut oak saplings should represent at least a third of sapling sized stems. Blueberry/Huckleberry heath will continue to be the dominant understory cover and expanded into pockets of currently dense mountain laurel.

Stands Two & Three are even aged eastern white pine oak stands with relatively even distributions of overstory eastern white pine and oak species, including chestnut oak. To improve age diversity of the stand, as well as help increase the chestnut oak seed source/reserve of Stand One the desired future condition for the stands are a patch mosaic of age classes. Within 2 chains of the Stand One chestnut oak should become majority species in sapling stems, and majority of long-term canopy basal area. Understory blueberry/huckleberry heath will expand into areas that currently have more pine in the overstory on the slope and will expand in regeneration openings at the top of the slope.

Stands Four & Six currently have little species diversity and without some reduction in the overstory will have very little age diversity moving forward. The desired future condition of these stands is an increased diversity of age classes, distributed throughout the stand.

Stand Five has the highest species diversity present in the proposal, but similarly little age diversity, and regeneration interference problems. Harvest in this stand will help increase the distribution of age diversity and relieve some of the vegetative regeneration interference.

Silviculture by Stand :

Stand One. The initial harvest will establish an irregular extended shelterwood system, reducing basal area to 30-40 ft² acre-1 evenly distributed. Retention will favor chestnut oak primarily and other oak species secondarily for retention. The operator will be required to mechanically treat mountain laurel patches and reduce to 10 % of current cover, as well as cut all softwood and hardwood stems between 1 and 5.6 inches dbh (any oaks falling into that category will be marked for retention). Depending upon the timing of the sale and harvest of the stand, the mountain laurel patches will be treated by brush saw the growing season after proposal approval. Treating the mountain laurel while there is still some canopy intact may help extend its recover period after canopy release. Harvest will require whole tree removal to reduce fuel loads prior to the prescribed fire. Standing snags will be retained where possible, except when within one- and one-half times their height from a delineated fire break. After at least two growing seasons of harvest, the initial prescribed fire will occur based on qualitative fuel assessments. An early growing season fire is targeted, however, implementing a fire at other times of the year when environmental conditions allow can benefit oak regeneration. If conducted outside the targeted seasonality, an additional prescribed fire may need to be implemented prior to switching to the maintenance fire interval. Maintenance prescribed fire interval will be based on regeneration and understory sampling 1 and 5 years after the first fire, as well as qualitative observations and photopoints. Harvest return is planned for 20 years post initial prescribed fire. This will be a selective harvest of at least 1/3 of shelterwood trees but retaining at least half of the surviving shelterwood stems.

Stand Two will be treated with a group selection system harvesting a third of the stand at first and return harvest. For a majority of the stand regeneration openings will vary in size from 0.75 to 1.2 acres in size with 5 – 10 40 ft2 acre-1of retention in openings greater than 1 acre, with retention focused on healthy crown codominant or dominant oaks or underrepresented hardwoods (e.g. black cherry, yellow birch, hickories). Adjacent to the focus chestnut stand (One) a 2 acre opening will be placed with retention solely focused on chestnut oak and a fire break established on the western edge to facilitate its inclusion with prescribed burning of the chestnut oak stand. Thinning from below will occur throughout the stand. At the return harvest an additional third will be harvested collocated with initial regeneration openings to maximize light exposure on established regeneration. At both harvests, where possible, snags and large diameter white pine will be retained to preserve structural diversity and carbon storage.

Stand Three will receive a similar silvicultural treatment to Stand One. A 2 acre regeneration opening will be placed adjacent to Stand One with a fire break established to the east for its

inclusion in prescribed burning of the chestnut oak stand and expansion of the heath. With more chestnut oak throughout this stand it will be a primary target for retention and release.

Stand Four will be treated with an irregular extended shelterwood system. The basal area will be reduced from 99 to 30-40 ft² acre-1 favoring surviving eastern hemlock (for wildlife values) and best formed/healthiest eastern white pine (preferring larger diameters for maintaining biological legacies). Retention will be chosen to best release existing white pine seedlings and aggregated to maximize light on pine/hemlock duff currently missing regeneration. At the return harvest, single tree selection of shelterwood individuals will be considered for release of new regeneration but retaining 50 % of shelterwood stems. All standing snags will be retained in this stand.

