

APPENDIX 6: Public Responsiveness Summary

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Introduction

The purpose of this document is to provide a summary of all public comments received during the Public Comment Period for the Worcester Range Management Unit (WRMU) Long-Range Management Plan (LRMP) and the Agency of Natural Resources (ANR or Agency) response to those public comments. The Draft Plan was released on December 1, 2023, and public comments were accepted between December 13, 2023, and February 2, 2024. Two public meetings were held on December 13 in Worcester and December 19 in Stowe. Additionally, ANR staff responded to questions from the public during the Public Comment Period.

The Agency received over 650 public comments on the Draft WRMU LRMP. All public comments received were reviewed, discussed and responses drafted by members of the Barre District Stewardship Team (DST). The DST is an interdisciplinary group of natural resource professionals from the Departments of Environmental Conservation (DEC), Fish and Wildlife (FWD) and Forests, Parks and Recreation (FPR), and is responsible for planning and management of lands located within the Barre District. When necessary, the DST seeks input from other ANR professionals.

Due to the large number of public comments received, and the fact that many of the comments had common themes and issues, the DST grouped the public comments by topic area and summarized the comment topic to capture the sentiment and issues raised. For that reason, commenters may not see their exact words below. This document organizes comments by themes and provides a response from the Agency to those comment themes. Where edits or changes were made in the WRMU Plan in response to comments, this is clearly stated. Also, many comment themes overlap and thus responses may overlap to other comment themes. ANR staff have attempted to cross-reference various responses rather than repeat in full all responsive statements for each response. A failure to cross reference each response does not mean that a given response or topic area is not applicable to another comment response.

Finally, some of the public comments received included legal arguments and issues. This Public Responsiveness Summary is not intended to be a forum to brief legal issues, provide legal interpretation or provide the Agency response to legal arguments raised by commenters. Rather, the Responsiveness Summary provides the Agency’s response to resource and land management issues on a technical and scientific basis. The Agency and DST staff comply with all applicable laws, rules, policies and procedures in drafting the WRMU Plan and proposing the various management proposals therein. To the extent that some legal issues raised may be addressed in a general manner, they have been included below.

Forests

Forest Management

A number of comments addressed forest management, in particular timber harvests, that were part of the plan. Before addressing specific comments related to forest management, an overview of the science and practice of forest management is provided at the end of the Public Responsiveness Summary in a section titled, *Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests*. We encourage readers to begin by reading this overview, as this information is referenced in the comment responses below.

Comment Theme 1. Timber harvested on state lands is de minimis and wood production should occur on private lands.

Economic gain is not the sole purpose of any harvest on state lands. Commercial harvests are designed and used as a tool to improve forest health, resiliency, diversify species and structure, and many other benefits (see *Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests*). Sustainably managed forests, while providing those benefits, can, at the same time, contribute high-quality wood products to our local economy. While the state provides a small percent of Vermont’s wood supply, it can be a meaningful amount of work in a rural economy and aligns with FPR’s mission to support the working forested landscape. Over the past two main operating seasons (2022-2023 and 2023-2024), there have been at least 17 sales engaging 26 contractors employing 33 people in four of our five districts. This is a conservative estimate. For example, it generally excludes trucking, site prep, timber stand improvement, and other related aspects.

Many harvests also incorporate a donation to the Woods Warms initiative. Wood Warms partners with Vermont’s state-owned lands, utilizing responsibly harvested timber to promote forest health and resilience. We enhance sustainability by incorporating Wood Warms donations into planned harvests, benefiting both the environment and local communities. This harvested wood is then processed and distributed to local organizations specializing in providing heating assistance to Vermonters in need. These organizations, in turn, ensure that the firewood reaches the homes of those who require assistance staying warm.

Another benefit of silviculture on state lands is an opportunity to participate in research studies or provide demonstrations that can help guide forestry on private lands. As we navigate challenges such as climate change, invasive plants, insects, etc. it becomes increasingly important to have a land base where we can conduct research and foster climate adaptation to better inform management practices. Since we are not focused solely on timber production, we can participate in experiments that help advance the field of sustainable forestry. As on other ANR lands, the WRMU provides space to conduct research experiments in collaboration with partners, like the University of Vermont, focused on climate adaptive strategies to add resilience to the landscape and provide demonstration sites for landowners, forest managers, and other stakeholders.

Lastly, as discussed in more detail elsewhere in this document, producing high-quality timber is generally an outcome of the type of active forest management used to achieve the goals of the WRMU because active management promotes the continued establishment and growth of healthy trees of many native species. Thus, producing high quality timber often aligns with many other management goals, such as managing for carbon sequestration and storage, forest

health, and more. Past management in much of Vermont's forests included high grading, which removed the largest, most vigorous trees and left the forest in a more vulnerable position. While FPR can reinvest revenue from timber harvests directly back into land management, financial considerations are not the primary driving force behind these management decisions.

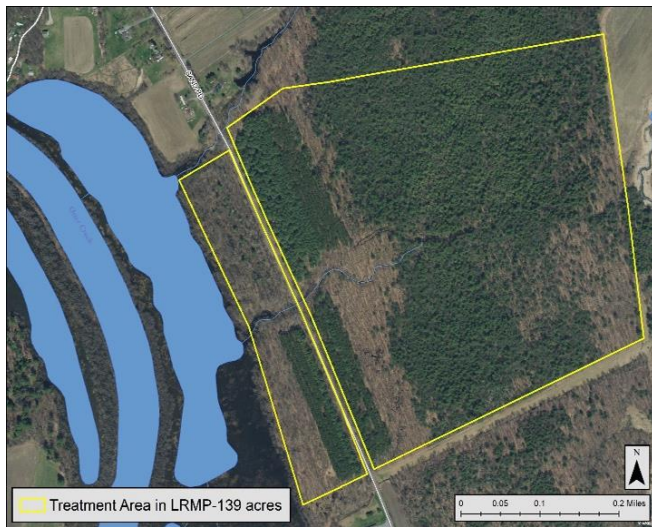
Once a LRMP is approved that identifies an area for timber harvesting, a commercial harvest goes through an extensive review process by many professionals from within ANR. There are many steps to moving a harvest forward on state lands that private lands are not required to go through, including review by the Division of Historic Preservation, biologists and ecologists, and other environmental specialists. Commercial harvests on state lands are done with the highest level of scrutiny and, therefore, while the percentage of total wood is small, wood from state lands is sustainably produced and done in such a way to improve the forests for the future.

Comment Theme 2. Concern and/or perception that all trees within the timber harvest treatment areas depicted on the maps will be cut and that sensitive areas within those areas are not being considered.

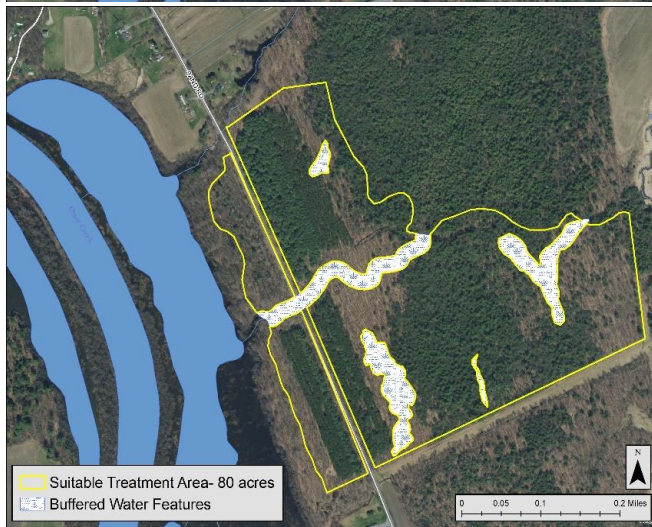
The treatment areas depicted in Map 42: Timber Harvest Implementation of the Plan represent an area that will be further analyzed and assessed for a range of factors before forest management operations begin. A full description of this process can be found on page 169 of the plan. This site-specific analysis may identify several reasons to exclude certain portions of the area from harvesting, often resulting in a smaller area of actual tree cutting when the harvest is implemented than is shown in the LRMP. Some examples of features that could be excluded from a proposed harvest area after site-specific analysis include historic structures or archeological sites, riparian buffers and wetlands, the presence of rare, threatened, or endangered plants or species, vernal pools, or areas of forest where the current size and distribution of trees don't warrant cutting according to current silvicultural guides.

Based on the results of the site-specific analyses, FPR foresters then select the appropriate silvicultural strategy to achieve the management goals identified in the LRMP for those areas that are deemed suitable for operations. The silvicultural strategy and the goals determine the nature of the tree cutting in any given treatment area. This can range from selectively cutting single trees, to creating small openings by cutting a group of trees, to cutting larger groups, patches or areas of trees to spur vigorous regrowth of a new generation of trees. The selection of the silvicultural strategy, and thus the nature of the cutting, includes consideration of the resource analyses and assessments discussed above, and thus, sensitive areas will be avoided in proposed timber harvest treatment areas. The amount of live tree retention and the resulting appearance post-harvest will depend on the silvicultural strategy and goals of the harvest.

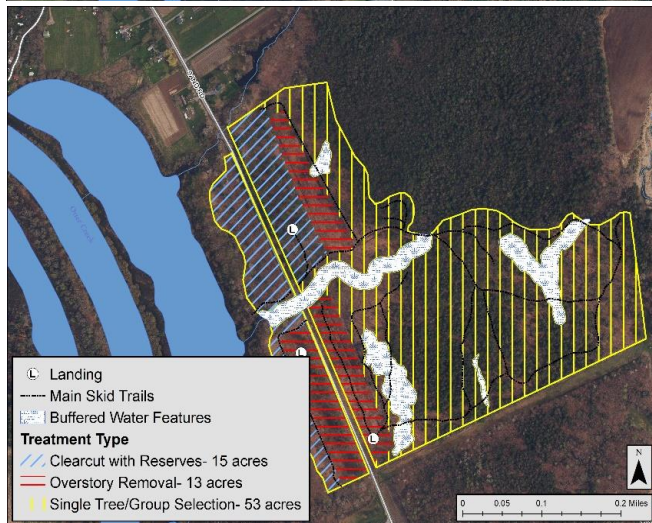
Combined, the process of narrowing down the overall treatment area through site reviews and selecting the right silvicultural treatments based on the management objectives results in a much more detailed timber harvest plan and map than what is shown in the LRMP. The figure below gives an example of the timber sale development process from the Lower Otter Creek Wildlife Management Area. The process of review and assessment of the area prior to the timber harvest resulted in a more refined and specific silvicultural treatment that fully considered existing natural resources.



This is the treatment area as depicted in the Long-Range Management Plan. This area was selected based on the goals of the plan and the general inventory and assessments done during the planning process.



A more detailed site-level inventory and review excluded the northeast portion from cutting, identified water features that would be avoided, and developed more detailed boundaries for cutting stands based on the conditions of the forest stands. The imagery underneath shows the forest cover prior to the harvest.



Treatment types were selected based on the site-level inventory and goals of the plan and then implemented. All trees were cut in the blue hatched area, the overstory of mature trees was removed to release the understory in the red hatched area, and individual trees or small clusters were cut in the yellow hatched area. The areas between weren't cut at all, and no cutting occurred in the water feature buffers. The imagery underneath shows the forest cover after the harvest, reflecting this variation in the nature of tree-cutting across the treatment area.

Comment Theme 3. Timber harvests, including creation of young forests, and ATV use will increase the spread of invasive plants and insects onto state land.

It is well established that vehicles can play a role in dispersal of invasive plants.⁷⁵ However, ANR implements specific controls to ensure timber harvesting on the WRMU will not lead to an increase in invasive plants and insects.

The harvest design/implementation phase of a timber harvest is often the best time for ANR staff to locate invasive plant populations and develop a control plan to reduce or eliminate invasives in the area as part of the treatment. These inventories and control efforts occur on most of our harvests. In addition to these efforts, all logging and earth moving equipment are required to be cleaned and inspected prior to moving on to state land to avoid spreading invasive plant material and/or seed. Any mulch used during close out is required to be seed-free straw. And finally, following a harvest operation, FPR continues to monitor and treat any lingering invasive plants on site. These common practices are consistent with best management practices for preventing introduction and spread of invasive plants from forestry operation.⁷⁶

Authorized ATV use is unlikely to be a vector for invasive plant dispersal on state lands due to existing policies and practices. ATV use is prohibited on state lands by statute as reflected in FPR Policy #1: *All Terrain Vehicles (Motorized)*, FWD rule CVR 12-010-062 and ANR's *Use of Mobility Devices on ANR Fee-Owned Lands by Persons with Mobility Disabilities Policy* (2015). Exceptions include access for emergency personnel for rescue purposes, management use by ANR staff and their designees, and users of other power-driven mobility devices for individuals with mobility disabilities. Thus, there is limited, or no ATV use on State lands that will serve as a vector for invasive plants.

Regarding invasive pests and pathogens of trees, the primary method of dispersal for many pests and pathogens is human movement of infested material. ANR land management activities adhere to all regulations for movement of material infested with invasive pests or pathogens including 6 V.S.A. § 1035, and follow [slow-the-spread guidance](#) for emerald ash borer to further reduce likelihood of accidental spread. Novel invasive pests and pathogens are detected and monitored through extensive surveying and monitoring by FPR Forest Health specialists and their partners who identify and respond to invasive pest occurrences on and off state lands and provide guidance and advice on management practices to prevent further spread. For these many reasons, harvesting on state lands will not contribute to the movement from or to state lands of invasive pests or pathogens.

⁷⁵ Ansong M., Pickering C. 2013. Are Weeds Hitchhiking a Ride on Your Car? A Systematic Review of Seed Dispersal on Cars. PLoS ONE 8(11): e80275. <https://doi.org/10.1371/journal.pone.0080275>, and Kahn, I., Navie, S., George, D., O'Donnell, C. and Adkins, S.W. 2018. Alien and native plant seed dispersal by vehicles. *Austral Ecology*, 43: 76-88. <https://doi.org/10.1111/aec.12545>.

⁷⁶ For example, LeDoux, C.B. and D. K. Martin. 2013. Proposed BMPs for Invasive Plant Mitigation during Timber Harvesting Operations. Gen. Tech. Rep. NRS-118. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 12 p. <https://doi.org/10.2737/NRS-GTR-118>.

For more information regarding strategies for invasive species monitoring and control, please see Section IV (E): MONITORING AND EVALUATION- Invasive Exotic Species within the LRMP.

Comment Theme 4. Cutting trees is mainly done to generate revenue for the state. The harvests planned in this LRMP will not benefit the Worcester Range but will do damage to the forests and to the state.

Timber harvests on state land and in the WRMU are developed purposefully to avoid damage to forest health, mitigate future forest stressors, and are never planned solely for financial returns (see Comment Theme 1). Commercial harvests can be used as a tool to diversify species assemblages, age classes, and forest structure which can contribute to improving forest health, increasing resiliency, and producing a broad range of ecosystem services one of which includes sustainably produced forest products.

ANR uses the science and practice of silviculture to manage its forests sustainably. Silviculture uses scientific understanding of forest ecosystems to guide decisions on vegetation management to achieve long-term goals such as increasing species and size diversity. When achieving a management goal calls for intervention based on silviculture and forest science, various tools are used to implement that management. The tools include commercial timber harvests, which generate revenue for the state; non-commercial timber harvests, which incur costs to the state; and non-commercial vegetation treatments, which also incur costs. This last category can involve a wide range of actions, such as invasive plant control, crop tree or mast tree release, tree regeneration treatments, and hazard tree removals. The practices used to meet the goals and objectives of the LRMP are selected and applied based on conditions on the ground, forest science, and silviculture. Please see, *Additional Information: Active Forest Management as a Tool to Increase Climate Resilience* in our Forests for more details around forest health and sustainable forest management strategies.

While some non-commercial treatments are difficult or impossible to implement due to costs, commercial timber harvests are never planned solely for financial returns. When there are financial gains from commercial timber harvests on state forests, the money is directly reinvested into state lands. Revenue from commercial harvests on State Forests goes into ANRs Land and Facilities Trust Fund. This fund is used to pay for a variety of beneficial projects, including State Park infrastructure work, the creation of accessible trails, other trail renovation projects, and non-commercial vegetation management like invasive plant control and brush hogging. Revenue from commercial harvests within State Parks goes into the Parks Special Fund, which is solely used for parks infrastructure projects. Revenue from harvests within Wildlife Management Areas goes into the Fish and Wildlife Fund, which is used for habitat improvement projects.

The process by which a timber sale is developed and reviewed is described in Comment Theme 2. Whenever forest management activities are planned, DST members identify opportunities not only for ecological protection, but also for ecological benefit. This happens in both the long-range management planning process and the harvest area analysis and timber sale development process. Forest management practices can create a greater variety of tree

species, size and density across the landscape, and spatial arrangement, leading to forest conditions that support a greater variety of birds, insects, bats, plants and other species.⁷⁷ This diversity also increases the resilience—or recovery following a disturbance such as drought or pest outbreak—by providing a more diverse mix of tree species and sizes that together help a forest have more recovery pathways in response to climate change.⁷⁸ See the section "Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests", for more information on how harvesting supports forest health and resilience. See also the following pages in the WRMU plan.

- Table 29 for a list of specific ecological benefits of treatments.
- Page 135, for a complete list of the land management strategies ANR will use within the WRMU.
- Climate Change Adaptation Strategies through Forest Management on page 148, for a complete list of climate adaptive management strategies ANR will use within the WRMU

Comment Theme 5. We should not log on State Land. State lands should be managed using passive management instead of active management.

State lands are to be managed for multiple uses according to Vermont statute, and on FPR lands management should “promote and protect the natural, productive and recreational values of such lands, and provide for multiple uses of the lands in the public interest” (10 VSA 2603). It is also our mission to monitor and maintain the health, integrity and diversity of important species, natural communities, and ecological processes. Many of Vermont’s forests are recovering from past-use history, such as extensive clear cutting, farm abandonment, or high-grading (a common, historic practice that involved removing the best trees and leaving the rest). As a result, the forests we see today are often even aged (the dominant trees in the forest are all close in age), with many of the largest, most vigorous trees removed. Many lack snags (standing dead trees) and coarse, woody material (logs and branches in varying stages of decay on the forest floor). This condition can result in ecosystems lacking in diversity, structure, and resiliency. See "Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests" for more information.

⁷⁷ Messier, C., Bauhus, J., Doyon, F., Maure, F., Sousa-Silva, R., Nolet, P., Mina, M., Aquilué, N., Fortin, M.-J., & Puettmann, K. 2019. The functional complex network approach to foster forest resilience to global changes. *Forest Ecosystems*, 6, 21. <https://doi.org/10.1186/s40663-019-0166-2>, Puettmann, K. J., & Messier, C. 2020. Simple Guidelines to Prepare Forests for Global Change: The Dog and the Frisbee. *Northwest Science*, 93(3–4), 209. <https://doi.org/10.3955/046.093.0305>, Wikle, J. L., & D’Amato, A. W. 2023. Stand spatial structure outcomes of forest adaptation treatments in northern hardwood forests in North America. *Canadian Journal of Forest Research*, 53(9), 721–734. <https://doi.org/10.1139/cjfr-2022-0274>.

⁷⁸ Messier, C., Bauhus, J., Doyon, F., Maure, F., Sousa-Silva, R., Nolet, P., Mina, M., Aquilué, N., Fortin, M.-J., & Puettmann, K. 2019. The functional complex network approach to foster forest resilience to global changes. *Forest Ecosystems*, 6, 21. <https://doi.org/10.1186/s40663-019-0166-2>, Palik, B. J., & D’Amato, A. W. 2023. *Ecological Silvicultural Systems: Exemplary Models for Sustainable Forest Management*. John Wiley & Sons., Puettmann, K. J., & Messier, C. 2020. Simple Guidelines to Prepare Forests for Global Change: The Dog and the Frisbee. *Northwest Science*, 93(3–4), 209. <https://doi.org/10.3955/046.093.0305>.

Active management is a tool that can be used to address these issues by restoring diversity in age and species composition, and in some cases, passive management may fail to achieve the best ecological outcomes. Through commercial and non-commercial management, we can increase forest health and complexity and create a forest ecosystem that can better withstand the challenges of climate change, invasive species, and more. See "Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests" for more information.

There is no one-size-fits-all approach to forest management. We support a balanced approach, using **both passive and active strategies**, where appropriate. The draft LRMP identifies 9,961 acres, more than half of the management unit, as suitable for largely passive management. In other areas, our management strategies provide numerous benefits. For example, creating openings in the forest canopy can enhance wildlife habitat, and add tree species diversity and structure to the forest. In another example, we can use management to create old-growth characteristics in forests, such as adding large, dead wood to the forest floor, using crown thinning to promote growth of large trees, and using regeneration methods to create or maintain an uneven-aged forest.⁷⁹ This type of management can be used to accelerate the natural processes that take place in passive management, while being able to mitigate invasive plants, choose regeneration methods that promote many different species, and make site-specific decisions.

Our forests provide numerous benefits to the people of Vermont and require a diversity of management strategies. This balanced approach is a collaboration of numerous professionals, including wildlife biologists, ecologists, foresters, and watershed scientists. Active management on state lands is subject to an extensive review process and demonstrates exemplary forestry.

Comment Theme 6. There were some comments that forest management is focused in Worcester and not in Stowe. Additionally, some commenters expressed concern about the disproportionate impacts of trucking to one area or town. There were requests for more explanation of these decisions.

FPR does not decide the location of timber harvests based on what town the harvest may be prescribed in. Decisions about where timber harvests will occur are based on access, suitable ground conditions, slope, soil drainage, forest conditions such as health of the forest, species composition, stand age and forest structure, soil characteristics, information on forest product quality and distribution as well as wildlife habitat considerations.

An analysis of proposed timber harvests shows percentages of harvest acreages prescribed in the three towns with the largest acreages of land within the WRMU are relatively equal – Worcester at 12.6%, Middlesex at 11%, and Stowe at 8.5%.

⁷⁹ Urbano, Andrea & Keeton, William. 2017. Carbon dynamics and structural development in recovering secondary forests of the northeastern U.S. *Forest Ecology and Management*. 392. 21-35.
<https://doi.org/10.1016/j.foreco.2017.02.037>.

It is true that there are more harvests prescribed on the eastern side (Worcester and Middlesex) of the Worcester Range compared to the western side (Stowe) of the Worcester Range. This would be expected as a total of 9,234 acres of the 18,772-acre WRMU lies in the town of Worcester (49%), compared to 4,088 acres, or 22%, in Stowe. The acreages of the other three towns in which the WRMU is located is as follows: Middlesex (2,807 acres or 15%), Elmore (1,831 acres or 10%), and Waterbury (812 acres or 4%). The three towns on the eastern side of the Worcester Range - Worcester, Middlesex, and Elmore - comprise 13,872 acres or 74% of the unit compared to 4,900 acres or 26% in the towns of Stowe and Waterbury on the western side of the Worcester Range.

There are 12 timber sales scheduled on 1,928 acres over the 20-year life span of the LRMP for the WRMU. The average size of these prescribed harvests is 161 acres, ranging in size from 74 acres to 298 acres. The table below shows the breakdown by town. See Table 33: Commercial Vegetation Management Schedule (2025-2045) on Page 172 of the Plan for the details of individual treatments.

Town	WRMU area in the town (acres)	# of treatments	Total treatment area (acres)	Average treatment area (acres)	% of WRMU acres in town identified for treatment
Worcester	9,234	5	1,172	234	12.6%
Stowe	4,088	3	375	125	9%
Middlesex	2,807	3	307	102	10.9%
Elmore	1,831	1	74	74	4%
Waterbury	812	0	0	0	0%

Also, an additional 2,250 acres of land have been added to the WRMU since 2019 through land acquisition. The majority of this acreage, 1,877 acres (83%), was added to the eastern side of the Worcester Range.

To address concerns about trucking in areas of proposed timber activity, the schedule of prescribed timber harvests (Table 33) has been adjusted to space harvests out more evenly to not have trucking occurring over an extended period of time in one area. Further discussion of forest products trucking can be found in Comment Theme 28.

Comment Theme 7. Why is the state spending large amounts of money subsidizing the timber industry?

ANR does not subsidize the timber industry through its forest management and timber harvesting. Inventory data collected as part of harvest development (see Comment Theme 2) is used to quantify volumes and expected forest products on sales to inform potential contractors about what is in the harvest area, and standard minimum pricing is applied to those volumes to set a minimum required bid for the contract.

Comment Theme 8. Who is being hired to do the logging and processing?

To ensure the best outcomes and operations on a timber harvest on state lands, an independent contractor is selected through a competitive public bid process, in compliance with Agency of Administration Bulletin 3.5. FPR prioritizes transparency and fairness by clearly defining sale boundaries, trees for harvest, and harvesting guidelines and requiring attendance at a bid showing for all bidders. Following these procedures, timber harvests are executed efficiently and at the best price possible. See <https://fpr.vermont.gov/forest/state-forests/forest-management-timber-harvests-state-lands> for more information.

Comment Theme 9. Concern that the Plan only allows for timber harvesting in 10% of the WRMU over a long period of time. Given the benefits of timber harvesting to the WRMU ecosystem, and the public, and its compatibility with many of the other planned uses, increasing the amount of area that is under active management, at the discretion of the DST, would be a prudent amendment to the plan.

The DST considered multiple factors in determining the proposed amount of timber harvesting for the WRMU, as described in Comment Theme 4. Additionally, current staffing levels and other work demands requires balancing vegetation management with other management activities. There is a balance that must be struck between meeting landscape level management goals and prescribing an achievable amount of work based on existing staffing levels.

Comment Theme 10. The next draft of the plan should include details on the intended prescriptions for the stands, including descriptions of the current and desired future conditions based on the inventory table, and how the intended treatments will promote that desired future condition.

In response to this feedback the Site-Specific Forest Management Activities section (page 170) was edited for clarity and additions were made to Table 33 (page 172), which now includes primary and secondary management objectives for each of the planned treatments that speak to desired future conditions for those stands. Detailed prescriptions are not developed for LRMPs, as the LRMP is intended to establish overarching management goals that serve as the foundation for developing detailed prescriptions. See Comment Theme 2 and Comment Theme 4 for more information on how LRMPs and prescriptions are connected.

Comment Theme 11. How much timber will be harvested?

This LRMP does not pre-determine how much timber will be harvested on a scheduled treatment. Through the planning process, ANR selects the areas scheduled for timber harvest analysis, as well as the vegetation management goals and objectives. During the implementation phase, the DST plans out the harvest based on these goals and objectives combined with conditions on the ground (see Comment Theme 2 for more information on this process) to develop a detailed harvesting prescription. It is at this time that the amount of timber to be harvested in a treatment is determined based on the trees that will be cut to achieve the management goals for the stand.

Comment Theme 12. If both logging and recreation are compatible with Land Management Classification 3.0, why is there only logging (and no recreation) proposed in the parcels on the east side of the range?

Additional recreation trails or alterations to existing recreation trails were not identified as goals on the east side of the Worcester Range because our recreation assessment did not identify a need here. The recreation assessment evaluates public demands for existing and new resources, existing infrastructure and tradeoffs between recreational and natural resource considerations. The recreation assessment did not identify highly impacted trails with parking areas unable to accommodate average parking demand in this area, nor has FPR received requests from the public for additional infrastructure in this area of the WRMU (please see page 99 of the Plan for more information about the recreation assessment). New trails and existing trail adjustments have been focused on areas where user impacts threaten the resource or where new acquisitions have occurred with previous concentrated recreation use that would benefit from more proactive management. FPR's focus on the trail network on the eastern side of the range is to continue managing the existing resource, improve the sustainability of trail infrastructure, and monitor use and trail infrastructure conditions. See Comment Theme 6 for more information about the geographical distribution of timber harvests in the WRMU.

Comment Theme 13. How many more parcels will be proposed to be logged in future 20-year increments? After multiple 20-year management periods, what percentage of the WRMU will get logged?

The locations and extent of future harvests will be determined when the next LRMP is developed based on surveys and assessments of forest, wildlife, and ecological resources, as well as public scoping. It is not possible at this time to quantify a number of parcels or proportion of the WRMU that will be hypothetically treated in the future.

Comment Theme 14. Are there smaller-scale, lower-footprint options other than industrial scale logging that can achieve our management goals? One commenter suggested traditional harvesting by horses; another commenter suggested the use of hand crews.

To achieve the forest management goals of the proposed plan at the necessary scale and at a cost that the taxpayers can bear, commercial vegetation management is required. This means that the value of the products cut from a timber harvest can cover the costs of doing the cutting. While planning for vegetation management FPR will consider what types of equipment and harvesting methods are appropriate for each unit, meet the management objectives of the harvest, meet the environmental requirements, and meet any requirements or restrictions set by the Forester-in-Charge. Anyone who bids on a timber harvesting contract can propose methods that will meet the requirements or restrictions on equipment set by the Forester-in-Charge. If there are no restrictions on equipment, mechanized equipment is generally preferred by the contractor to make timber harvesting commercially viable. There are very few logging contractors using animal powered harvesting systems and the ones that do provide a very niche service. If FPR restricted all commercial harvest to this method, it would almost eliminate the ability to achieve the forest management goals of the Plan and the Agency in general.

ANR does consider whether an individual project may be achieved using hand crews rather than commercial vegetation management, and there are some instances where vegetation management is conducted with hand tools at a higher cost to the State. This most often occurs as a "non-commercial vegetation management" project. The costs of this type of work can

range from \$300 to \$500 an acre for selective tree cutting for stand improvement and up to \$1,500 an acre for grinding work needed to maintain early successional habitat. This is compared to commercial timber harvests which usually result in net payments to the state that can be reinvested in land management that improves forest condition and provides public access and recreational opportunities.

A number of edits were made to Section IV detailing other vegetation management approaches that will be used on the WRMU, complementing commercial vegetation management. An edit has also been made to Section III.D of the plan to indicate that the access and operability considerations refer primarily to viable *commercial* vegetation management.

Comment Theme 15. While timber harvest is assumed to occur on nearly every acre where it is not considered infeasible because of site constraints, it is not clear whether timber harvest is appropriate in all these areas without any kind of stand assessment. The State would do well to conduct a site-specific resource assessment before determining the location of timber harvests and codifying those assessments in the Plan.

It is not accurate to assume that timber harvests will “occur on nearly every acre where it is not considered infeasible because of site constraints”. As part of the assessment process in developing the LRMP, many areas are excluded from further consideration of timber harvest for other reasons such as the presence of sensitive natural or cultural resources, special habitat features, important landscape features, etc. Of those areas where general conditions are compatible and management goals can be achieved with timber harvests, detailed, site-specific assessments do occur on all areas scheduled for vegetation management, however, this level of analysis does not occur during the LRMP development process and is therefore not included in this plan. Detailed stand assessments are not developed for LRMPs, as the LRMP is intended as the guiding document that serves as the foundation for defining the management goals. The stand assessments provide the detailed information needed by ANR staff to outline and identify the specific management approach (e.g. silvicultural prescription) to achieve the LRMP management goals. See Comment Theme 2 and page 170 in the plan for additional information.

Comment Theme 16. One commenter noted: “Under FPR ownership only three harvests have occurred to date within the Burt Hollow Block, covering 201 acres. The former Storey parcel was a working forest and managed by the previous owner for forest products.” This would make it appear that this unit is available for harvest and likely having stand and access conditions that would support future timber harvest. It is unclear why this unit is not considered for active management. We encourage the State to look more closely at the available management options for this Block.

Treatment areas 8 and 10 are located within the former Storey parcel and are currently scheduled for commercial management during the planning cycle of the LRMP. Please refer to the Management Strategies and Actions section in the LRMP for further details about these two areas.

Comment Theme 17. One commenter noted: “The Perry Hill Block is described as having infeasible access, though it is not clear what makes this so since the block has previously had timber harvests using the existing road and access. We would encourage the State to consider active management to address the serious red pine decline occurring on this block. This may

or may not include timber extraction, and that decision should be made based on site constraints and resource goals.”

The Agency’s current access to the Perry Hill Block is very restricted. The only road access consists of a narrow roadway that passes through a small tunnel under the interstate highway that is too small for current-day log trucks to navigate. Historically, the State owned the parking area which could be used as a landing and used smaller trucks to access the site for timber sale, but neither of those are options today. There is also no developed landing area on the parcel nor is there a place to create one due to the topography of the site. These constraints make active management where wood products are extracted unlikely unless other means of access are found. Although no commercial activities are planned during the LRMP, non-commercial activities to address the red pine decline can and will be completed as funding, opportunity, and resource conditions allow when compatible with the LRMP. For example, FPR has identified an area where forest stand improvement will be conducted by Agency personnel during chainsaw training events to meet the goals and objective of the LRMP. FPR is also managing the risks associated with the red pine decline and their proximity to the recreation trail network.

Comment Theme 18. It is my opinion that Vermont should harvest more on state lands. It would help mitigate blow downs and create better wildlife habitat.

ANR works to balance the many benefits that forests and forest management can provide. Part of that balancing effort is to utilize both active and passive management strategies. While less than half of the WRMU is classified in a way that allows for commercial timber harvests, all these acres were analyzed and considered for treatment based on the overarching natural and cultural resource goals of the LRMP. After extensive review, ANR has determined that the final forest management implementation schedule appropriately balances all the goals and objectives of this LRMP. See Comment Theme 4, Comment Theme 5 and Comment Theme 47, as well as the Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests section for additional explanation.

Comment Theme 19. One comment noted: “Each of the 12 planned commercial vegetation management treatments included in the draft LRMP describe the use of uneven-aged silvicultural systems. This approach is highly supportive of developing a compositionally and structurally diverse forest condition over time. The General Strategies and Tactics presented on page 124 of the plan include examples of even-aged silviculture; regular shelterwood, seed tree, and possibly, patch cutting (depending on definition). We recommend removing these even-aged systems from the list of options and replacing with examples such as those provided in *Silviculture with Birds in Mind (Audubon VT and VT Dept. Forests, Parks, and Recreation 2011)* and *Ecological Silviculture: Foundations and Applications*.⁸⁰”

Given the current conditions and history of the forests found within the WRMU all basic traditional silvicultural systems are listed as available to meet the goals and objectives of the plan. Text on page 132 was added to clarify the range of silvicultural systems and examples of when they might be used, and the Implementation Schedule on page 172 includes additional

⁸⁰ Palik, B. J., D’Amato, A. W., Franklin, J. F., & Johnson, K. N. 2020. *Ecological Silviculture: Foundations and Applications*. Waveland Press.

details on general goals for each treatment that will inform the selection of silvicultural techniques. While the above referenced documents are relevant and contain techniques and variations that will be used to reach a portion of our goals and objectives, ANR does not feel it is necessary to restrict silvicultural options at the broad planning level to techniques that favor specific objectives as ANR manages for a wide range of goals and objectives.

Comment Theme 20. One comment noted: “Gap sizes can be variable in ecological/uneven-aged silviculture, ranging from 1/10 acre up to 2 acres. Gap sizes >1 acre, particularly when multiple gaps occur within a small area, are likely to move structural conditions from closed-canopy mature forest to open-canopy young forest. While a component of young forest on the WRMU is deemed appropriate... we recommend the majority of gap sizes to be <1/2 acre in size to better align with natural process dynamics of the matrix northern hardwood forest type.”

Given the current conditions, size of parcel and history of the forests found within the WRMU restricting canopy openings at this broad planning level could prohibit ANR from meeting the goals and objectives of the plan. Canopy opening size will be determined at the sale development stage when a silvicultural prescription is developed to address site specific goals and objectives (see Comment Theme 2 for more information on this process). Many factors are considered when making this decision and include desired tree species to regenerate, specific wildlife habitat required, existing condition of the forest, browse pressure, location on the landscape, and aesthetics.

Comment Theme 21. One comment noted: “We appreciate the incorporation of timing of silvicultural treatments, winter vs summer, to support other management goals such as water quality protection, desired species for regeneration, and reducing conflict with recreation. We encourage the added consideration of harvesting impacts to nesting songbirds. When and where possible we recommend harvesting outside of the primary breeding season (May-July).”

Each proposed timber sale area is reviewed by experts from across ANR following the timber sale development process (see Comment Theme 2). If a resource concern such as impacts to nesting songbirds is identified through the Annual Stewardship Plan review and subsequent resource reviews, the prescription is modified to address the concern.

Comment Theme 22. One comment noted: “Since forest inventory data and site visits have been conducted, we suggest amending the LRMP to provide more detailed information about age classes and forest composition and condition. We would value the opportunity to comment on this information, especially if another round of public comment is afforded.”

The previous draft of the LRMP included data in Appendix 2 on forest cover types and comparisons of acceptable growing stock to unacceptable growing stock by stand, outlining forest composition and condition information. Additional summary of the data to generate information about age classes of stands and more detailed species composition breakdowns would not change the assessment of the forest resource and the management strategies in the LRMP, so we have not added the requested information to the Appendix in the updated LRMP.

Comment Theme 23. One comment noted: “We understand the ability of timber harvest to create species and age class diversity within forested areas, and if this is the intent behind the harvest activities, we would encourage the State to describe the desired future conditions for the unit including the distribution of age classes or forest developmental stages to ensure that harvest planning will promote that desired condition.”

The decisions about what stands to treat are based on the individual stand conditions found during the forest resource assessment and the considerations outlined above following existing silvicultural guides. Creating age and species diversity is one of many goals in the treatments, and these are included because they are generally aligned with improving forest health and climate resilience, rather than because they move the entire WRMU towards a specific desired age and species diversity condition by forest type at a landscape scale. ANR agrees that this could be interesting and useful information to first assess and then set targets against and will consider this suggestion in future discussions around planning, but this is not the approach currently used in determining stands for treatment on ANR lands.