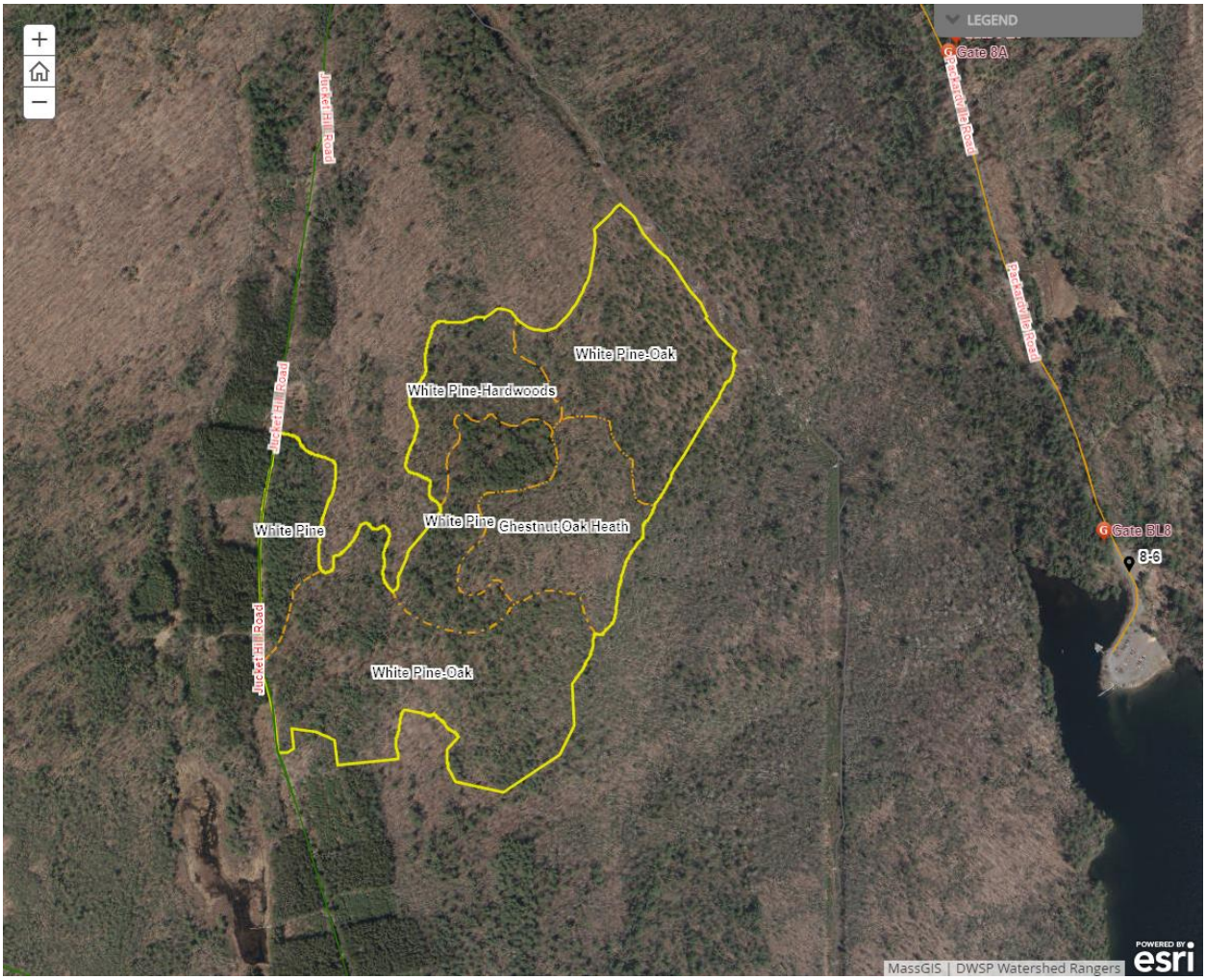
Stand Five. While Stand Five borders the chestnut oak heath of Stand One, similar to Stands Two and Three, its position at the top of the ridge does not make it ideal for expansion of the chestnut oak heath cover. One third of the stand will be treated with regeneration openings of 0.5 - 1 acre in size. Retention will favor well formed, healthy oak species (northern red, black, and chestnut), hemlock, and large diameter eastern white pine. Given the smaller opening size green tree retention within the openings will be limited to 5 ft² acre-1 or less. Where possible dense mountain laurel will be mechanically treated during harvest to attempt to allow some regeneration to establish before the mountain laurel rebounds. Limited thinning throughout the rest of the stand will target very poorly formed, or diseased stems. At the return harvest an additional third of the stand will be treated with similarly sized regeneration openings and retention goals. The final third of the stand will be thinned again at that time but otherwise left intact to retain the structural diversity within the stand.

Stand Six. The very northern end of Stand Six at Juckett Hill road will host the main landing. This landing will be large enough to accommodate whole tree harvesting (necessary for the prescribed fire to be applied in Stands One-Three), and may reduce the size of the stand by 0.75 - 1 acre. The rest of the stand will be treated with a shelterwood prep cut, reducing the basal area from its current 132 ft2 acre-1 down to 40 ft2 acre-1. Retention will favor well-formed canopy dominant or codominant hardwoods, then well-formed dominant or codominant white pine and will be retained in clusters to reduce windthrow and maximize light availability. An average of 5 ft2 acre-1 of poorly formed white pine will be girdled and left standing to increase structural diversity and promote wildlife habitat. At the return harvest an additional 25 – 30 ft2 acre-1 of the shelterwood overstory will be removed to release established regeneration. At this point regeneration will target well-formed canopy dominant hardwoods and largest diameter white pine.

Prescribed Fire & Monitoring:

Upon approval of the proposal, in consultation with prescribed fire experts within DWSP NR and DCR Fire Control an approved burn plan will be developed to apply prescribed fire to the site as specified previously. Fire breaks will be laid out in Stand One and the adjacent 2 acre openings prior to harvest for the operator to cut. Where possible skid roads will be placed to serve as fire breaks. Whole tree harvesting will be required in Stand One to reduce fuel loads. Snags will be retained as much as safety allows, with fuel removed from their base. Prescribed fire will follow the approved protocols of DCR Fire Control.

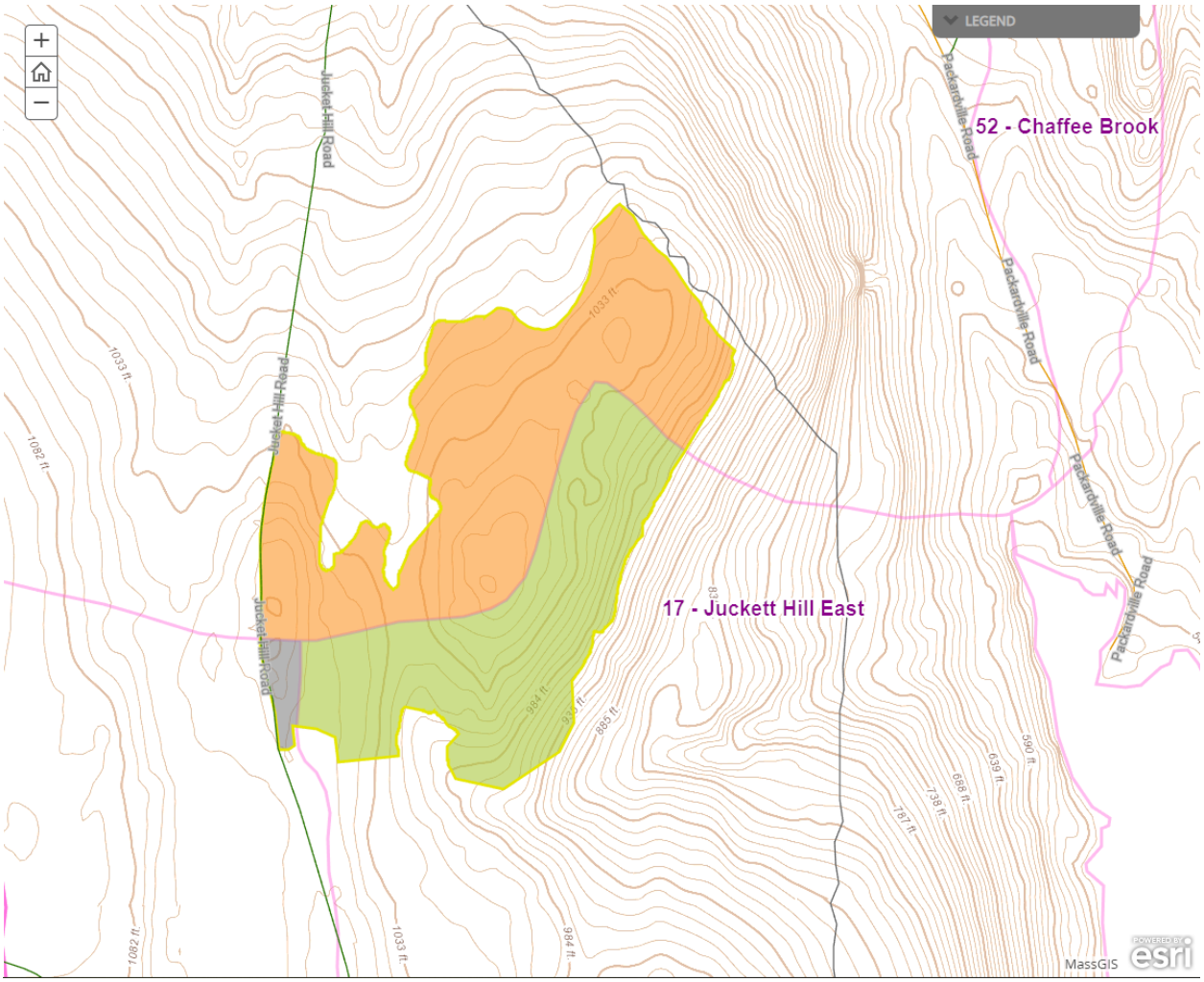
Prior to harvest 20 permanent monitoring plots will be established within the chestnut oak stand and the adjacent expansion openings. Within the existing stand 16 plots will be place randomly, with an additional 4 placed within the expansion openings. Overstory will be sampling will be determined with a BAF 10 prism, and three mil-acre plots will be established 12 ft from plot center 0, 120, and 240 ° for sampling seedling and understory composition. At 12 ft from plot center 60, 180, and 300 °, three six ft radius plots will be established for measuring the two tallest trees 1” < dbh < 5.5”. Sampling will be repeated the growing season after prescribed fire, and five years post fire. The fire return interval will be determined by the response of vegetation but a return of after 5-8 years is likely timeframe.