Forestry Operations

Comment Theme 24. Comments asking for more information about road infrastructure management/planning.

No new additions to the State Forest Highway (SFH) system are planned within the WRMU during the lifecycle of this plan. The current road infrastructure meets our management and public access needs. Additional information on the management, creation and closeout of road infrastructure was added into the LRMP and can be found in the Infrastructure and Access section of the plan, as well as within Table 25: WRMU Access Road Information: Maintainer, Length, Needs.

Maintenance and upgrades to the existing road infrastructure will continue across the WRMU throughout the life of the plan as need and funding allows. General maintenance work includes annual tasks of cleaning ditches and culverts, removal of hazard trees, and maintaining waterbars where applicable. Roadside vegetation is maintained as needed (typically every three years) by mowing, tree cutting, and mastication. Road surfaces are maintained as needed by grading, shaping, smoothing, and re-surfacing to ensure the roadway maintains positive drainage. Larger projects such as road infrastructure improvements are completed based on need and funding.

In 2022, the road infrastructure of the WRMU was inventoried to establish baseline conditions and identify priority areas where improvements could be made to bring the roads into compliance with Vermont’s Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont (AMPs), improve road resiliency during storm related events, reduce sediment movement, and improve water quality. These projects can consist of replacing undersized culverts, disconnecting roadside ditches from discharging into streams, installing ditch relief culverts, and resurfacing/re-grading road surfaces where erosion is present.

Comment Theme 25. One comment noted: “It is not clear to us if new road construction is anticipated as part of vegetation management on the LRMP. We do not support the

development of new permanent roads that could fragment the forest, and we have an overall concern for how proposed treatment areas will be accessed in areas where there are no roads. For example, how will skid roads be designed and laid out and how will these areas (some well above 1,500 ft and on steep slopes) protect small, high gradient, cold-water streams? We have a specific concern related to wetlands off Bear Swamp Road, and headwater streams off of Brownville Road (nine headwater streams originate within proposed harvest area). If new roads are proposed, which we do not support, the public should have the opportunity to weigh in on the proposed location and extent of roadbuilding.”

All management roads on State Lands are classified as State Forest Highways and are equivalent to “permanent truck roads” as defined in AMPs ([CVR 12-020-010](#)). Language was added to the LRMP to clarify that no new additions to the State Forest Highway system are proposed as part of the management plan and that the current infrastructure meets our management needs. Please see further discussion in Comment Theme 24.

Temporary truck roads and skid trails as defined in the AMPs are used to access logging operations, and must be properly constructed, sited, maintained and closed out according to the AMPs ([CVR 12-020-010](#)) and the Riparian Management Guidelines for Agency of Natural Resources Lands (VT ANR, 2015). The sufficiency of the existing temporary truck roads and skid trails to meet these requirements and guidelines as well as considerations around equipment types, seasonality of operations and terrain is assessed as part of the site-specific timber harvest development process. A full description of this process can be found on page 170 of the plan. Any skid trails or temporary truck roads constructed to accomplish the management goals of the harvest area would comply with all applicable regulations, guidelines, and policies. For more information about how the AMPs and the Riparian Management Guidelines intersect with protection of water quality please see Comment Theme 63 and Comment Theme 66.

Concerns about fragmentation associated with forest management activity are addressed in Comment Theme 55. Concerns about impacts of forestry operations to wetlands and headwater streams are addressed in Comment Theme 65 and elsewhere throughout the Water Resources section of the Public Responsiveness Summary.

Comment Theme 26. Has the State considered and analyzed the potential impacts of logging truck traffic on Middlesex Road infrastructure (including bridges) and community safety and wellbeing (dust, noise).

The state has not analyzed the potential impacts of truck traffic on road infrastructure or dust and noise. In response to several public comments, FPR evaluated the draft forest management activity schedule and how traffic may impact the road network and neighborhoods. The schedule was revised to reduce impacts to the greatest extent possible and avoid having treatment units operating consecutively to reduce the duration of trucking in any one community. In addition, FPR attempts to work with towns to manage interactions with other road users to the extent possible when conducting logging operations. More information can be found in Comment Theme 27.

Comment Theme 27. Concerns about road damage and heavy vehicle traffic in Worcester resulting from the transport of logging equipment, noting the presence of walkers, cyclists, and school buses. One commenter requested that the State communicate with the Worcester town road commissioner regarding heavy vehicle passage, provide remuneration for road repairs, and refrain from using heavy vehicles on the road during winter and mud season.

Truck traffic on public roads and highways (including truck traffic associated with forest management) is neither governed nor regulated by ANR. While conducting forest management activities does increase truck traffic during active operations, timber harvest contractors are required to abide by all applicable federal, state, and local laws. These laws govern speed, width, height and weight while on public roads and ensure that the trucks operate safely on the highway during all seasons and carry insurance. Forestry operations are generally inactive during times of year when public roads are not well equipped to support heavy machinery (e.g., mud season) to protect the forest resource and reduce or eliminate trucking on sensitive road conditions. In addition, FPR attempts to work with towns to manage interactions with other road users to the extent possible when conducting logging operations. Like any other user of a town road, ANR or contracted logging operators do not provide financial compensation to towns for use of town roads.

Comment Theme 28. How many logging trucks can we expect to see on our roads, what routes through our community will the lumber trucks take and how far is the lumber being transported?

ANR does not estimate the number of loads of forest products that may be harvested in a scheduled treatment during the LRMP development process. During the LRMP development process, ANR determines land management goals and objectives and the areas that will be analyzed for vegetation management treatments. Once the plan is approved, ANR follows the implementation schedule to develop projects, such as timber harvests. See Comment Theme 2 for details regarding the timber sale development process.

Comment Theme 29. Considering the large impact forest roads have on hydrology, we would encourage the State to conduct a more detailed inventory and assessment of roads on the Unit, and to prioritize projects based on that assessment.

FPR is currently conducting a Road Erosion Inventory of all State Forest Highways on state lands. This inventory identifies segments of roads that do not meet current AMP standards and provides information to help staff prioritize projects in terms of both water quality benefits and other considerations. See Comment Theme 66 and page 118 of the Plan for more details and information.

Forest Economy

Comment Theme 30. What forest products are being harvested?

Timber harvests on state lands have the potential to provide a full range of forest products. This can include veneer logs; higher-quality sawlogs that can be cut into boards; moderate-quality logs suitable for making posts and pallets; pulpwood that can be used to make paper, paperboard, packaging, tissue and sanitary paper, or composite materials; and fuelwood that can be processed into pellets, cordwood, or chips and used to produce heat and electricity for

residential, commercial, municipal, and institutional users. When State Lands Foresters set up a timber harvest, they mark trees for harvest based on their forest management goals, and tally the marked trees based on broad classes of sawlogs or pulp/pallet. Consistent inventory standards guide the tallying to provide a clear and consistent picture to potential contract bidders regarding estimates available for harvest. The decision about where to send logs is made by the contractor, and the decision about what to do with that log is made by the receiving processors, such as a mill. Estimated volumes from timber sale prospectuses from the past 10 years for timber sales on state lands indicates that an average of 1,365 million board feet of sawlogs and 3,223 cords of pulp/pallet were tallied prior to harvest. The actual utilization of the harvested wood is determined by the contractor, and thus the actual products harvested may differ from the figures above.

Comment Theme 31. What is the market for those products?

Markets for forest products change regularly based on numerous factors, including the season during which the harvest occurs, local economic activity, and global trade conditions.⁸¹

Comment Theme 32. How far is lumber being transported?

ANR does not determine, or dictate in a contract, the distance or locations to which a contractor transports forest products that are harvested as part of a state timber sale contract. Likewise, ANR does not determine which mills or other facilities a contractor may use as part of its business operation. Logging contractors structure their businesses in a variety of ways and utilize numerous regional sawmills, local sawmills, pulp mills, biomass facilities, and firewood processors to develop marketable forest products. One exception is when the State donates firewood through its Woods Warms program for heating assistance. In this case, the State identifies the delivery location for a specified amount of firewood in the contract.

Comment Theme 33. No proof or standard is included in this document to show that the extracted lumber will stay in Vermont.

The purpose of a LRMP is to outline management goals and activities for the Plan period, not to provide an economic analysis of the forest products industry in Vermont. The destination of wood products harvested from state lands is a business decision made by the contractor. However, more information about the destination of wood products harvested in Vermont in general (not just from state lands) can be found in FPR’s Harvest Reports (available online at <https://fpr.vermont.gov/harvest-reports>) and information about how contractors decide where wood goes can be found in Comment Theme 30 and Comment Theme 32.

Comment Theme 34. Is any effort being made to create or support local jobs?

This question was posed in the context of timber harvesting specifically. The Division of Forests in FPR has a program devoted to assessing and supporting the forest economy in the State, from highlighting manufacturers and processors to supporting businesses with data and

⁸¹ A summary and review of the differences in consumption and production of wood products between states in New England can be found in Littlefield, C., Donahue, B., Catanzaro, P., Foster, D., D’Amato, T., Laustsen, K., Hall, B. 2024. [Beyond the “Illusion of Preservation”: Taking Regional Responsibility by Protecting Forests, Reducing Consumption, and Expanding Ecological Forestry in New England.](#)

information to engaging in training and safety efforts. More information can be found at <https://fpr.vermont.gov/forest/working-landscape>.

As timber harvests on state lands are bid competitively in compliance with the Agency of Administration Bulletin 3.5, no preference is given based on the business location of the bidder, but the location-specific nature of the work tends to make it easier for contractors within the state to be competitive. Most contractors working on state lands timber harvests are located within Vermont or nearby, and the offering of timber harvests in and of themselves is an action that supports the creation and maintenance of local jobs, including loggers, truckers, mill workers, other forest product processors, wood products manufacturers, mechanics, and other adjacent industries. Further description of the bid process can be found in Comment Theme 8.

Comment Theme 35. The perennial revenues generated by recreation and other non-timber uses far outweigh the revenues generated by logging. There seems a fiduciary responsibility here that is being overlooked.

FPR's primary charge on state lands is long-term sustainable management of natural and cultural resources for multiple uses, not balancing revenue considerations across different uses. There is no economic analysis of the revenues of one type of activity on state land against another, as this would not account for the underlying natural resource values supported by the proposed management.

Comment Theme 36. The State should limit large scale logging contractors that do whole tree chipping to give the smaller operations an opportunity.

Decisions about operational constraints on a given timber harvest are up to the forester developing the harvest. In general, potential bidders are given flexibility to determine the harvesting equipment and utilization strategies, provided the management outcomes and site condition requirements can be met. Setting operational constraints to favor one type of contractor over another would contradict the competitive bidding principles underpinning the Agency of Administration's Bulletin 3.5 governing contracting and procurement by the State. See Comment Theme 8 for more information on contracting and state lands timber harvests.

Comment Theme 37. Is it possible to reduce the carbon footprint of this proposed logging by setting up local mill operations?

Transportation costs can be significant, and contractors will typically seek to reduce these costs by using the closest mills and processors. FPR promotes the establishment and maintenance of local processing capacity as part of its core work related to the forest economy (see Comment Theme 34) and will continue to do so. State lands timber harvests are an important support for these local operations by providing a predictable supply of a range of wood products.

Forest Health

Comment Theme 38. One commenter expressed concern about the impact of jumping worms on forest health and a question about measures the state uses to control the spread of jumping worms.

See Comment Theme 3 for information about general controls for invasive plant spread that will be effective for preventing spread of jumping worms as well. More information on

preventing the spread of jumping worms can be found at <https://vtinvasives.org/invasive/jumping-worms>.

Comment Theme 39. One commenter expressed concern about “a lack of cutting and new growth [leading] to higher risk of fires,” when faced with summer drought.

Climate models strongly suggest that the Northeast will be receiving more precipitation in the future, punctuated by periods of drought.⁸² Predictions of future wildfires in Vermont are somewhat more complicated. Although there is concern of wildfire, we are not currently seeing increasing trends in fire occurrence. While we do not have data to show an increase in forest fires, we are working with partners to look at other indicators of change such as the correlation between flash drought and fire potential under future climate scenarios. We hope to have more information on this soon that could help identify any increases in risk and subsequent strategies we can implement to mitigate these challenges—emphasizing the importance of our ability to conduct forest management on our state lands as the commenter has suggested. Another aspect that makes risk of wildfires in Vermont difficult to quantify is the fact that our fires are primarily human caused. Our Wildland Fire team is actively involved in assessing these threats. Also see Comment Theme 43 for further information.

Comment Theme 40. Non-native and invasive plants and pests are among the greatest threats to supporting biodiversity and forest health. The draft LRMP describes current and potential future occurrences of these plants and pests within the WRMU, however, the current plan provides little detail on how current or anticipated presence of non-native and invasive plants and pests will influence management. We recommend additional detail on non-native and invasive plant management scenarios along with a description of how exotic pests, such as emerald ash borer, will influence management during the planning period covered by the plan.

The impact, monitoring, and treatment of invasive pest are covered in Comment Theme 3 and additional language was added to the LRMP and can be found on page 197.

Comment Theme 41. In the climate change adaptation section of the draft LRMP, deer browse patterns affecting forest regeneration are named as an immediate climate change impact due to reduced snow winter depths. There is a need to balance deer habitat management with forest regeneration and to ensure that if deer browse impacts forest regeneration that it is addressed. We recommend listing browse pressure as a condition to inform management planning, monitoring browse of regenerating forest patches, and considering alternatives to only recreational hunting, as currently regulated, to manage the deer herd if regeneration is affected.

Deer browse impacts on forest regeneration is a general concern due to warming climate and is an issue in some places in VT. However, ANR staff have not observed evidence that deer browse is currently a concern within the WRMU. ANR staff will include strategies to protect regeneration in harvest areas. If browse pressure is a concern at a site, ANR will consider

⁸² Hayhoe et al. 2007. Regional climate change projections for the northeast USA, *Mitigation and Adaptation Strategies for Global Change*, vol. 13, no. 5-6, pp. 425–436. <https://doi.org/10.1007/s11027-007-9133-2>.

management strategies such as leaving whole treetops following harvest to inhibit deer movement and emphasize continued control on browse pressure by more broadly encouraging hunting on state lands.

Comment Theme 42. Can we put in a blueberry management area like in Goshen? That is a phenomenal recreational area, as well as critical habitat for fire adapted plants and open herbaceous species.

Blueberry management in the WRMU would be a significant challenge due to intertwined ecological and environmental factors. The lack of deep sandy soils, cooler climate, mountainous terrain, and resulting economic constraints makes blueberry management in the WRMU particularly unfeasible compared to more naturally suitable sites, like the one managed in Goshen. Blueberries can be found growing naturally in the unit on the Red Spruce-Heath Rocky Ridge, Boreal Outcrops, Red Spruce-Cinnamon Fern Swamps, and Temperate Acidic Outcrops.

Comment Theme 43. No mention of fire control measures under Vegetation Management. Uncontrolled forest undergrowth can be a fire hazard.

Currently, we are not seeing trends towards more frequent or more severe fires in Vermont. FPR has a Wildland Fire team that monitors fire trends and dangers, and this information can inform management decisions if fire trends change. Presently, we are more likely to see other types of stand-level disturbance than fires, such as wind events, forest pests and disease, or ice storms. We do not rule out the possibility of a large fire, but, based on existing conditions in this region, managing forests to resist catastrophic fire or reduce intensity of potential future forest fire is not currently a priority. Fire has been and will continue to be used on some state lands for management purposes in natural communities adapted to fire as a disturbance, such as Sandbar Wildlife Management Area and West Mountain Wildlife Management Area.

As for articles about western fires, fire regimes vary greatly depending on region and vegetation community within each region. Species that evolve with regular fire develop adaptations to survive fires. As a result, where you find fire-adapted species, there are more frequent fire regimes. Places with infrequent or rare fires, such as the Northeast and particularly northern hardwood forests (the dominant forest type of the WRMU), are not adapted to fire.

The USDA Forest Service [Fire Effects Information System](#) (FEIS) brings together information about fire ecology and fire regimes in the United States. The FEIS breaks down the fire regime by region and plant community. Within each vegetation community, this table shows the fire severity regimes seen for that community, with a percentage of how often each occur, and the interval of time between fires.⁸³

Fire severity regimes are broken into three categories:

⁸³ Fryer, Janet L and Luensmann, Peggy S. (2012, February). Fire regimes of the conterminous United States. U.S. Department of Agriculture, Forest Service, FEIS.

https://www.fs.usda.gov/database/feis/fire_regime_table/fire_regime_table.html#Northeast

- **Replacement:** Any fire that causes greater than 75% top removal of a vegetation-fuel type, resulting in general replacement of existing vegetation; and may or may not cause a lethal effect on the plants.
- **Mixed:** Any fire burning more than 5% of an area that does not qualify as a replacement, surface, or low-severity fire; includes mosaic and other fires that are intermediate in effects.
- **Surface or low:** Any fire that causes less than 25% upper layer replacement and/or removal in a vegetation-fuel class but burns 5% or more of the area.

As an example, within the Northeast region, the northern hardwoods vegetation community has replacement fires 39% of the time, with a mean interval between fires of more than 1,000 years. The other 61% of the time is a mixed fire regime and occurs with a mean interval of 650 years. Northern hardwoods do not have surface or low fire severity regimes; mostly there are mixed fire regimes occurring infrequently, and replacement fires regimes occurring at the most infrequent time scale provided by the FEIS.

By comparison, if you look at the California Ponderosa Pine vegetation community, a fire-adapted species, there are replacement fires 5% of the time with a mean interval of 200 years, mixed fires 17% of the time with a mean interval of 60 years, and a surface or low severity fire 78% with a mean interval of 13 years. This tells us that there are frequent low severity fires most of the time, with mixed fires happening every 60 years. Ponderosa Pines, being a fire-adapted species, have developed to survive fire with age, due to features such as such as increased bark thickness and root depth. These examples illustrate the difference in fire regime for a fire-adapted species compared to a fire regime in a region that rarely sees large fires.⁸⁴

Comment Theme 44. My comment is really a question or concern about timber harvesting and impacts on forest fires. I regularly read articles about the big western fires and how the best resiliency plans seem to include plans to preserve the mature trees as they are more likely to survive fires and play a key role in recovery. I don't think the presentation got into the weeds on the harvesting methods, but will that be identified in the plan? My concern also applies to remediation requirements to prevent erosion.