Subwatershed Analysis

Sub-watershed number	Total DCR-owned Acres	Acres Regenerated on DCR Land in the last 10 years	Acres Remaining for Regenerating Up to the 25% / 10 Year	Acres part of this proposal
60 (Cadwell)	1643	41	370	58
17 (Juckett Hill East)	551	7	131	42
61 (Gates Brook)	594	23	126	2

Proposed harvesting will not exceed the 25% threshold.



Harvesting Limitations

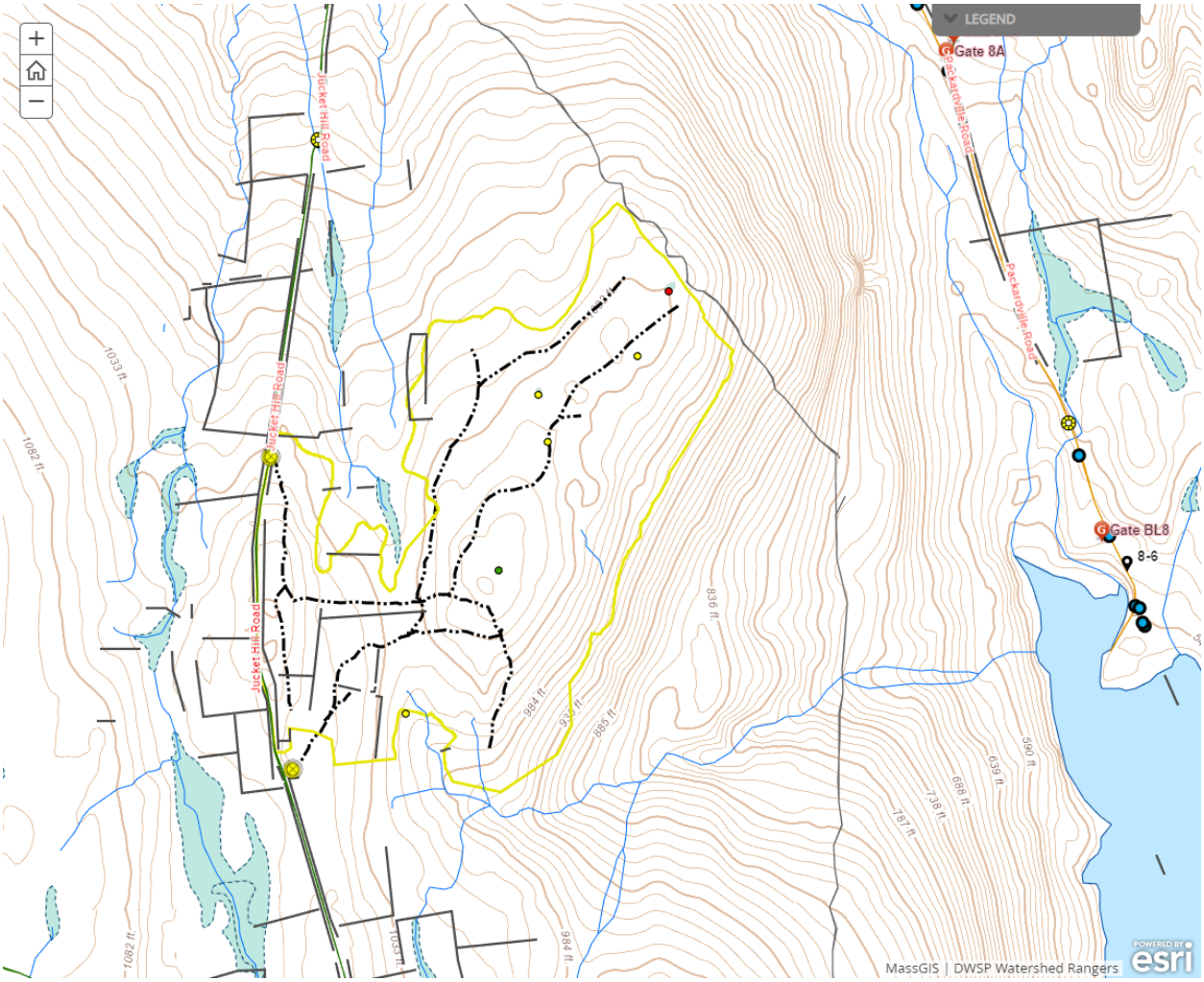
Forwarder required: **No**

Feller/processor required: **No**

Steep slopes present: **No**

Comments on harvesting limitations:

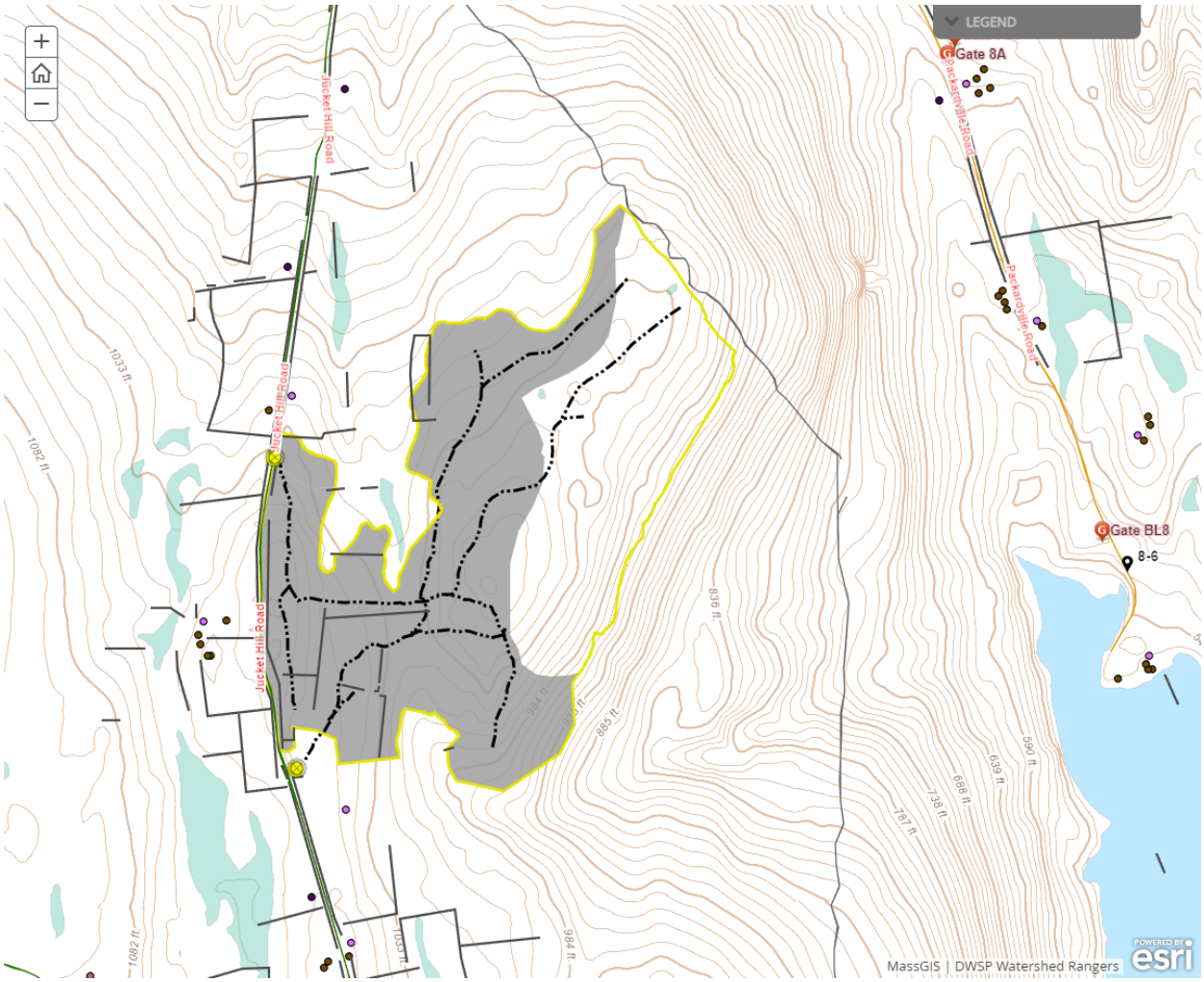
Whole tree harvesting will be required in the chestnut oak stand and in marked regeneration openings adjacent to the chestnut oak where prescribed fire is likely.