Please see the response to Comment Theme 43 for more discussion about the nature of fire regimes in general in Vermont as compared to the western US. Forests that are adapted to frequent low-intensity fires have species within them that tolerate fire. An example common in western forests are ponderosa pines, which have thick bark insulating them from lower-heat fires. In Vermont, species like oaks and red pine are similarly adapted to surviving low-intensity fires, while other mature trees common on the WRMU such as beech and yellow birch are not. The decisions about what trees to retain after a harvest consider a range of science and silvicultural guides based on how forest ecosystems in the Northeast function, and where fire is a consideration, that will be factored into the decision making. There are limited examples of

⁸⁴ Fryer, Janet L. 2018. *Pinus ponderosa* var. *benthiana*, P. p. var. *ponderosa*: Ponderosa pine. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Missoula Fire Sciences Laboratory (Producer). Available: www.fs.usda.gov/database/feis/plants/tree/pinponp/all.html

fire-adapted species in the WRMU, and the harvests proposed in this plan do not occur in those forest types.

Conservation Planning

Comment Theme 45. The draft LRMP lacks mention (or depiction) of adjacent and nearby conserved land. Considering the landscape context of the WRMU is an essential starting point for management and should guide decision making at all scales during the development and implementation of the plan.

Landscape context is described in the Vermont Conservation Design section of the Executive Summary, and in detail in the [Ecological Assessment of Natural Communities](#), and the [Wildlife and Habitat Assessment](#). This information is the foundation of the comprehensive lists of management strategies and actions on page 135. Additionally, a paragraph and a map were added to the Vermont Conservation Design section in the Executive Summary to illustrate the location and connectivity of adjacent conserved land (pages x-xi).

Comment Theme 46. Consider compatibility between land management classifications and the values of interior forest blocks and connectivity blocks, and wildlife corridor function.

The compatibility between management classifications and ecological functions is carefully evaluated during the planning process. The proposed classifications and management activities are developed with consideration for wildlife linkages and corridors. See Comment Themes Comment Theme 47, Comment Theme 48, and Comment Theme 55 for further explanation.

Vermont Conservation Design – Old Forest Targets

Comment Theme 47. The plan should align with Vermont Conservation Design and adequately help to meet targets for old forest in the WRMU, particularly in low-elevation areas.

The draft plan is consistent with Vermont Conservation Design (VCD) and a section has been added to the executive summary (page x) to more specifically highlight this alignment. More information describing this alignment can be found on page 135 in the Unit-Wide Goals, pages 136-139 in General Management Strategies and Actions, and page 182 in the Site-Specific Recreation Management Actions.

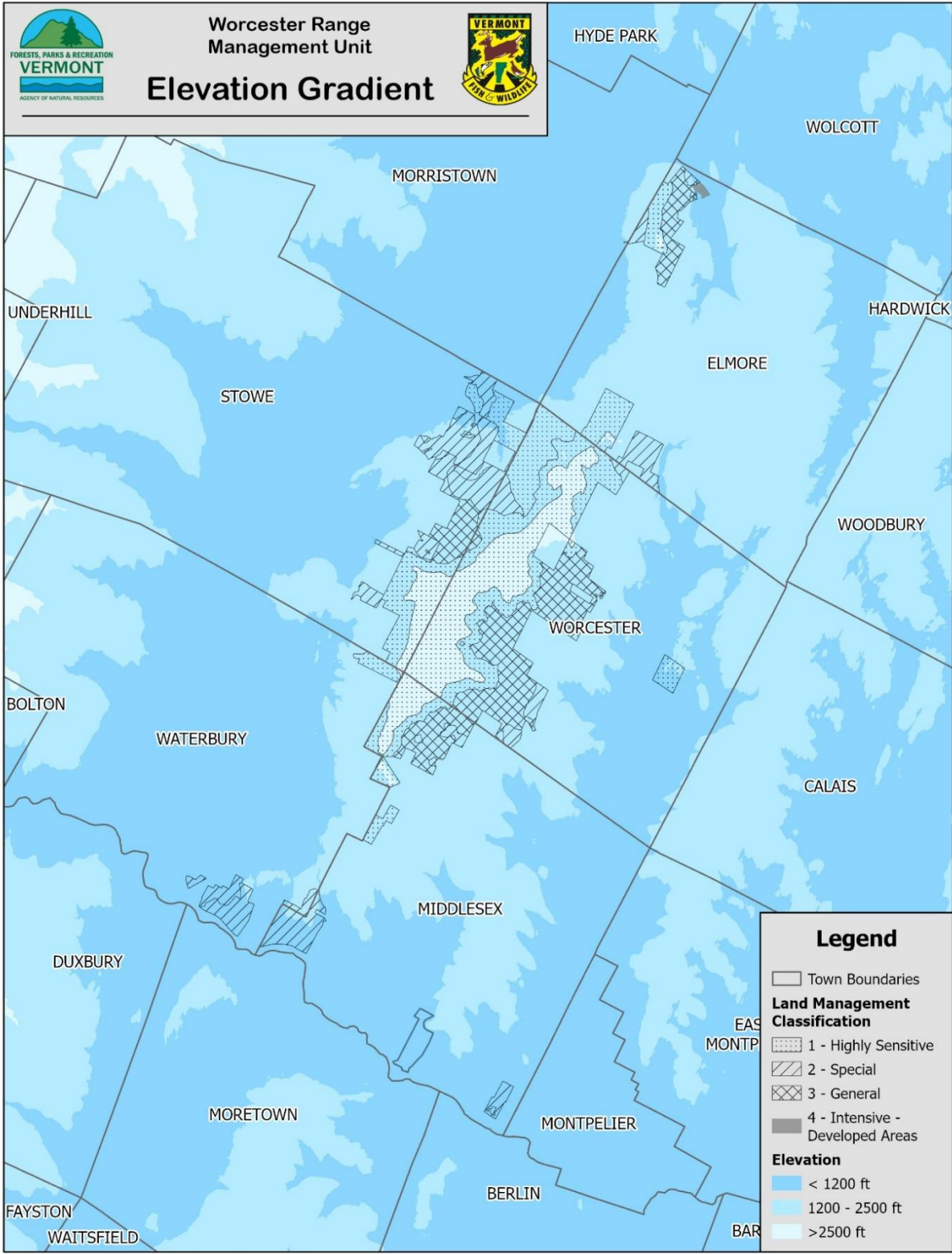
VCD outlines priority features at various scales to maintain ecological function statewide and regionally. These features and guidelines are detailed in the VCD Summary Report and two technical reports available at <https://vtfishandwildlife.com/consERVE/vermont-conservation-design>.

VCD aims to restore 95,000 acres of old forest in the Northern Green Mountains biophysical region, where the WRMU is located. As of 2021, the Vermont Department of Fish and Wildlife identified 75,087 acres (79% of the target) already conserved and managed to develop into old forest. This includes state-owned Natural Areas in the WRMU, such as the 4,057-acre Worcester Range Natural Area and the 80-acre Moss Glen Falls Natural Area. The draft LRMP proposes managing an additional 5,821 acres in the WRMU as Highly Sensitive Management

Areas (HSMA), which will more than double the area designated for old forest development in the WRMU and contribute significantly to the VCD target.

While the WRMU constitutes only 1% of the Northern Green Mountain region, it contributes 10% towards the region's old forest target, playing a substantial role in achieving VCD goals. Currently, the target for the region is primarily met through protecting Montane Spruce-Fir Forest, Montane Yellow Birch-Red Spruce Forest, and Northern Hardwood Forest (78%). Most of the WRMU is above 1,200 feet in elevation and consists mainly of these common forest types. Areas below 1,200 feet, like Moss Glen Headwaters and Worcester Woods WMA, enhance the diversity and representation of natural communities needed for the region's targets, including Hemlock Forest, Hemlock-Northern Hardwood Forest, and Lowland Spruce-Fir Forest.

Active and passive management for old forest characteristics will be applied to Special and General Management Areas in the WRMU, such as Moss Glen Falls Headwaters, Wetlands, and Mast Areas and Bobcat Habitat. Passive management, except for invasive species removal, is the primary approach for wetland features covering over 350 acres. For more details, see pages 151-155 of the plan.



Comment Theme 48. Designate ~3,000 additional acres for the establishment or maintenance of old forest. As described previously, the WRMU provides a rare opportunity to manage for old forest in a context that meaningfully advances the targets presented in Vermont Conservation Design and enhances the conservation value of the landscape.

This suggestion has been incorporated. We have added over 5,775 acres into passive management in this management planning process: 5,492 acres were identified in this first draft of the LRMP, and an additional 309 acres were added in the final draft of the Plan. In total, this LRMP identifies 9,961 acres, more than half of the management unit, as suitable for passive management. Please see Comment Theme 47 and Comment Theme 5 for information on VCD and on passive management within the WRMU.

Comment Theme 49. The State should use the new Forest Reserve category of the Current Use Program as a model. It requires that woodlands be managed to encourage mature, diverse, “old growth” forests, allowing the owners to eliminate invasive species and other diseased or problem plants, to encourage such woodlands.

Although the forest reserve category concept was developed for use on private lands to accelerate the development of old forest conditions, the associated management practices are also implemented on state lands and will be utilized during prescription development where appropriate. The creation of this category in Vermont’s Use Value Appraisal (UVA) Program, often referred to as Current Use, allows private landowners to manage their land for old growth forest conditions rather than active long-term forest management for the purpose of growing and harvesting repeated forest crops. As such, landowners who manage for old growth forest are eligible to receive the benefit of taxation at current use value rather than fair market value. Although the UVA Program requirements do not apply to State lands, the Agency manages for old forest conditions that align with the management goals and objectives of the LRMP and the condition of the forests.

Comment Theme 49. The future representation of old forest across a range of elevations, aspects, and geophysical settings in the WRMU could be strengthened by eventually including some of the lower elevation, gently sloping lands on the eastern flanks of the Worcester Range. We recognize that these are also the lands best suited for timber production and for deploying commercial management as a tool to enhance climate resilience and forest health. In the areas proposed for commercial harvest we recommend the plan explicitly state that the goal of every harvest is to increase climate resiliency as well as produce timber products and improve terrestrial and aquatic habitats.

The unit wide goals listed in the LRMP have been edited to clearly reflect the goals of improving climate resiliency and wildlife habitat as well as producing forest products. The unit wide goals can be found on page 135 of the plan. See Comment Theme 47 for additional information on the application of Vermont Conservation Design’s old forest targets in the Worcester Range.

Comment Theme 50. We also encourage the DST to consider conducting an inventory to identify suitable stands with similar landscape position outside of the proposed harvest areas that could be more formally directed to old forest conditions in the next LRMP. Depending on existing conditions, this could include both passive management and active restoration of old forest characteristics.

Due to a) capacity constraints, b) the size of the unit, and c) the very limited extent of vegetation management outside treatment areas, this was not pursued. The combination of limited staff capacity to conduct inventory and the large acreage of the unit outside treatment areas, conducting additional inventory at this level of intensity was infeasible. Furthermore, the actual outcomes on the ground of designating additional stands for passive management is unlikely to differ from what will happen under the current designations, as no large-scale manipulation of vegetation will occur in any of the areas not designated for treatment. Designating additional stands for active management would require more capacity to implement than currently available. The proposed nature and timing of treatments represents a reasonable balance of resource needs and capacity to implement management.

Comment Theme 51. The State should consider sharing a state-wide strategy for how it envisions Agency lands, both new and existing, can contribute toward the old forest targets identified in VCD.

Decisions about HSMA designations within the WRMU (many of which will become old forest) were informed by an analysis of the distribution of forest types within the Northern Green Mountains Biophysical Region, the relative distribution of forest types within the biophysical region that are on a path to become old forest based on their designation or land protection status, and the “opportunity” that the WRMU forests present to contribute to the distribution and overall old forest targets within the biophysical region. A more detailed description of this analysis can be found in Comment Theme 47.

Vermont Conservation Design – Young Forest Targets

Comment Theme 52. The plan should include the creation of more young forest habitats to help meet Vermont Conservation Design young forest targets and provide a more diverse array of habitat types for wildlife.

Young forest is an important habitat feature in Vermont and one that is under-represented in the Northern Green Mountain Biophysical Region (VCD Part 2: Natural Communities and Habitats Technical Report, 2018). In Vermont’s Wildlife Action Plan (2015), fifty-four Species of Greatest Conservation Need are supported by young forest. Opportunities to create young forest in the unit will be informed by forest stand conditions, ecological habitat requirements, and harvest logistics. ANR will work to opportunistically identify places on the WRMU where young forest creation can be incorporated in planned forest management projects, when consistent with management objectives and silvicultural guides.

Comment Theme 53. Active management will compromise the old growth and wilderness aesthetic of the WRMU.

The forest aesthetics described by commenters and conveyed by the WRMU’s forested peaks, ridges, and wetlands, are a result of both natural processes and several types of forest management since the land was settled by colonizers over 200 years ago.

While there are areas that exhibit old forest characteristics, no areas of true old growth – areas with no history of intensive land use – have been documented within the WRMU. Areas that exhibit old forest characteristics will be managed to support those features consistent with the management approaches outlined in the land management classification and any newly

documented areas will be managed similarly. The beneficial functions of old forest will also be created by accelerating the development of structure and composition reflective of old forest characteristics using active old-growth forest restoration techniques (D'Amato and Catanzaro 2023) where identified in the LRMP. More information about this type of management can be found in the Management Strategies and Actions section under General and Site-Specific Management Strategies and Actions (beginning on page 135) and Table 33. More information about the history of forest management on the WRMU is found in the Forest and Timber Resource Assessment (page 54). This section describes a brief forest history of the land area that has been actively managed within the WRMU.

Wildlife

Comment Theme 54. Timber harvesting should not cause forest fragmentation, impact wildlife habitat, or impede movement within wildlife corridors in the unit.

When forests are sustainably managed and trees are harvested, the forest remains as forest—tree regeneration is occurring, and a new age class develops. For this reason, sustainable forest management is not the same as fragmentation or deforestation which is defined as the conversion of forest land to non-forest land as defined by the Intergovernmental Panel on Climate Change (IPCC). This new age class is beneficial for many species - deer and moose, ruffed grouse, elfin butterflies, and a variety of songbirds. Pages 135 to 136 of the plan outline general strategies aimed at preserving the WRMU's role in Vermont's ecologically functional landscape, while pages 136-139 detail broad-scale strategies intended to create high-quality wildlife habitats across the WRMU. These aim to support overall wildlife connectivity throughout the unit.

During the Annual Stewardship Plan (ASP) review, the interdisciplinary DST, in accordance with the *Riparian Management Guidelines for Agency of Natural Resources Lands* (2015) and the *Memorandum of Agreement Regarding Administration of State Lands* (2012), assesses the needs of various species before implementing timber harvests.

Following the ASP review, a specialized subset of the DST, including wildlife biologists and the State Lands Ecologist, evaluates potential harvest sites to provide recommendations aligned with the LRMP's strategies. These recommendations aim to support an ecologically functional landscape and wildlife connectivity, foster high-quality habitat, and safeguard rare, threatened, and endangered species, as well as sensitive state-significant natural communities.

Comment Theme 55. Maintaining connectivity for wildlife should be explicitly included as a management strategy in management area 2.5C. Consider similar strategies to manage for connectivity elsewhere in the WRMU, particularly along the northeastern portions where State lands approach VT Route 12.

Special Management 2.5C, the North Branch Headwaters Property Conservation Easement Area, in the draft plan, was changed to Special Management 2.2C, Wildlife Corridors, where the strategy, "ensure that management actions promote these wildlife corridor functions" was added to the Management Strategies and Actions. Additionally, a Vermont Conservation Design

section was added to the Executive Summary to further clarify the importance of wildlife movement and ecological connectivity in these areas.

The plan also includes unit-wide general management strategies promoting both aquatic and terrestrial wildlife connectivity to protect the WRMU's contributions to Vermont's ecologically functional landscape (pages 135-142).

Comment Theme 56. The plan should comply with the Federal Endangered Species Act and the implementation of rare, threatened, and endangered species surveys should be completed.

The WRMU LRMP complies with all applicable regulations and laws, including the Federal Endangered Species Act. Management activities are subjected to a range of resource reviews. One review includes screening for potential impacts to federally listed endangered bat species following the consultative framework established by the US Fish and Wildlife Service (USFWS) for federally funded (USFWS 2024) projects and applying those criteria to all potentially impactful projects regardless of funding. When potential impacts are found, the DST consults with the state Bat Biologist to identify any needed modifications to the activity to avoid the 'take' of an endangered species. In addition, staff incorporate guidance from USFWS on habitat modification to further minimize risks to endangered bat species (USFWS 2023).

Additionally, each year, the State Land Ecologist conducts a desktop review to assess potential impacts on rare, threatened, or endangered (RTE) plant species or state-significant natural communities in proposed management areas. Projects with potential conflicts undergo a field review by the State Lands Ecologist. During this field review, focused surveys for Vermont's RTE plant species are conducted as part of project implementation. Subsequently, we adjust our activities based on the survey findings. As of the writing of this plan, no legally protected plant species are known to occur within the WRMU (page 27). In fact, of the three federally endangered plant species that occur in Vermont, only one is found on state lands. This species occurs in wetland habitats that are protected through the [Riparian Management Guidelines for Agency of Natural Resources Lands](#) (2015) and the VT Wetland Rules (2023). Page 35 of the plan includes the section on Listed Bird and Mammal Species (T&E) and Species of Greatest Conservation Need (SGCN) and page 170 of the plan includes additional information on project review for vegetation management activities.

Comment Theme 57. Wintering areas for many species need to be identified and updated, then protected from too much incursion.

Every winter the DST meets to review all projects that are proposed for implementation in the coming year through the Annual Stewardship Plan review process. ANR specialists review maps of the proposed project work, conduct a thorough desk review, and request a site visit if field review is necessary to further refine the details of the project to minimize impacts to other natural resources. It is through this process that species and habitat such as deer wintering areas would be considered by ANR's wildlife biologists, and project adjustments made to reduce or eliminate impacts to deer wintering areas.

Climate

Comment Theme 58. My concerns center around the species that will be viable over the next 100 years, what has grown well for the last 100 will likely not thrive in the next 100. If we don't harvest some and maybe consider thoughtful plantings, will we have just a large standing dead forest?

As this comment theme suggests, the disparity in the rate of changing climate regimes and tree migration will affect forest growth and composition in the future, leading to significant implications for management and conservation efforts.⁸⁵ Model projections are being utilized to better inform management strategies and identify species that are both vulnerable and adapted to climate change.⁸⁶ These shifts in species composition are largely reflected in the understory layer where seedling regeneration will have the greatest vulnerability to shifting climate regimes. Species that are at the southern extent of their range or located on marginal sites may have greater susceptibility and may be targeted for intervention. At the landscape-scale, spatial, structural, and compositional diversity within intact forests is much more resilient to climate change threats.⁸⁷

As part of the WRMU management strategies, managing for climate adaptation is an essential part of our planning to increase resilient characteristics within our forest ecosystems. Further, the LRMP will enable implementation of research experiments in partnership with the University of Vermont focused on climate adaptive strategies, including plantings of future-adapted species and adaptive silviculture techniques to add resilience to the landscape and provide demonstration sites for landowners, forest managers, and other stakeholders.