Cultural Resources

Comments on Cultural Resources:

Along Juckett Hill Rd the proposed area contains a foundation and there are walls throughout the roadside white pine stand, and the western portion of the white pine oak and white pine hardwood. Walls are conspicuously absent from the chestnut oak and white pine/oak stands of the southeasterly facing slopes, and the Quabbin Reservoir 'Taking Sheets' indicate that much of this area without stone walls was used as woodland. Much of the proposed area is described as 'woodland' in the Quabbin taking sheets.



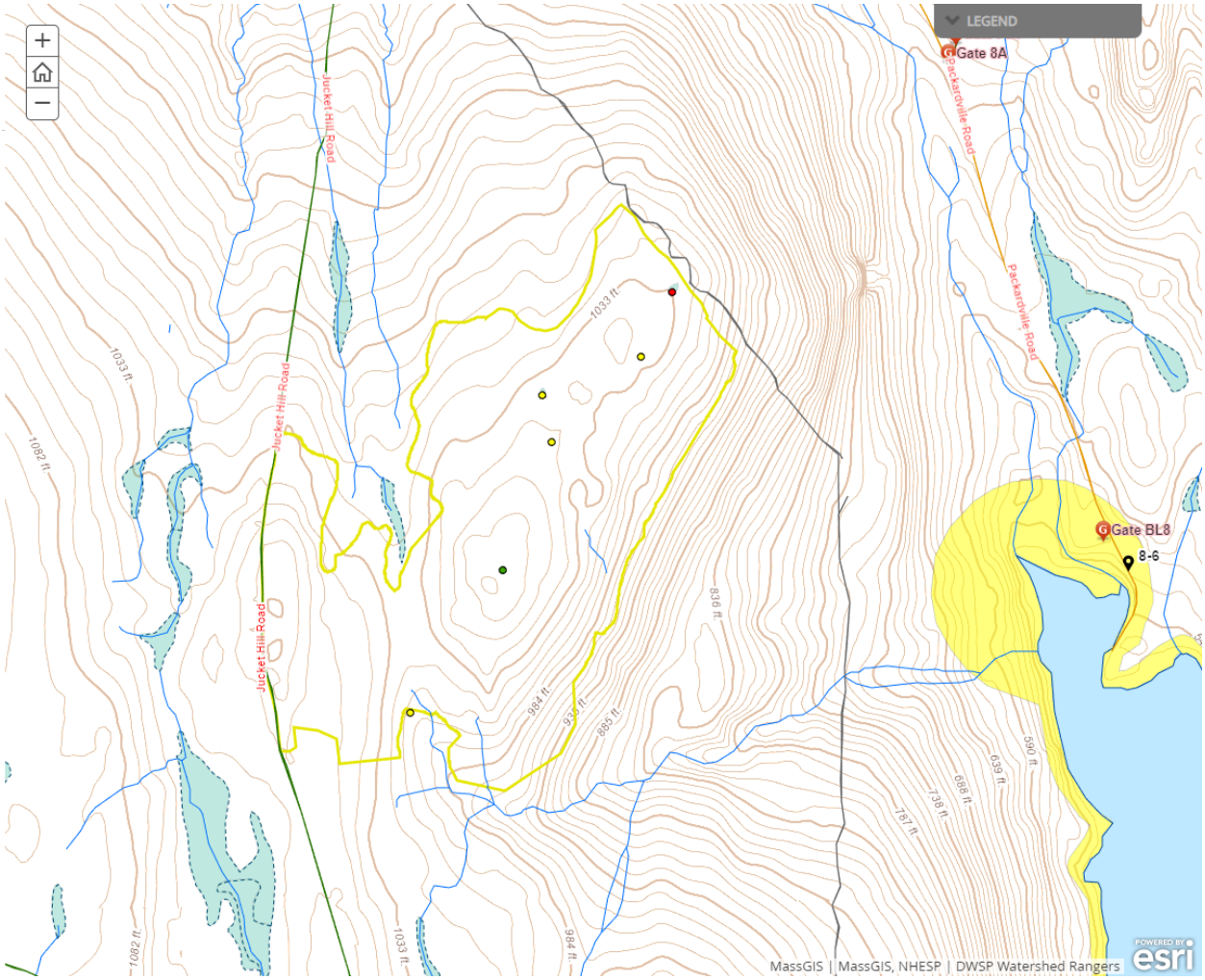
Wildlife Resources & Rare and Endangered Species

General Wildlife Comments:

Herbivore browse of woody plants is present, and the chestnut oak regeneration below browse height shows several years worth of browse and regrowth.

Comments on Rare Species/Habitats:

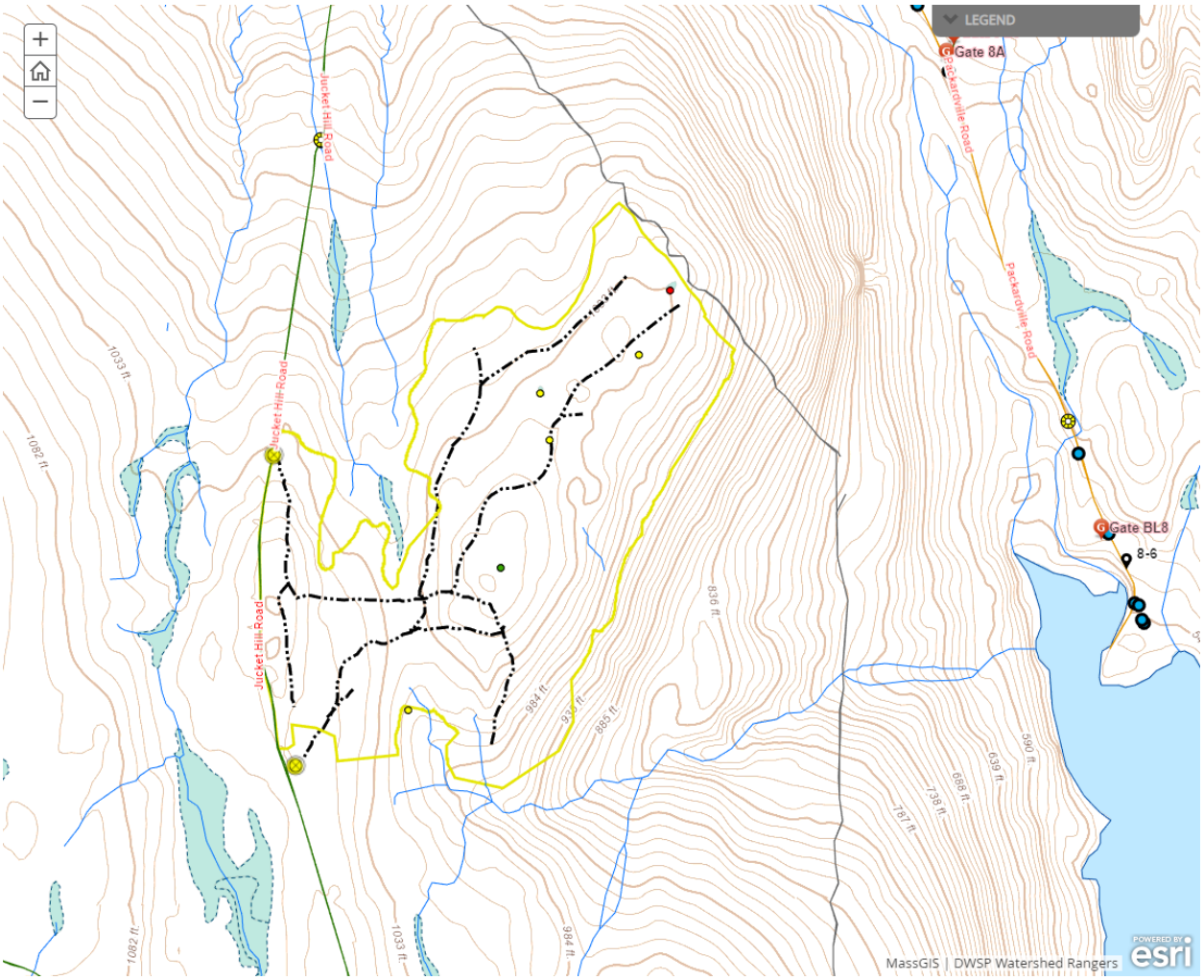
The chestnut oak stand understory is mostly dominated by a blueberry/huckleberry heath community with pockets of dense mountain laurel. The chestnut oak/heath forest is a statewide rare habitat. Avoiding management at this site is likely to result in the loss of this habitat type as eastern white pine and red maple regeneration begin to dominate the site.