⁸⁵ Oswald, W. W., Foster, D. R., Shuman, B. N., Doughty, E. D., Faison, E. K., Hall, B. R., Hansen, B. C. S., Lindbladh, M., Marroquin, A., & Truebe, S. A. 2018. Subregional variability in the response of New England vegetation to postglacial climate change. *Journal of Biogeography*, 45(10), 2375–2388. <https://doi.org/10.1111/jbi.13407>, And Williams, M. I., & Dumroese, R. K. 2013. Preparing for climate change: Forestry and assisted migration. *Journal of Forestry*. 111(4): 287-297. <https://doi.org/10.5849/jof.13-016>.

⁸⁶ Janowiak et al. 2018. New England and northern New York forest ecosystem vulnerability assessment and synthesis: a report from the New England Climate Change Response Framework project. *General Technical Report NRS-173*. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 234 p. <https://doi.org/10.2737/nrs-gtr-173>

⁸⁷ Allen, C. R., Angeler, D. G., Cumming, G. S., Folke, C., Twidwell, D., & Uden, D. R. (2016). Quantifying spatial resilience. *Journal of Applied Ecology*, 53(3), 625–635. <https://doi.org/10.1111/1365-2664.12634>, Messier, C., Bahuus, J., Doyon, F., Maure, F., Sousa-Silva, R., Nolet, P., Mina, M., Aquilué, N., Fortin, M.-J., & Puettmann, K. 2019. The functional complex network approach to foster forest resilience to global changes. *Forest Ecosystems*. 6, 21. <https://doi.org/10.1186/s40663-019-0166-2>,

Seidl, R., Spies, T. A., Peterson, D. L., Stephens, S. L., & Hicke, J. A. (2016). Searching for resilience: Addressing the impacts of changing disturbance regimes on forest ecosystem services. *The Journal of Applied Ecology*, 53(1), 120–129. <https://doi.org/10.1111/1365-2664.12511>, and Timpane-Padgham, B. L., Beechie, T., & Klinger, T. (2017). A systematic review of ecological attributes that confer resilience to climate change in environmental restoration. *PLOS ONE*, 12(3), e0173812. <https://doi.org/10.1371/journal.pone.0173812>.

Comment Theme 59. The LRMP does not satisfactorily account for climate change and carbon in general goals and planning.

ANR considers many objectives when making management decisions and manages forests for a variety of benefits, and in many cases it's possible to use active management to achieve multiple benefits at the same time. Managing forests to be resilient to climate change is a critical component of sustainable forest management and achieving many of the goals of the Plan. Although the plan broadly accounts for climate change, climate related goals and strategies have been added to the Management Strategies and Actions, Executive Summary, and incorporated into the Resource Analysis section and Management Strategies and Actions from the Climate Adaptation section from the previous draft. These additions better reflect ANR's consideration and implementation of these strategies to address climate change and carbon on the landscape. Climate change related strategies can also be found throughout the other unit-wide goals within the plan (e.g., wildlife, water resources, forest management, etc.).

For example, increasing forest complexity is one such strategy for climate change (see "Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests"). Forest complexity is generally based on the following characteristics: tree species diversity, tree size and age, tree functional traits, tree arrangement, and deadwood accumulation. This may be accomplished through reserves, single-tree and group selection, matrix thinning, or larger patch cuts that prioritize the establishment of shade-intolerant and intermediate species that have valuable adaptive characteristics. These strategies for adding or maintaining structural and species diversity are achieved through both active and passive management. For more information on specific strategies with greater detail, please refer to the aforementioned pages in the management plan.

Forests can also serve as a natural solution to climate change by providing carbon sequestration and storage. Healthy, resilient forests that remain forests into the future will both sequester and store carbon securely over long time periods, and many of the management strategies and actions outlined above will yield increases in either or both carbon sequestration and storage at the stand and landscape scale. See Comment Theme 60 and Comment Theme 61 for more details on balancing carbon sequestration and storage with other management goals.

Comment Theme 60. Request for more information regarding the plan's impact on carbon. Vermont should halt all commercial logging on state land to maximize carbon sequestration in the forest.

The ability of a forest to store carbon and the rate at which forests accumulate or sequester carbon peak at different stages of forest development. Young forests accumulate carbon at a higher rate but have less storage, while old forests have a lower rate of accumulation but can store greater amounts of carbon.⁸⁸ See Comment Theme 61 for a greater explanation of these differences.

⁸⁸ Hoover, C.M., Smith, J.E. 2023. Aboveground live tree carbon stock and change in forests of conterminous United States: influence of stand age. Carbon Balance Manage 18, 7. <https://doi.org/10.1186/s13021-023-00227-z>.

Both the rate of accumulation (sequestration) and storage of carbon are critical pieces of the equation for carbon mitigation and resiliency, emphasizing the importance of having a range of forest structural and compositional diversity, as well as age classes across the landscape. Forests with both young and old trees possess a combination of these characteristics—high rates of sequestration and high rates of storage. It’s important to note that forests are more than their carbon content or the timber products they provide; they are complex systems that provide an array of ecosystem services and should be managed tactically to achieve a balanced approach and not through the narrow lens of a single-objective approach to maximize one service over the other (e.g., carbon, timber, etc.). The WRMU LRMP will be implemented using sustainable forest management practices. These practices can be used to enhance or maintain forest and carbon resilience by diversifying both species and structural composition while addressing social and ecological needs (e.g., wildlife habitat, forest products, carbon storage and accumulation, recreation, etc.).

Carbon benefits are dependent upon the temporal and spatial scale being considered. Different perspectives in time and in scale lead to very different conclusions about management activities on carbon. Although timber harvests initially reduce the amount of carbon stored in the forest during a snapshot in time following the harvest, this carbon is transferred into wood products harvested from state lands which can be used for building materials, energy, heat and other uses, that continue to store carbon or either displacing fossil fuels directly or substituting for greenhouse gas emission-intensive manufactured products that have a role to play in overall approaches to reducing emissions and/or storing carbon.⁸⁹

According to the International Panel on Climate Change (IPCC), the effects of forest management on the atmosphere are best understood by considering the carbon dynamics that the atmosphere experiences. This involves examining how management practices affect forest carbon stocks, the emissions from harvesting activities, and the carbon storage in harvested wood products as well as the scale of management. Additionally, this perspective includes assessing whether there is a permanent change in land use or land cover (e.g., development) that impacts the ability of the harvested area to regenerate as a forest and continue sequestering carbon into the future.

Comment Theme 61. Old forests store and sequester more carbon than young forests and old forests should be prioritized over the establishment of young forests.

As mentioned in Comment Theme 60, the ability of a forest to store carbon and the rate at which forests accumulate or sequester carbon peak at different stages of forest development. Young forests accumulate carbon at a higher rate but have less storage, while old forests have a lower rate of accumulation but can store greater amounts of carbon.⁹⁰

⁸⁹ Johnston, C. and Radeloff, V. 2019. Global mitigation potential of carbon stored in harvested wood products. *Proceedings of the National Academy of Sciences* 116 (29). <https://doi.org/10.1073/pnas.1904231116>.

⁹⁰ Hoover, C.M., Smith, J.E. 2023. Aboveground live tree carbon stock and change in forests of conterminous United States: influence of stand age. *Carbon Balance Manage* 18, 7. <https://doi.org/10.1186/s13021-023-00227-z>.

A common point of confusion when trying to understand forest sequestration and storage is conflating the rate of sequestration and storage for individual trees to that of a forest stand. An individual tree with no competition can increase in biomass at an accelerating rate, having high rates of sequestration, until they reach old age at which time their growth rates slow along with the rate of sequestration. However, in a forest, things are more complex: many small trees can occupy the same amount of space as one large tree and young trees usually have the most vigorous growth because there is high competition for resources (this is also the period where the amount of leaf area and rate of photosynthesis peaks.⁹¹ The ability of dominant individuals to continue growing and sequestering is an important attribute to consider but it is not to be confused with forest-level growth and sequestration rates, which generally decline with age. The outcome is a decline in both the growth and sequestration rate of the forest as a whole. Acre for acre, a forest with the greatest carbon sequestration capacity is a young forest compared to an old forest, while old forests have the greatest carbon storage capacity.⁹² These higher rates of sequestration generally occur when the forest is approximately 30 -70 years old or the trees are approximately 4"-16" in diameter, although specific age and size ranges are dependent upon site factors and land-use history.

Both young forests and old forests are an important part of the carbon equation. Beyond their carbon contributions, young and old forests are a critical part of the landscape mosaic and contribute to wildlife habitat, climate resilience, and habitat connectivity.

Comment Theme 62. Forest management exacerbates climate change problems.

Establish a top-line goal of promoting climate resilience and orient planned management activities around that. The first draft LRMP had a dedicated climate adaptation and resilience section, however, it was determined that this information needed to be incorporated more broadly across the strategies to reflect the fact that climate resilience and adaptation is a goal that is consistent with and considered by ANR staff in conjunction with other management goals. The plan has been rearranged and clarifying language has been added to explicitly address climate resilience and adaptation goals that were not clearly identified in the first draft Plan to better reflect the consideration of climate adaptation goals of ANR. See Comment Theme 59 for more information.

⁹¹ Binkley, D., Stape, J., Ryan, M. *et al.* 2002. Age-related Decline in Forest Ecosystem Growth: An Individual-Tree, Stand-Structure Hypothesis. *Ecosystems* 5, 58–67. <https://doi.org/10.1007/s10021-001-0055-7>

⁹² Catanzaro, P., & D'Amato, A. W. (2019). Forest Carbon: An Essential Natural Solution for Climate Change. University of Massachusetts Amherst. <https://masswoods.org/sites/default/files/pdf-doc-ppt/Forest%20Carbon%202022.pdf>, Hoover, C.M., Smith, J.E. 2023. Aboveground live tree carbon stock and change in forests of conterminous United States: influence of stand age. *Carbon Balance Manage* 18, 7. <https://doi.org/10.1186/s13021-023-00227-z>, Smith, J.E., Heath, L.S, Skog, K.E., Birdsey, R.A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p. <https://doi.org/10.2737/NE-GTR-343>.

Water Resources

Comment Theme 63. Proposed forest management in the WRMU LRMP will exacerbate downstream flooding and threaten human communities. ANR should identify flood resilience as an overall management goal for the WRMU.

As detailed below, existing management guidelines and a plan-specific analysis ensure that the proposed activities of the WRMU LRMP will have de minimis effects on the potential for downstream flooding.

Managing for flood resilience is an important component of sustainable forest management that underlies multiple goals for the WRMU. The Plan recognizes the impacts that flooding can have on human and natural communities (Page 65), the likelihood that flooding will become more frequent with climate change (Page 46), and the need to implement flood resilient actions to achieve multiple overall management goals of the WRMU (Pages 135-135). These flood resilience strategies— maintaining riparian and river corridor areas, wetlands, and adjacent upland forest buffers; upsizing culverts; maintaining woody debris and other complex in-stream habitat features that dissipate energy and spread flows; and improving or hydrologically disconnecting forest road and trail network infrastructure— are explicitly identified in the Plan’s Management Strategies and Actions section and within other documents guiding ANR land management (see paragraphs below).

Furthermore, to assess whether the draft Plan’s proposed forest management activities could potentially exacerbate downstream flooding at Wrightsville Reservoir on the North Branch of the Winooski, the Vermont Department of Environmental Conservation modeled the potential impacts of the LRMP’s proposed forestry treatments on downstream water levels in the reservoir using USDA Natural Resource Conservation Service’s curve number method (USDA NRCS 2021). The curve number method models the total event volume of runoff from a given depth of precipitation. This method makes a number of conservative assumptions including that the total acreage of a single proposed treatment area is harvested simultaneously and removes all trees from the area. In addition, the model reflects that unique treatment area harvests are staggered through the 20-year life of the plan, that harvested areas regenerate young forest cover through time, and that different soil types have different effects on the water storage capacity of harvested areas. This modeling approach does not account for Vermont’s implementation of the *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont (AMPs; VT FPR, 2018)* and the *Riparian Management Guidelines for Agency of Natural Resources Lands (RMGs; VT ANR, 2015)* which together reduce harvest areas adjacent to waterways and the runoff generated from them during state harvest operations. The modeled precipitation event was a 100-year rainfall event of 0.5ft of rain in 24 hours, according to NOAA’s Atlas-14 tool.

Under these conservative assumptions, DEC found that harvesting the proposed Plan treatment areas could increase the level of Wrightsville Reservoir during the 100-year rainfall by 0.075 feet (0.9 inches) relative to a no-harvest management scenario. Although this analysis is neither a formal prediction of flood levels or peak streamflow, it does shed light on the relative impact that various land use change scenarios within treatment areas can have on total flood volumes

at the reservoir. In reality, FPR uses selective silvicultural techniques that avoid sensitive areas within a treatment such that harvest areas will usually be smaller than treatment areas. Therefore, changes in reservoir levels are likely smaller than the model indicated.

While the modeled effect of the Plan's treatment plans on downstream inundation flooding was relatively small (i.e., less than 1 inch in Wrightsville Reservoir), an active forest harvest may lead to transient increases in peak flow rates in smaller sub-watersheds. Available literature values suggest that increases in peak flows may be detectable after more than 20-30% of a stream's watershed area is harvested, though effects on peak flow change are likely dependent on ecoregion as well as implementation of varied management practices regarding cutting technique, compaction and infiltration capacity of forest floor, hydrologic connectivity of the forest road network, and proximity of harvests to wetlands and streams (e.g., Guillemette et al. 2005, Grant et al. 2008). The total proposed treatment areas of the Plan as a proportion of total watershed area are all less than 20%: Minister Brook: 13.5%; Hancock Brook: 17.7%; Martins Brook: 2.3%; Moss Glen Brook: 5.3%; Gold Brook: 1.4%.

In reality, FPR uses various selective silvicultural techniques such that actual harvest areas will be smaller than would be with a complete clearcut of the Plan's proposed treatment areas. In addition, treatments are also staggered in time such that the total proportions of watershed area listed above will not be treated simultaneously, further reducing the impact on peak flow rates during extreme weather events.

FPR's foresters also implement AMP, RMG, and other Plan strategies to further minimize treatment area impacts on runoff volume and reduce potential increases in stream flow during harvest periods. The RMGs and AMPs identify various strategies for foresters to slow, spread, and store stormwater runoff from silvicultural treatment areas and reduce in-stream volumes and velocities during high flows. Such strategies listed in the RMGs and AMPs include disconnecting or reducing runoff from hydrologically connected roads and trails; maintaining or restoring intact, forested buffers of 50-100+ feet, depending on local slopes; restoring channelized streams, ditched wetlands, or rip-rapped shores; designing culverts and bridges on perennial streams to meet the design principles of Vermont's Stream Alteration General Permit;⁹³ maintaining forest floor cover especially within riparian zones and river corridors, and maintaining in-stream complexity through leaving or adding in-stream wood to improve

⁹³ Dixon, SJ, Sear, DA, Odoni, NA, Sykes, T, & SN Lane. 2016. The effects of river restoration on catchment scale flood risk and flood hydrology. *Earth Surfaces Processes and Landforms* 41, 997-1008. doi: [10.1002/esp.3919](https://doi.org/10.1002/esp.3919), Gillespie, N, Unhtank, A, Campbell, L, Anderson, P, Gubernick, R, Weinhold, M, Cenderelli, D, Austin, B, McKinley, D, Wells, S, Rowan, J, Orvis, C, Hudy, M, Bowden, A, Singler, A, Fretz, E, Levine, J, & R Kirn. 2014. Flood effects on road-stream crossing infrastructure: economic and ecological benefits of stream simulation designs. *Fisheries* 39, 62-76. doi: [10.1080/03632415.2013.874527](https://doi.org/10.1080/03632415.2013.874527), Kastridis, A. 2020. Impact of forest roads on hydrological processes. *Forests* 11, 1201. doi: [10.3390/f11111201](https://doi.org/10.3390/f11111201), Salemi, LF, Groppo, JD, Trevisan, R, Marcos de Moraes, J, de Paula Lima, W, & LA Martinelli. 2012. Riparian vegetation and water yield: a synthesis. *Journal of Hydrology* 454, 195-202. doi: [10.1016/j.hydrol.2012.05.061](https://doi.org/10.1016/j.hydrol.2012.05.061), and Singh, NK, Wemple, BC, Bomblies, A, & TH Ricketts. 2018. Simulating stream responses to floodplain connectivity and revegetation from reach to watershed scales: implications for stream management. *Science of The Total Environment* 633, 716-727. doi: [10.1016/j.scitotenv.2018.03.198](https://doi.org/10.1016/j.scitotenv.2018.03.198).

floodplain connection and in-stream roughness.⁹⁴ The provided references are just examples from a rich literature evaluating how these natural resource management practices can beneficially influence watershed hydrology.⁹⁵

FPR's foresters receive support to protect water resources from other ANR staff. The Department of Fish & Wildlife's (FWD) State Lands Ecologist reviews all treatment plans in part to ensure that the plans sufficiently protect aquatic habitats, which generally has co-benefits for flood resilience and water quality functions. The Department of Environmental Conservation's Watershed Planner and the FWD's Fish Biologist play similar roles in reviewing treatment plans for water resource considerations as members of the Barre DST that oversees decisions on state lands management.

Comment Theme 64. The LRMP does not incorporate the Vermont Hazard Mitigation Plan.

While the Plan acknowledges the importance of adhering to and supporting the implementation of other regional planning efforts (page 5), it does not attempt to reference all the pertinent local, regional, and state planning efforts directly. However, the Plan does share common general strategies with the Vermont State Hazard Mitigation Plan and the Local Hazard Mitigation Plans for Worcester, Middlesex, Waterbury, Stowe, and Elmore.

All these local hazard mitigation plans emphasize the importance of right-sizing road infrastructure to increase local flood capacity and reduce the acceleration of flood velocities and downstream erosion. Likewise, the Plan notes the critical importance of upgrading forest road and trail infrastructure to increase flood resiliency. The Plan formalizes this work through adherence with AMPs, assessment and prioritization of road and trail work through forest road and trail erosion inventories, and adherence to permitting requirements and the VT Road and Bridge Standards for all new permanent crossings on perennial streams.

The flood resilience benefits of road infrastructure upgrades have been demonstrable on ANR's Barre District lands during the recent July 2024 flooding. So far, FPR staff have not documented any damage or adjacent natural resource impacts to road and trail infrastructure projects recently improved, up-sized, or up-graded with Clean Water funding, whereas damage has been documented in unimproved areas in the same region. These include road and trail segments in: Middlesex (Carriage Road/Middlesex Trail to Mt. Hunger); Waterbury (three miles of Cotton Brook Road to McCaffrey Orchard; Dalley Road and Compartment One Road in the Ricker Block); Stowe (roads to and above the Pinnacle Meadows parking area; New Michigan Brook Road); and Groton, Orange, and Topsham (roads in the Butterfield Mountain Block).