Environmental Quality Engineering

Comments on EQ Issues:

There are no planned stream crossings, and no perennial streams are present within the proposed area.



Forest Access Engineering

Gravel needed: Yes

Landing work needed: Yes

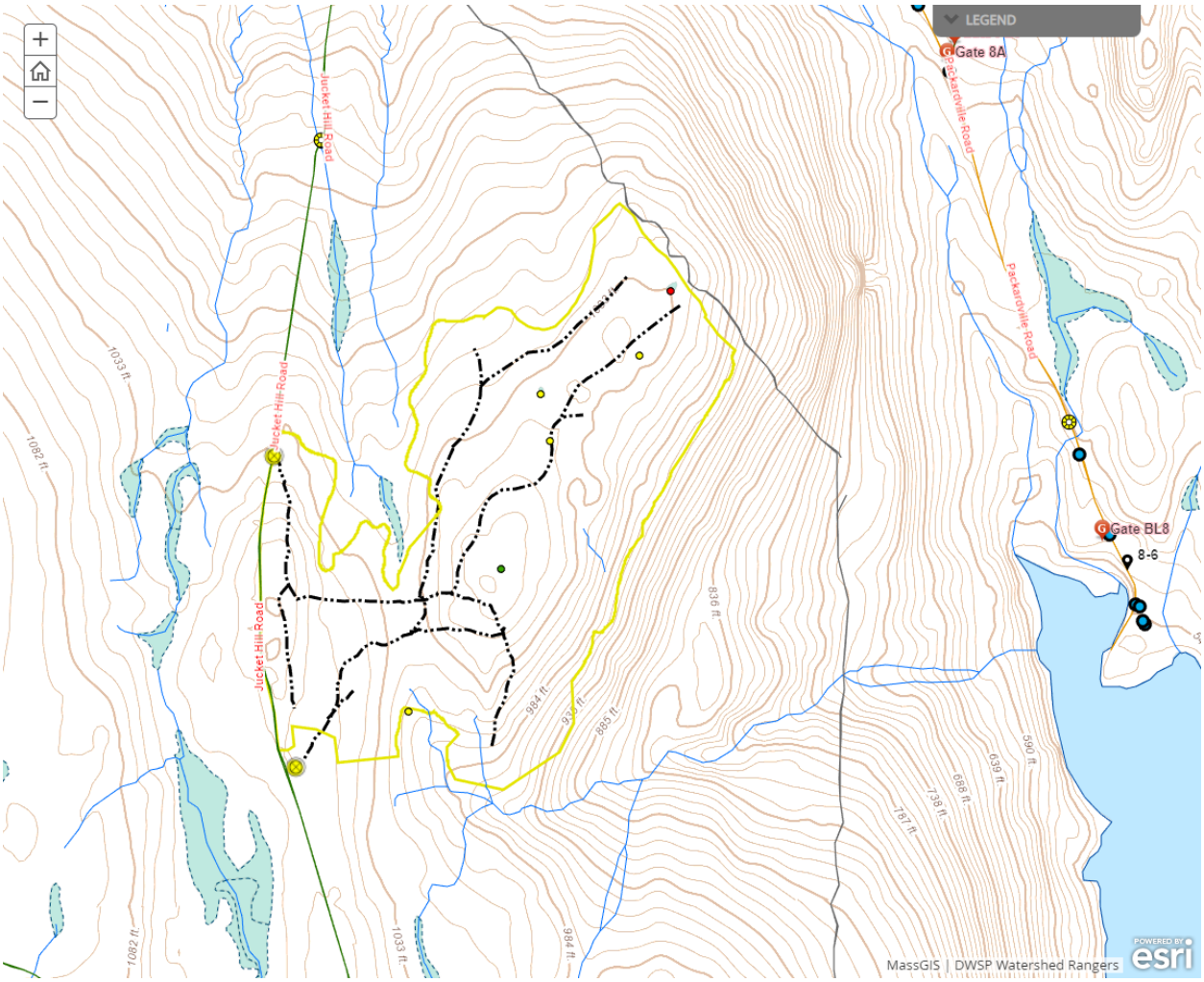
Culverts needed: No

Work needed on permanent bridges: No

Beaver issue: No

Further comment on access needs:

Some landing work and gravel will be needed to allow enough space to accommodate whole tree harvest. Access will be needed for a tanker truck for prescribed fire crews. While the harvester will be required to maintain the existing skid road leading to the chestnut oak stand, some material may be needed in places to allow access of prescribed fire equipment.



DWSP FY 2022 Forestry Proposals – Master Legend for story maps