⁹⁴ Dixon, SJ, Sear, DA, Odoni, NA, Sykes, T, & SN Lane. 2016. The effects of river restoration on catchment scale flood risk and flood hydrology. *Earth Surfaces Processes and Landforms* 41, 997-1008. [doi: 10.1002/esp.3919](https://doi.org/10.1002/esp.3919), and Lo, HW, Smith, M, Klaar, M, & C Woulds. 2021. Potential secondary effects of in-stream wood structures installed for natural flood management: a conceptual model. *WIREs Water* 8, e1546. [doi: 10.1002/wat2.1546](https://doi.org/10.1002/wat2.1546).

⁹⁵ Lane, SN. 2017. Natural flood management. *WIREs WATER* 4, e1211. [doi: 10.1002/wat2.1211](https://doi.org/10.1002/wat2.1211), and Nilsson, C, Riis, T, Sarneel, JM, Svavarsdóttir. 2018. Ecological restoration as a means of managing inland flood hazards. *BioScience* 68, 89-99. [doi: 10.1093/biosci/bix148](https://doi.org/10.1093/biosci/bix148).

Some municipalities also prioritize hazard mitigation strategies that protect floodplain and river corridor conditions to allow for natural attenuation of flood waters. To this end, following the RMGs, all proposed management activities on state lands must limit encroachments into both the existing and potential future riparian management zones: i.e., the river corridor. More information on the various types of Riparian Management Zones, how they are delineated, their protective buffer widths, and the allowed activities within these zones is available in the RMGs. These Guidelines support numerous riparian, floodplain, and river corridor functions that can confer flood resilience including water storage, energy dissipation, reduced erosion, and reduced flow velocities.

Comment Theme 65. The LRMP does not address how the plan relates to the Lake Champlain Phosphorus TMDL, how the proposed management activities would impact, or be designed to mitigate impacts to, stream health (sedimentation, quality, and habitat), or planned avoidance and restoration measures with the TMDL. Forest harvest will increase phosphorus generation from state-managed forested lands and slow progress toward TMDL achievement. The 2023 Winooski Tactical Basin Plan serves as the implementation plan of the Lake Champlain Phosphorus TMDL and describes the most updated perspective on forestlands phosphorus accounting. The Plan is updated on page 143 to summarize how proposed management activities relate to the Lake Champlain TMDL.

In brief, the TMDL anticipates that the forestlands phosphorus reduction target in the Winooski basin will be fully achieved by state, town, and private landowner compliance with the AMPs. The AMPs were revised in 2018 to meet the intent of Vermont's 2015 Clean Water Act (Act 64) and implementation of the AMPs will ensure that all logging operations, on both public and private forestland, are designed to prevent or minimize discharges of sediment, petroleum products, and woody debris (logging slash) from entering streams and other bodies of water; improve soil health of forestland; protect aquatic habitat and aquatic wildlife; and prevent erosion and maintain natural water temperature. ANR implements the AMPs on all logging jobs on State lands.

The TMDL developed the forestlands phosphorus reduction target with the expectation that land development, agriculture, and forestry operations would continue to operate over the lifetime of the TMDL. The forestlands sector is currently on track to meet, or even exceed, its 2036 phosphorus target for the Winooski basin (1,293 kg/yr achieved as of SFY2023 out of the total 2036 target of 1,904 kg/yr, or approximately 68% of the 2036 TMDL target achieved as of SFY2023). These estimated phosphorus reductions to date are conservative, as ANR currently only accounts for reductions from parcels enrolled in the Use Value Appraisal program after the TMDL baseline period and has not yet credited AMP implementation elsewhere, including on state lands. Estimated annual phosphorus reductions are anticipated to increase as phosphorus accounting methods are implemented for other types of projects in the forest sector.

Comment Theme 66. This LRMP will increase erosion, sedimentation, and water quality decline due to management and development of forest road infrastructure, poor on-site logging practices, and failure to protect riparian buffer zones and wetlands.

Adherence to the AMPs and RMGs will minimize increases in erosion, sedimentation, and phosphorus runoff during Plan implementation. As described above in Comment Theme 65, FPR foresters and timber sale contractors comply with the updated AMPs to minimize water quality impacts from forest lands management and silvicultural activity. AMP compliance reduces sediment and phosphorus runoff from forestry activity by approximately 80% relative to forestry activity that does not implement AMPs (VT DEC 2022 Standard Operating Procedures for Tracking and Accounting of Natural Resource Restoration Projects). AMPs set standards for the maintenance of forested buffer zones around water features; planning harvests near wetlands; the development, maintenance, and closeout of new forest roads, trails, and log landings; and the handling and storage of hazardous wastes. Where active logging is occurring, historic forest road infrastructure that may not otherwise have been addressed must also be brought into compliance with the AMPs providing further reducing erosion and sediment loss.

Comment Theme 67. Not all known water resources are mapped in the LRMP, leading to potential impacts from management activities.

Management actions proposed on state lands generally receive both desktop mapping reviews during project planning as well as field reconnaissance/review by a variety of ANR staff on the DST before harvest of a treatment area is initiated. Therefore, water resources that may not be specifically identified in early planning stages because they are unmapped are still identified and accounted for in the field as a project progresses.

Specifically, areas identified for treatment in this LRMP will receive additional review, inventory and analysis prior to implementing a harvest. A detailed review of special wildlife habitat (e.g., habitat for rare, threatened, or endangered species), significant natural communities, important historical or cultural sites, and sensitive natural features (e.g., streams, steep slopes, wetlands, etc.) will be conducted on each treatment area. A more detailed pre-harvest inventory will also be conducted on each treatment area to collect data and information related to forest health, species composition, stand age, forest structure, soil characteristics, wildlife habitat, and information on forest product quality, value and distribution.

Comment Theme 68. Allowing increased recreational resource development and trail use will impact water resources.

Trail development and maintenance on state lands follow a variety of BMPs to facilitate the user experience while reducing natural resource impacts, including mitigating stormwater runoff. Recommended Trail Standards are available on FPR's webpage and include specific VTDEC Guidance for trail building around wetlands and in riparian areas. All newly proposed or LRMP-sourced trail development and management activities are also reviewed by the Barre DST, including the DEC Watershed Planner, FWD Fisheries Biologist, and FWD State Lands Ecologist to ensure that trail impacts to natural and water resources are minimized.

An overarching strategy of the Plan is to create more resilient trail systems by addressing erosion- and flood-resilience via increasing the size and number of appropriate water diversion

structures (e.g., water bars, bridges and culverts: page 143). Likewise, a variety of more detailed trail management activities described in the Plan (Site-Specific Recreation Management Actions: page 182) include goals of increasing the sustainability of the trail treadway and reducing trail encroachment in wetted areas. Potential trail condition issues have been identified during 2017-2019 assessment work and will be addressed as needed and as resources allow (Plan Appendix 4: "Recreation Assessment Methods and Data"). Such examples of implemented trail management activities in the WRMU, including those with a water quality focus, are available in the Plan (Appendix 2, Table 35: Stand data for the WRMU).

Comment Theme 69. The LRMP's forest management activities will impact aquatic habitat and recreational fishery resources.

As described in the Plan (e.g., Pages 118, 145), the RMGs, AMPs, VT's Road and Bridge Standards, and adherence to state and federal water-related permit requirements guide the maintenance and enhancement of aquatic habitat on state lands within and beyond active timber harvest areas. The benefits of following these guidelines include protected riparian corridors that shade streams, capture overland runoff, stabilize streambanks, and provide organic inputs; improved hydrologically connected forest road and trail infrastructure that supports aquatic organism passage and reduces direct stormwater discharges to streams. Given these guidelines and practices laid out in the RMGs, DFW anticipates the proposed forest management activities will have no impact on the WRMU's recreational fishery. See the Plan's Fisheries Resource Assessment Page 70 and the Vermont Stream Crossing Handbook (VT FWD, 2016) for more information.

Comment Theme 70. ANR should specify its plans for monitoring water quality under the "Monitoring and Evaluation" section of the draft plan to evaluate and adaptively manage LRMP impacts to water resources.

ANR water resource monitoring and assessment is carried out in a five-year cycle for each of Vermont's 15 major tactical basins as described on [DEC's basin planning webpage](#) and in more detail within each Tactical Basin Plan ([2023 Winooski Tactical Basin Plan](#); [2021 Lamoille Tactical Basin Plan](#)). Tactical Basin Plans include a table of possible water resource monitoring needs identified by various state staff and water resource partners, and ANR staff meet before each assessment cycle to prioritize these and other identified monitoring needs.

ANR does not have the capacity for detailed before-after control-impact studies for every management action it takes on public lands. However, baseline water resource data are available in most of the WRMU's major watersheds for both water quality and fisheries resources (see Fisheries Resource Assessment Plan, page 70). We have also updated the Water Resource Assessment section (beginning page 65) describe the location and condition of DEC's available geomorphic and biomonitoring data for streams draining the WRMU, and 2) identify WRMU watersheds that have been identified as a monitoring priority by the Tactical Basin Plan because they lack baseline biomonitoring data (beginning page 68).

Where periodic reassessments of water resource condition indicate any changes beyond expected normal variation in biomonitoring data, further investigation may be warranted. As the Plan states, if monitoring results indicate that there is a significant difference between the

outcomes predicted by the plan and actual conditions, changes to the plan may be recommended. Likewise, the DST can review and support appropriate, more detailed research proposals addressing the long-term evaluation of management activities if proposed by partnering organizations.

Comment Theme 71. Including the Water Resources and Flood Resiliency Assessment section should not be at the discretion of ANR, as currently indicated.

Our intention was to indicate that some ANR-managed lands without significant water resources may not include a Water Resources and Flood Resiliency section; this clearly does not apply to the WRMU. We've deleted this unclear statement from the Plan (Page 65).

Comment Theme 72. Plan management actions are currently protective of the WRMU's Source Protection Area (SPA) for Waterbury, managed by the Edward Farrar Utility District (EFUD). It should continue to protect this and other adjacent sources of public water by minimizing incompatible uses in SPAs and by regularly coordinating with the appropriate SPA managers. The Plan should also address if and how the proposed management activities will impact upland recharge for the protection of groundwater resources and downhill wells.

ANR concurs that the Edward Farrar Utility District (EFUD) Source Protection Area will be minimally impacted by the LRMP's proposed management activities and will coordinate with EFUD if significant management activities are proposed in the vicinity of the Source Protection Area. No management activities are proposed within any other surface water or groundwater Source Protection Area (no others exist within the WRMU), and adherence to the AMPs and RMGs will contribute to reducing hydrologic impacts to all surface and groundwater resources by slowing, spreading, and sinking overland flows in wetland and stream riparian zones as well as actively managed areas (Comment Themes 63, 65 and 66).

Comment Theme 73. Your agency management plan must acknowledge the under-appreciated role of wetland / riparian buffer zones. With weather and extreme events becoming more unpredictable and severe, the importance of buffering on water retention and water quality must be acknowledged in future management efforts. The emphasis on buffer zones translates into making them universally larger, perhaps double what we have done in the past.

ANR agrees with the importance of riparian buffers to provide multiple water retention, runoff reduction, stream equilibrium, water quality, and wildlife habitat functions. Foresters follow *VTANR's 2015 Riparian Management Guidelines* when establishing buffer zones during forest management activities. ANR's reliance on these guidelines for achieving water quality and water retention goals are further discussed in Comment Theme 63, 65 and 66 and in the revised Water Resources Assessment section of the Plan.

These guidelines were established after extensive review of the available scientific literature evaluating the widths necessary to achieve a variety of ecological functions. These findings and references are provided in *VTANR's Riparian Buffers and Corridors: Technical Papers* (VT ANR, 2005) and in Appendices *B: Research Notes* (Pages 28-43), *C: Measuring Stream Riparian Management Zones* (Pages 44-47), and *D: Literature Cited and Bibliography* (Pages 48-57) of the RMGs.

Recreation

Mountain Bikes

Comment Theme 74. There should be more mountain bike trails identified to be built during the span of the next Long-Range Management Plan.

Our assessment of current trails in the Worcester Range Management Unit shows that there is much work that needs to be done to current infrastructure. Because of current staff capacity and funding limitations, the plan focuses on improving existing trails during the next management cycle except for the proposed sustainable loop trail at Stowe Pinnacle (1.11A CE, 3.0, SM 2.5A) and the potential endorsement of an additional 2.5 miles (in addition to the existing 2.5 miles of currently endorsed pedestrian trail) of trail in the Brownsville network (SM 2.5.B). We are open to considering new trails through our recreation proposal process and recognize that new trails can be necessary to make connections and disperse use.

The draft plan also proposes approximately 5 miles of trail on the Brownsville parcel be designated for mechanized management pending infrastructure improvements and the identification of a partner group to support maintenance and management. This approximately 5 miles of trail represents the total allowed trail mileage on the acquired parcel (2.5 currently authorized for pedestrian use and 2.5 additional miles available for authorization with trail improvements).

Based on feedback to the draft plan we have also added a statement of support for the concept of a connector trail between Perry Hill (SM 2.9A) and Little River State Park to the LRMP. A feasibility assessment for this connector trail was performed by the Town of Waterbury and partner groups.

Comment Theme 75. Class 1 electric bicycles should be allowed on mountain bike trails.

Use of electric bicycles cannot be allowed through a LRMP as this is governed by State Land policy. Electric bicycles are not included in Policy 4 which clarifies the use of mountain bikes on State Land. As such, electric bikes are currently categorized as motorized equipment.

Ecological Impacts

Comment Theme 76. The plan should limit additional impacts to the Highly Sensitive Management Areas due to ecological impact concerns.

We recognize that improper trail location, design or use can impact Highly Sensitive Management Areas (HSMAs). Much of the WRMU has no trails, and no expansion of trails are planned in any of the HSMAs in this plan. The DST thoroughly reviews the routes of any proposed new trails and considers the impact on important ecological features, fish and wildlife, habitat, wetlands, water quality, and forest health.

Comment Theme 77. Trails should be updated to the latest standards for sustainability with reroutes and relocations considered as needed.

The infrastructure assessment that was performed to support this plan is also being used to focus maintenance, new infrastructure, and potential reroute efforts aimed at improving

resource sustainability. The installation of trail reroutes is one strategy that will be utilized to reduce user impacts for sections of trail that are susceptible to erosion due to trail layout.

Comment Theme 78. Additional development of trails described in this plan should not occur due to concerns with impact to wildlife.

We recognize that improper trail location, design or use can impact important wildlife habitats. All new trail proposals, both in the LRMP and proposed through the recreation proposal process, are reviewed by the DST, which includes wildlife biologists. Potential impacts to wildlife habitat are considered through the LRMP and recreation proposal processes.

Comment Theme 79. The plan should include more specifically identified new trails instead of relying on the “consideration” of new trails.

The word "consider" is used because review of trail proposals requires rigorous site-specific evaluation by the DST. The DST is a multidisciplinary group of specialists with expertise in the many values of state lands. New trail proposals can be submitted to the DST using FPR's recreation proposal process. We also routinely vet these proposals with partner organizations representing use types. New proposed trails may be significant enough to require an amendment to the WRMU LRMP to allow for public process.

There are a limited number of new trails included in this draft LRMP because, based on our assessment of existing trails, we need to address current infrastructure needs and sustainability improvements in the next management cycle. New trails such as the Brownsville network (SM 2.5B), a sustainable loop at Stowe Pinnacle (1.11A CE, 3.0, SM 2.5A), and the potential for a boardwalk at Moss Glen Falls (HSM 1.8B, HSM 1.11D) have been included because they have been identified as areas requiring management action and have had initial evaluation and reviews performed.

Consideration of additional trails will require a significant commitment from a partner group to support funding, installation, and long-term maintenance and management.

Based on the feedback we have received as part of the draft LRMP review process we will be including the support of a connector trail between Perry Hill and Little River State Park. The initial concept for this route was developed through a FEMA grant issued to the Town of Waterbury. This project will likely require amendment or update to the Mt. Mansfield LRMP.

Comment Theme 80. Protect ecological resources by prioritizing existing trails over new development.

The plan proposes new trails (Stowe Pinnacle loop, Brownsville extension, Moss Glen boardwalk) to address use issues, reduce ecological impact, and manage existing recreation. These new trails address unmanaged and/or excessive use problems and prioritize stewardship of existing resources. In each circumstance land managers have determined that more ecological impacts would occur if no new trails were installed.

Brownsville Forest

Comment Theme 81. Mountain bike use should be allowed at the Brownsville Forest trail network.

The plan proposes that mountain bike use be an endorsed and managed use at the Brownsville network pending:

- An upgrade to infrastructure to achieve sustainable standards and best practices.
- Development of a formal partnership with a maintenance/management group.
- The installation of adequate four-season parking.

Comment Theme 82. Mountain bike use should not be allowed at the Brownsville Forest trail network.

When FPR acquired the parcel and performed an initial assessment there were several factors that made the pre-existing trail network ideal for mechanized designation. It was clear that based on grades, the flow of the trail, and integrated turn radiuses that the existing trail was laid out to accommodate mountain bike use. The Inberno Trail is recognized as the first mountain bike trail installed in Stowe and it has been expressed that this history is important to the user group. The terrain is not steep and as such, allows for a network that could be rated for beginner and intermediate riders, as well as reducing potential erosion issues. In addition, it is also possible for a majority of the network to be built to adaptive mountain bike standards. Limiting the size of the network to five miles and managing for beginner/intermediate use will limit the number of mountain bikes on the network. Allowing for both pedestrian and mountain bike use on this network will also create more support for long-term maintenance and management. For these reasons we will work toward mechanized endorsement of the Brownsville network by upgrading the infrastructure to achieve sustainable standards and best practices, formalizing partnership with a maintenance/management group, and installing adequate four-season parking.

Comment Theme 83. Managed winter use for pedestrian and mechanized activity should be considered at the Brownsville network through this LRMP.

Once a management partner is established and mechanized use is established through the improvement of trail standards, winter recreation management can be considered through DST review and approval.

Perry Hill

Comment Theme 84. More specific new trail corridors at Perry Hill should be provided in the plan.

During the development of the draft LRMP, specific trail corridors were not identified and reviewed by the DST for inclusion in the Plan. General guidance has been included to support partner group planning efforts. New trail proposals will be reviewed by the DST using the state lands new trail proposal process.

Comment Theme 85. Winter use management should continue at Perry Hill.

FPR intends to make the current pilot winter recreation management plan a part of standard management through the WRMU LRMP.

Trailhead Parking

Comment Theme 86. Expanding trailhead parking areas can lead to increased trail use.

Trailhead parking expansion is proposed to occur at locations where overflow parking is causing safety concerns for users and impacts on adjacent landowners. Observation of WRMU trailhead parking areas shows that the size of the parking area does not limit the degree of trail use.

Comment Theme 87. The plan does not call for enough detail for implementing parking solutions associated with the Stowe Pinnacle Trailhead.

Solutions to insufficient parking are typically complex and involve the development of enforceable parking bans, the design and permitting of additional parking area, fundraising, and construction. It is FPR's intent to further develop the Pinnacle Meadow Trailhead to accommodate the overflow that is occurring at the Stowe Pinnacle Trail. Finalization of the WRMU LRMP is the next step in what will be a multi-year process to upgrade the parking area.

Logging Impacts

Comment Theme 88. Trails should be formally buffered from impacts to logging by having a 500' buffer on each side of the trail, conducting harvests in the winter or low use times of the year, and avoiding skid and haul road crossings.

ANR manages state lands for multiple uses, users, and management activities. There are times when uses/management actions overlap and in these circumstances the goals of each use or management action are considered and plans are developed to mitigate conflicts. FPR does not have specific policy for buffering recreation trails from timber harvest activities. Recreation staff work with State Lands Foresters on a site-specific basis to ensure the impacts from timber harvests are minimized.

Comment Theme 89. The recreation values that Hancock and Minister Brook provide should be protected from logging impacts.

Hancock Brook and Minister Brook provide opportunities for recreational fishing and swimming and the setting for other activities, such as hiking. As described on page 119 of the LRMP, ANR's *Riparian Management Guidelines for Agency of Natural Resources Lands (2015)*, *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont (AMPs; VT FPR, 2018)*, VT's Road and Bridge Standards, and state and federal water-related permit requirements guide the stewardship and enhancement of aquatic habitat on state lands within and beyond active timber harvest areas. The benefits of following the guidelines include protected riparian corridors that shade streams, capture overland runoff, stabilize streambanks, and provide organic inputs; well-designed forest road and trail infrastructure that permits fish passage and reduces direct stormwater discharges to streams; and, where appropriate, in-stream manipulations like strategic wood addition that increase aquatic habitat complexity with various flood resilience, water quality, and fisheries co-benefits. Given these guidelines and practices laid out in ANR's Riparian Management Guidelines, DFW anticipates the proposed forest management activities will have no negative impact on the WRMU's recreational fishery.

In addition to the water resource protections on ANR lands, ANR's foresters consider impacts to adjacent recreational infrastructure and experiences when designing timber sales to preserve the desired recreational experience. The Recreation Opportunity Spectrum (ROS) (Page 99) describes the visitor experience that state land managers seek to provide. The state land around Hancock Brook and Minister Brook is designated Semi-Developed Natural, and Semi-Developed Non-Motorized, which are characterized as follows:

- Semi-Developed Natural: Area is a natural-appearing environment. Evidence of the sights and sounds of people are moderate. Sights and sounds of people usually harmonize with the natural environment.
- Semi-Developed Non-Motorized: Area appears to be a predominantly natural or natural-appearing environment of relatively medium-to-large size.

The timber sale near Hancock Brook and Minister Brook will be designed to adhere to these ROS classes to protect the recreation values of the area.

Comment Theme 90. If some timber harvests need to be conducted, eliminate Timber Harvest Tracts #3 (138 acres) and #6 (124 acres) in the Brownsville Recreation Area. These tracts are where the only hiking trails are located (see the maps on pages 149 and 161 of the Draft Plan). The construction and use of logging roads and the harvesting of timber in the vicinity of the trails would degrade the aesthetics and the character of the forest for many years.

ANR manages state lands for multiple uses, users, and management activities. There are times when uses/management actions overlap and in these circumstances the goals of each use or management action are carefully considered and plans are developed to avoid, minimize or mitigate conflicts. During these times each situation is evaluated and support for mitigation efforts can be developed by ANR staff and partner groups. Recreation staff will work with state lands foresters on designing specific operational plans for Treatment Areas #3 and #6 that ensure continued recreational use of the trail before and after the harvest and consider the Recreational Opportunity Spectrum ("semi-developed natural") in layout and tree marking. The importance of recreation on these two treatment areas was highlighted with an update to the implementation schedule starting on page 172, and this schedule also enumerates the natural resource benefits of these harvests.

Comment Theme 91. For Timber Harvest Tracts #9 (264 acres) and #12 (166 acres) near the Mt. Worcester Trail, maintain a wide buffer zone to protect the trail and the streams. Take other steps as determined by the DST to minimize the impact that harvesting will have on these trails.

Recreation staff will work with state lands foresters on designing specific operational plans for Treatment Areas #9 and #12 that ensure continued recreational use of the trail before and after harvest and consider the Recreational Opportunity Spectrum ("semi-developed natural" and "semi-primitive non-motorized") in layout and tree marking. The importance of recreation within these two treatment areas was highlighted with an update to the implementation schedule starting on page 172, and this schedule also enumerates the natural resource benefits of these harvests.

Comment Theme 92. Concerns about impacts of proposed timber harvests on hiking trails, with requests to maintain a 500' buffer on either side of the hiking trail, to conduct harvests in winter when possible, to schedule forestry activities to avoid peak trail use, to refrain from skidding on recreation trails and minimize crossings, to avoid permanent road crossings of recreation trails, and to apply stricter forestry management practices near recreation assets to minimize impacts to hikers.

For each prescribed timber management project that is implemented, FPR develops a plan to limit impacts to recreation resources. Plans are developed by State Lands Foresters with support from the District Outdoor Recreation Specialist and are reviewed by the DST. Typical tactics to reduce recreation asset and user experience impacts include:

- Laying out skid roads to cross recreation trails perpendicular to the path of travel when a trail crossing is necessary.
- Linking visual and noise impacts of timber management activities to management objectives and user experience goals described within the Recreation Opportunity Spectrum. Examples of how this could be applied are buffering management impacts (visual/noise) in more primitive designations, linking trail users to managed areas in more developed settings for educational purposes.
- Conducting timber management in winter when appropriate to reduce impacts to soils and have work occur at a time of year with less recreational use.

Other

Comment Theme 93. The plan should directly address the need for more accessible recreation.

Based on draft feedback from the public we have added further support for accessible recreation in the WRMU LRMP. This includes the evaluation of current and proposed mountain bike trails for adaptive bicycle accessibility, identifying the opportunity to create an accessible trail at the Brownsville network that would allow for access to a managed meadow with overlooks of a beaver pond and views of the Mansfield Range and installing a beach mat that would allow wheelchair access to the water at Elmore State Park beach.

Comment Theme 94. The plan limits the ability to have new trails in Highly Sensitive Management Areas.

The protection of areas that contain uncommon or outstanding biological, ecological, geological, scenic, cultural, or historic significance is typically the primary consideration for management within Highly Sensitive Management Areas (HSMAs). The primary management values are identified in the land management classification. New recreation trails and corridors can be considered in the HSMA land management classification if the impacts of the recreation resource on the primary values for which the HSMA was designated will not compromise the exceptional features highlighted in the HSMA.

Comment Theme 95. ATV and snowmobile access for emergency response to Worcester Range peaks should be integrated into the LRMP.

FPR works with the Department of Public Safety and local emergency response to ensure first responders have vehicular access to the WRMU. Recent work occurred to Pinnacle Meadows and Middlesex forestry roads to support management and emergency access. If an additional access corridor is desired, proposals can be submitted through the recreation proposal process. ATV use is allowed on FPR managed lands for management purposes, and emergency response.

Comment Theme 96. Can more information be provided about what best practices and sustainable design are for trails?

Sustainable guidelines set forth best practices and standards for the development and management of trails, to reduce degradation to the tread and adjacent resources, and limit the need for annual maintenance. Many trails within the WRMU were built before current sustainable guidelines and best practices were developed. To achieve sustainable trails constructed in accordance with best practices we either improve current trail infrastructure, add trail infrastructure where needed, install reroutes of short sections of trail, or create new trails built to current standards. Sustainable guidelines and best practices used by state land recreation managers to upgrade or build new trails include those developed by the US Forest Service, the Professional Trail Builders Association, and by representative organizations for the wide variety of user groups that help maintain and manage trails, depending on what type of trail is being constructed. Recreation managers also follow permitting requirements, OSHA and other building regulations, and specifications and standards unique to trail infrastructure. FPR maintains a list of trail standards on the department's website:

<https://fpr.vermont.gov/recommended-trail-standards>.

Comment Theme 97. Backcountry skiing should be considered a primary management goal for the WRMU. This includes allocating land usage and allowing trail development and stewardship in all management zones including the Highly Sensitive Management Areas (land use category 1) shown on Map 36. In particular for all the 1.11 (A, B, C, D) areas, 1.8(A, B) areas, 2.5A areas, and the 3.0 areas.

Backcountry skiing without trail development or tree cutting or trimming can occur anywhere on the landscape in winter. As such, it is considered a dispersed use that is allowed on state lands unless otherwise noted. Given the many objectives for the WRMU, and the goal of managing for multiple uses, the DST is not designating this single activity as a primary management objective. Additionally, cutting and/or pruning trees to improve backcountry skiing is a managed use that can only legally occur if permitted by FPR.

It is understood that legal backcountry skiing is occurring throughout the WRMU. Unfortunately, illegal cutting, and a pattern of use that has contributed to management issues, has been identified in the Stowe Pinnacle area. For this reason, this geographic area was called out in the draft plan. To manage this use FPR seeks to work with a partner group representing the backcountry ski user-base. FPR District 4 land managers aim to engage with representatives of the user-group to better plan for this activity and evaluate potential locations for management through the recreation project proposal process and apply management guidance developed in the Backcountry Ski Manual.

Other managed backcountry ski trail/glade locations can be proposed to the DST through the recreation proposal process. These locations may require an amendment to the LRMP.

Comment Theme 98. The management action of "monitoring for unauthorized cutting of trees and shrubs for the purposes of backcountry skiing" should be changed to "collaborate with local backcountry skiers and organizations to approve permission to create new backcountry ski trails following the guidelines including in the Vermont Backcountry Ski Handbook."

Cutting trees on State Land is illegal unless done with specific permission from the State. Any person who cuts, trims, or damages any vegetation on State land without permission may be subject to civil or criminal prosecution including violations and fines. This prohibition applies to unauthorized cutting associated with backcountry skiing, which can include cutting trees or shrubs, pruning or trimming trees or shrubs or causing any damage to vegetation. The so-called "Timber Trespass Law," Chapter 77 of Title 13 of the Vermont Statutes Annotated, also applies, and defines "timber" as including "sprouts from which trees may grow, seedlings, saplings, bushes, or shrubs that have been planted or cultivated by a person who owns or controls the property where they are located." Other criminal and civil statutory provisions may also apply to unauthorized cutting or trimming of vegetation on State lands, and the Agency has and will pursue such violations, on a case-by-case basis. Illegal cutting is not acceptable. Illegal cutting associated with backcountry skiing has been observed on many State Lands parcels, which is why the management action of monitoring for unauthorized cutting of trees and shrubs was identified and included in the Plan.

FPR is willing to work collaboratively with any well-organized backcountry skier user group to address recreational needs/desires and to identify and propose potential areas where management of this activity could include the establishment of backcountry ski trails through the recreation trail proposal process. However, such uses have not been included in the Draft Plan because evaluation of potential resource impacts and the identification of a partner group to support management have not yet occurred.

Management Planning Process

Comment Theme 99. Request for clearer description of next steps in the process.

The current process for developing a LRMP is described on the Department of Forests, Parks and Recreation [website](#), and in [FPR Policy #21: State Lands Management Planning](#).

The timeline for the WRMU LRMP planning process is outlined below:

- *Natural Resource Assessments*: 2019-2020. Some assessments were completed before this date, but compiling of the assessments began in 2019.
- *Public Scoping*: June 20-August 3, 2020. This process is described on page 10 of the LRMP.
- *Draft Plan Development*: August 4, 2020 – December 2023.
- *Public Comment*: December 13, 2023-February 2, 2024.
- *Final Draft Development*: In Progress.

- *Final Draft Release:* TBD.
- *Implementation:* As outlined in the LRMP.

Comment Theme 100. Perception that the WRMU LRMP process is fundamentally flawed.

ANR staff complied with all requirements of statute, rule, procedures and policies applicable to planning for the management and use of State lands. ANR staff provided public scoping input opportunities as well as public comment public meetings and opportunity to provide written public comments. ANR staff have reviewed, considered and responded to all public comments received and, where appropriate, have modified the Draft LRMP. ANR staff also responded to questions of the public after the scheduled public meetings were held on the WRMU Draft Plan to answer questions and assist the public in their understanding of the Draft Plan and provide their written public comment.

There is no statutory requirement for ANR to provide a public scoping or input process related to land management planning. Rather, the General Assembly has authorized ANR and the Commissioners of FPR and FWD to manage and plan for the use of public lands consistent with the statutory policies associated with those Departments and lands (Chapter 83 and 103 of Title 10 of the Vermont Statutes Annotated). FPR adopted *Policy #21: State Lands Management Planning* (1995) to establish the process and requirements for land management planning for public lands. FPR Policy #21 includes a public involvement component for land management planning and *ANR Policy: Public Involvement in ANR Lands Management* (2002) guides the public involvement process.

This planning process has entailed the opportunity for extensive public input, including responding to individual questions and communications after the public meetings. ANR has considered all public comments and has made changes to the plan in response to suggestions that are compatible with ANR and its Departments' missions, ANR lands management principles, and fiscal constraints. Therefore, not all public comments and suggestions are incorporated into a final LRMP.

Comment Theme 101. The WRMU LRMP effort should not proceed until a LRMP rule is in place.

There is no statutory requirement to adopt rules governing the Long-Range Management Planning process. See Comment Theme 103 below. ANR and its Departments have policies that provide for the LRMP process, including public involvement. See Comment Theme 100. These policies allow ANR to plan for the management of public lands, in a manner that provides opportunity for public input and considers a broad range of public uses and benefits. The General Assembly has authorized FPR to manage and plan for the multiple uses of state forest and park lands consistent with the statutory policies and purposes set forth in Chapter 83 of Title 10. This specifically includes providing for the conservation of forest lands and simultaneously providing for multiple uses of those lands in the public interest, including recreational uses and forest management activities.

ANR initiated pre-rulemaking public engagement on a draft LRMP rule in August 2024 and anticipates beginning rulemaking in winter 2025. ANR has policies and procedures in place to

guide our management planning that will continue to be followed until a new LRMP rule is in place. Public pressures on state-owned lands are only increasing; it would be irresponsible to halt all management planning and use of state lands while ANR proceeds with any rulemaking process.

Comment Theme 102. Perception that the LRMP process is being rushed. Requests to slow process down, generally.

The timeline of the development of the WRMU LRMP, as set forth above in Comment Theme 101, is consistent with our average pace of planning. Finalizing the LRMP will allow the ANR to proceed with implementation of the plan and will provide clear public benefits. These benefits include enhancing forest resilience, wildlife habitat and recreational infrastructure.

Comment Theme 103. Comments raising legal issues, including stating that ANR is required to adopt rules governing the Long-Range Management Planning process for state lands; timber harvesting is not mandated by statute; water quality monitoring, AMPs and public trust doctrine.

As stated in the introduction section, the Responsiveness Summary is not intended to provide a judicial review of all legal requirements and is not a form for full legal briefing of any legal issues raised in public comments. However, ANR responds in general to some legal issues raised below.

Title 10 V.S.A. §2603 does not require FPR to adopt rules governing the land management planning process. 10 V.S.A. §2603(a) directs the Commissioner to implement the policy and purposes set forth in 10 V.S.A. §2601 which includes the economic management of its forests and woodlands, to sustain long-term forest health, integrity and productivity, to maintain, conserve and protect soil resources, control forest pests, alleviate flood, soil erosion and lessen forest fire hazards. There is no statutory requirement to adopt a rule to address these policies and related activities in 10 V.S.A. §2603(a). Likewise, 10 V.S.A. §2603(b) does not require the adoption of rules, but explicitly authorizes the Commissioner to implement the policies and purposes of the chapter, to promote and protect the natural, productive and recreational values of state lands and to provide for multiple uses of state lands in the public interest. Further, 10 V.S.A. §2603(b) specifically authorizes the Commissioner to sell forest products from state lands and does not require the adoption of a rule to do so. Finally, 10 V.S.A. §2603(c) requires the adoption of rules for the use of state forest and park lands, including reasonable fees for such uses. All the language in 10 V.S.A. §2603(c) relates to the establishment of fees for uses of state lands, including for state parks and for timber sales.

As noted above, 10 V.S.A. §2601 specifically requires the Commissioner to comply with and implement the policies and purposes of chapter 83 of Title 10. Productive and economic management of forests and woodlands including on state lands, is an express policy and purpose of 10 V.S.A. §2601. Additionally, there are many other statutory provisions in Title 10 that support the productive and sustainable forest management of state lands. The Commissioner is required to implement these policies in effecting and planning for the management of state lands.

Water quality monitoring for logging or forest management activities is not required by the Public Trust Doctrine, the Clean Water Act (as delegated to ANR and implemented in Chapter 47 of the Vermont Statutes Annotated) and the AMPs.

The EPA delegated implementation of the Clean Water Act to ANR DEC through the Vermont Water Quality statutes (see VSA Chapter 47, et.seq) and the Vermont Water Quality Standards. Logging operations that are in compliance with the AMPs are exempt from the discharge permit requirements of 10 V.S.A. §1259(f), the stream alteration permit requirements of 10 V.S.A. §1021(f), and the stormwater permit requirements of 10 V.S.A. §1264(d)(1)(C). Monitoring of every logging operation for water quality impacts is not required by these laws and rules. The AMPs are designed to assure compliance with the Vermont Water Quality Standards. The Vermont Legislature has approved this approach in the above cited statutes and in 10 V.S.A. §2622(b) and through LCAR approval of the AMP Rule in 2018 (and prior adopted versions).

ANR received references to various scientific literature in support of some comments. In some cases, the cited literature has been misapplied or mischaracterized and does not support the commenters' claims. ANR staff relied on their education and years of expertise in making these determinations. For example, Lamoille County Vt., Landscape-Based Forest Stewardship: Lamoille County Vermont, (2012), was cited for the proposition that "[t]imber harvesting in unfragmented forests is known to have negative effects on water quality." The referenced citation states, "Poor forestry practices on one parcel can have negative impacts on water quality and forest health on an entire watershed." The preceding sentence states that "Forests can be managed and harvested responsibly, and there are many responsible foresters and loggers in Lamoille County." See Lamoille County VT, pages 44-45. Other cited sources likewise support the fact that implementation of the AMPs mitigate impacts of logging and are protective of water quality⁹⁶. ANR ensures and requires that the AMPs are appropriately implemented on all timber harvesting and forest management activities that occur on State lands, protecting water quality and preventing soil erosion, and in compliance with State laws and Rules.

Similarly, the TMDL does not require water quality monitoring on every logging job in Vermont, including on State lands. The TMDL anticipates that the forestlands phosphorus reduction target in the Winooski basin will be fully achieved by state, town, and private landowner compliance with the *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont (AMPs; VT FPR 2018)*. The TMDL developed the forestlands phosphorus reduction target with the expectation that land development, agriculture, and forestry operations would continue to operate over the lifetime of the TMDL. See response to Comment Theme 65 for a complete discussion of this topic.

Finally, the Public Trust Doctrine does not require water quality monitoring on every logging job on state lands and does not require that ANR conduct pre-decisional water quality analyses

⁹⁶ Shah et al. (2022). The effects of forest management on water quality. *Forest Ecology and Management* 522: 120397. <https://doi.org/10.1016/j.foreco.2022.120397>

prior to timber harvesting on state lands. The Vermont constitution provides “The inhabitants of this State shall have liberty in seasonable times, to hunt and fowl on the lands they hold, and on other lands not enclosed, and in like manner to fish in all boatable and other waters (not private property) under proper regulations, to be made and provided by the General Assembly” (Vermont constitution Chapter II §67).

The Vermont General Assembly has codified many regulations, or laws, governing water quality protection, none of which require pre-decisional or ongoing monitoring for timber harvests or logging. Rather, the General Assembly has codified statutory requirements, and through LCAR has approved the AMP Rules. Additionally, the Vermont General Assembly supports the sustainable management of the State’s forests in numerous statutory provisions and has declared that the conservation and the sustainable economic management of the State’s forests and woodlands is in the public interest. For example, see Chapters 82, 83, 85, 87 of Title 10, Chapter 207 of Title 6, Chapter 196 of Title 12, Chapter 117 of Title 24, and Chapter 124 of Title 32 of the Vermont Statutes Annotated.

Comment Theme 104. How will ANR keep the public up-to-date on its management successes and difficulties regarding LRMP goals? How often will the ANR seek public input about its management of the Worcester Range?

DSTs develop Annual Stewardship Plans (ASPs) each winter to catalog the suite of management actions that will occur in the upcoming year. These are typically finalized by April and are available upon request. There is no public comment associated with the development of Annual Stewardship Plans, although Agency staff will receive public comment at any time regarding ANR lands management. The LRMP also articulates ongoing monitoring goals for the LRMP which are tied to the management goals (see Section V: page 195); results of these monitoring efforts are available upon request. ANR’s Policy on Public Involvement in ANR Lands Management provides a helpful overview of the public involvement principles that guide our work.

Comment Theme 105. I ask for a full series of public hearings to learn more from all quarters of the state on the wisdom of this draft plan.

Residents from the across the State of Vermont have been provided with an opportunity to review and comment on this draft plan. The in-person public information meetings were recorded and posted on our website so that anyone who was not able to attend in person could learn more about the plan and provide public comment. Attendance at the public meeting was not required to submit a public comment. More information about the public process supporting the development of this plan can be found on page 10 of the LRMP.

Comment Theme 106. Continue to use Story Maps and other online mapping platforms to solicit input and share information. This was an effective and engaging way to share a wealth of critical information about the WRMU with the public. We hope the State will continue to use this platform to engage the public and its partners in the development of Long-Range Management Plans. It is especially helpful to have the maps presented as interactive data, as it is often hard to present a similar level of detail in page-map format. If possible, it would also helpful to present the all of the planning and resource data together in an interactive

web map, such as ANR Atlas, to facilitate toggling layers on and off and seeing how various plan elements overlap with each other.

This is a great suggestion; we will attempt to incorporate this in future planning efforts, though our success may depend on budget, staff capacity and skill.

Comment Theme 107. How are the management actions in the plan executed? What happens after the plan is approved?

Once a LRMP is approved by ANR leadership, management actions identified in the plans are planned and executed based on the goals, strategies, and actions of the plan. Each of the ANR's five district offices prepare Annual Stewardship Plans (ASPs) which describe all planned stewardship activities for ANR lands in the district for the upcoming year. The ASP includes activities from all current LRMPs based on the timing of activities as identified in the plan, the availability of staff and/or funding to accomplish LRMP goals, and/or to respond to new conditions on the ground provided they are consistent with existing LRMPs. In addition to complying with all statutes, regulations, policies, procedures, conservation easements, deed restrictions and permit requirements, ASPs undergo a thorough review by resource specialists and leadership from ANR. New recreation proposals can be submitted through the recreation project proposal process; see Comment Theme 79 for more information. More information on the planning process can be found at https://fpr.vermont.gov/state_lands/lands-management-planning.

Comment Theme 108. Request to more explicitly incorporate the Tropical Storm Irene report.

The commenter did not identify the report they are referencing. If it is the *Enhancing Flood Resiliency of Vermont State Lands* report, we refer the commenter to Comment Theme 109.

Comment Theme 109. ANR should follow the recommendations from the 2015 Enhancing Flood Resiliency of Vermont State Lands report.

Response: ANR occasionally commissions reports by experts external to the Agency to advise on topics of interest or importance. These reports generate new concepts or ideas for consideration and discussion by Agency staff. When these concepts are compatible with Agency or Department missions, goals, policies, procedures, practice, and statute or rules, some of the proposals may be incorporated into those policies and practices. However, some proposals may not be consistent with Agency missions, goals, policies, practice and statute or rules, particularly with respect to the balancing of multiple uses and purposes of the management of state lands, and thus may not be reflected in such policies and management actions in whole or in part.

Many of the flood resilience concepts identified in the 2015 Flood Resiliency Report either already existed, or have since been incorporated into, our practices for managing state-owned lands. The AMPs were updated in 2018 to reflect best practices for management of water quality on logging jobs in Vermont. The 2015 ANR Riparian Management Guidelines reflect best practices for protecting riparian areas on Agency-owned lands.

Comment Theme 110. The plan does not detail how it aligns with the Global Warming Solutions Act and/or the Vermont Climate Action Plan.

The Climate Action Plan (CAP) required by the Global Warming Solutions Act (GWSA) promotes the conservation and restoration of Vermont forests as well as utilization of forest management practices that sequester and store carbon on forest land. In addition to the CAP, the GWSA sets a net-zero target for the state by 2050. In service of that requirement, staff from the Climate Action Office are collaborating with experts across state government and other states to better understand the role that Vermont’s natural and working lands play in carbon sequestration and storage, climate adaptation, and ecosystem and community resilience, as well as what types of businesses depend on these forest resources. This LRMP is well aligned with relevant goals from the GWSA and the CAP to achieve long-term sequestration and storage of carbon and to achieve climate mitigation, adaption, and resilience on natural working lands with the goal to incorporate a balanced approach of both passive management and active management strategies during the plan cycle to increase long-term sequestration and promote carbon storage. In areas where active management is implemented, harvested timber will produce durable wood products storing carbon or replacing fossil fuel usage in heat and electricity. Further, forest management can contribute to increased sequestration through thinning practices or by producing young forests.

Of the more than 120 actions developed by the Agriculture and Ecosystems Subcommittee as part of Vermont’s Climate Action Plan (CAP), three specific actions are the responsibility of state lands directly, and an additional 13 more general actions will connect to, depend on, or inform state lands management. Many of the actions in the CAP are formulated to affect policy and practice at a higher level than individual unit plans, but some actions can be tied to unit-level strategies. There are five actions listed in the CAP that align with or will be supported by the strategies and actions within the WRMU LRMP:

19 Pathway 1 – Adaptation: Sustain, restore, and enhance the health and function of Vermont’s natural and working lands to help both natural and human communities adapt to climate change	
19b Promote and incentivize Climate-Adaptation forest management practices	
Vermont CAP Action	Connection to the WRMU LRMP
Where appropriate, promote planting future climate adapted tree and crop species	Where compatible with policies and natural resource management goals, planting of climate adapted tree species may accompany forest management activities, as has been done in Groton State Forest as part of a co-produced study with UVM on the effects of climate change on regeneration and forestry practices.
19c Promote funding for nature-based solutions and traditional ecological knowledge efforts and incorporate into state funding and planning efforts (merged two strategies)	
Vermont CAP Action	Connection to the WRMU LRMP

<p>Include Tribal members, traditional ecological knowledge traditional ecological knowledge (TEK), youth in state, regional and municipal resource management planning</p>	<p>The state lands LRMP process includes public involvement steps in a variety of media and a range of venues and methods for learning about the plan and providing comments, with an intended outcome of incorporating input as many voices as possible in the state.</p>
<p>19d Manage natural and working lands for biodiversity, forest health and climate resilience</p>	
<p>Vermont CAP Action</p>	<p>Connection to the WRMU LRMP</p>
<p>Support research efforts to better understand forest ecosystems, local climate change and impacts to forests and ecosystem services</p>	<p>Overall unit-wide goals for forest management include providing opportunities for research (p 124), as well as specific plans to support appropriate and compatible research on long-term outcomes of forest management (p. 187) and climate change impacts on forest ecosystems (p. 188). ANR has historically worked with a number of academic research partners to conduct a range of environmental research on state lands, including ongoing work on Groton State Forest and Camel’s Hump State Park.</p>
<p>Through direction to VT Fish & Wildlife and VT Forests, Parks and Recreation, establish primary land management objectives of protecting and improving forest health and biodiversity on state lands, and private lands enrolled in UVA; and promote adoption of these objectives through outreach to regional and municipal planners.</p>	<p>This plan establishes primary land management objectives centered on protecting and improving forest health and biodiversity on state lands through multiple goals and strategies. The draft plan is also consistent with Vermont Conservation Design (VCD) which identifies a range of features at multiple scales that are highest priority for maintaining ecological function. Numerous unit-wide strategies related to these goals can be found on pages 134 through 138, and are further enumerated by resource or focus area (wildlife, forest management, climate change) on pages 138 to 147.</p>
<p>22 Pathway 4 – Landuse: Shape land use and development that support carbon sequestration and storage, climate resilience and adaptation, and natural and human communities for a sustainable and equitable future</p>	
<p>22b Include biodiversity and resilience goals in the planning and management of natural and working lands (both public and private).</p>	
<p>Vermont CAP Action</p>	<p>Connection to the WRMU LRMP</p>
<p>Improve statewide forest planning efforts on State and Federal Lands, including development of an action plan by ANR for how state lands will help accomplish Vermont Conservation Design targets by 2030 and 2050, and collaborate with the U.S. Forest Service (Green Mountain National Forest)</p>	<p>While this LRMP does not set a statewide action plan for how state lands will help accomplish VCD targets, there is ample discussion of how this plan is designed to contribute to VCD goals throughout. Refer to . There were some comments that forest management is focused in Worcester and not in</p>

<p>planners for more unified forest planning across the state.</p>	<p>Stowe. Additionally, some commenters expressed concern about the disproportionate impacts of trucking to one area or town. There were requests for more explanation of these decisions. for more discussion of the incorporation of VCD goals within the LRMP.</p>
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Comment Theme 111. The WRMU planning process should not proceed until the Act 59 conservation planning effort is complete.

Act 59, the Community Resilience and Biodiversity Protection Act (CRBPA), was enacted to require a detailed assessment of existing conserved lands and to develop a conservation plan to achieve a balanced portfolio of conserved lands with a target of 30% conserved lands by 2030 and 50% conserved lands by 2050. Act 59 provides definitions of three conservation categories: ecological reserve area, biodiversity conservation area, and natural resource management area. The legislature tasks the Vermont Housing & Conservation Board (VHCB), in consultation with ANR, with creating “an inventory of Vermont’s conserved land and conservation policies...” by (or before) July 1, 2024. The inventory includes “an assessment of how State lands will be used to increase conserved ecological reserve areas.” The Act also requires VHCB and ANR to “develop a plan to implement the conservation goals of Vermont Conservation Design” on or before December 31, 2025. ANR staff are actively engaged in this inventory and planning effort alongside many other conservation partners. All lands that comprise the WRMU are among the existing conserved lands in Vermont that will be inventoried and count toward the total land currently conserved - becoming the baseline for the conservation plan which will serve as the road map to meet the 30x30 goal.

The legislature specifically recognized the critical role that working lands play in overall land conservation in Vermont, as well as the importance of sustainably managing state and private conserved lands to achieve the goals of Act 59. The biodiversity conservation area and natural resource management area categories specifically include sustainable management to achieve the goals, including sustainable forest management activities. Also, the ecological reserve area does not prohibit management activities but requires that the goal of any management be to maintain a natural state where ecological processes may proceed with minimal interference. The Legislative Findings of Section 2 of Act 59 recognize the importance of sustainable forest and land management activities and require VHCB and ANR to consider the Forest Futures Strategic Roadmap and how that interacts with and supports the goals of the Vermont Conservation Design and Staying Connected Initiatives in establishing a balanced portfolio of conserved lands.

Some public comments oppose harvesting timber in the WRMU and call for ANR to halt the LRMP process until the Act 59 conservation planning effort is complete. It would be impractical to pause management planning for state lands until the Act 59 conservation planning effort is complete. In addition to the Act 59 inventory and planning effort, there are a number of other important planning efforts in varying stages that have the potential to inform state land management activities including the Forest Futures Roadmap, Move Forward Together Vermont, the Wildlife Action Plan and Parks Modernization Study. There will never be a time

when the next guiding plan is not in progress; if ANR made the decision to pause planning to capture the outcomes of related plans, we would never develop LRMPs and ANR would halt all management actions on state lands, including wildlife habitat improvement, forest roads and water quality improvements, recreational improvements, and others. This could include potentially restricting some public uses of the state lands as well. Act 59 does not require such a pause, and the impact from such a pause could be contradictory to the overall goals of Act 59.

Similarly, if ANR applied a rationale for pausing any activity with the potential to be informed by other planning efforts, much of the work carried out by ANR focused on state land including land conservation would also be affected. These statewide plans are incorporated into the LRMP efforts, as relevant, on a rolling basis and as they are adopted. Additionally, ongoing land conservation efforts of VHCB and ANR that continue to conserve lands in Vermont that will ultimately contribute to the goals of Act 59, should, under this theory of the commenters, also be paused until the conservation plan is completed to ensure that conservation efforts match the conservation plan. This would also be counter-productive to the overall purpose and goals of Act 59.

Act 59 does not require that VHCB and ANR halt all ongoing land conservation effort or halt all land management activities on state lands, including preparing and adopting updated Long-Range Management Plans.

Comment Theme 112. Designate the Worcester Range an Ecological Reserve.

We believe these comments are specifically referencing the “Ecological Reserve” category in Act 59. The Department of Forests, Parks and Recreation has a mission to manage for multiple uses, purposes and goals (see generally 10 VSA 2603). FPR conducts land management planning efforts in collaboration with Fish and Wildlife and Environmental Conservation staff of ANR (as discussed more fully in other comment responses) to achieve conservation of all natural resources, improvements to those resources to achieve the multiple goals of all three departments in ANR. The WRMU LRMP identifies areas and proposed management that contributes to multiple conservation goals and strategies and aligns with the goals of Act 59 and Vermont Conservation Design, among other planning efforts.

The WRMU specifically increases the acreage of the Highly Sensitive Management Area, which is consistent with Act 59. Designating the entire WRMU as an Ecological Reserve would not be consistent with Act 59 or statutory requirements of FPR to provide for multiple uses and purposes of state land and would likely result in a significant change to existing recreational uses on the WRMU itself that may not be supported by the public. For all of these reasons, ANR declines to designate the entire WRMU as an ecological reserve as defined by Act 59 but has increased the acreage of land that will qualify as that designation by 309 acres in the final Plan. See Comment Theme 111 regarding requests to pause the WRMU LRMP process until the Act 59 process is complete.

Comment Theme 113. It appears that the land use classification was done based on constraints rather than opportunities, and any area that was not described as infeasible for active timber management is scheduled for a timber harvest. We do not believe that this

approach will lead to the best resource outcomes and would encourage the State to adopt an approach based on establishing desired future conditions and opportunities to advance them, and planning management activities around those.

As part of the planning process, the lands, resources, and facilities held by the ANR are evaluated and assigned to the appropriate land management category. The DST assigned the management categories based on resource goals and the characteristics of resources identified on the WRMU. The resources that are assessed in developing the LMC include natural communities, plants, and wildlife as well as recreation, historic, forest, and water resources. While classifications are based on resources and related goals, the LRMP creates opportunities to sustain and enhance resources by implementing strategies such as managing for forest resilience, old growth forests, wildlife habitats, and recreation.

Comment Theme 114. Timber harvests are to occur in 13 designated parcels over a 12–14-year period, the annual harvests averaging 0.5% of the entire MU area. These harvests appear to be targets. What is to prevent the ANR from unilaterally deciding to increase the size and scope of any of these planned cuts?

ANR initiates an LRMP amendment process when “significant changes to the plan are proposed,” which include: “1) substantial changes to any goals, management objectives, and implementation actions contained in the current plan; 2) major change in land use, land classification, or species management direction...” (ANR LRMP Planning Binder). The scenario described in the comment would require an amendment to the LRMP. The LRMP amendment process involves public comment.

Comment Theme 115. All long-range plans should ... document the amount of CO2 each project area sequesters.

The sequestration rate of a project areas is not the only determinant of forest condition and associated management needs, and quantifying carbon sequestration with accuracy is a resource-intensive endeavor, making this recommendation impractical. Further, measuring carbon sequestration involves monitoring changes in biomass, soil organic carbon, and carbon fluxes over time requiring long-term datasets which we do not have to implement in this LRMP. Sequestration is one of many services provided by forests related to climate change mitigation and resilience; see the Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests for how the forest management in the WRMU Plan supports resilience and adaptation of forests to climate change. Carbon is sequestered and stored in growing vegetation and soils.

Quantifying the carbon sequestration by trees in a specific project area requires either modeling based on current composition and general site conditions or measurements requiring extreme precision of tree growth over time.⁹⁷ The level of effort required to collect detailed

⁹⁷ Smith, J.E., Heath, L.S., Skog, K.E., Birdsey, R.A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p.
<https://doi.org/10.2737/NE-GTR-343>, and Pearson, T. R. H., Brown, S. L., & Birdsey, R. A. (2007). Measurement

tree measurements over time that can quantify sequestration on a specific project area is beyond the capacity of ANR staff and is not the best use of resources given the many competing demands on state lands management. Modeling can be helpful for understanding sequestration rates for larger areas but will not represent a harvest area accurately without detailed underlying forest inventory data. The data collected for LRMP development cannot support this modeling. Carbon storage can be estimated more accurately from the finer scale inventory data collected during project development) but cannot quantify sequestration accurately. Given that a more detailed pre-harvest inventory will be conducted after the LRMP is adopted as part of the development and analysis of proposed timber sales, this data collected—forest health, species composition, stand age, forest structure, soil characteristics, wildlife habitat, and information on forest product quality, value and distribution—may then be utilized to account for rough estimates of carbon storage dependent on staff capacity.

Other

Land Conservation

Comment Theme 116. The community worked to expand the protection of the CC Putnam State Forest that covers the Worcester. Those donating had the understanding that the land would be protected. Yes, primarily from development, but also from logging.

The Vermont Department of Forests, Parks and Recreation secured funding for the Hunger Mountain Headwaters conservation project through the federal Forest Legacy Program. The Forest Legacy funding application emphasized the benefit of continued forest management on this parcel and the selection and funding of the project was based in part on continued forest management (Forest Legacy LWCF Application: Hunger Mountain Headwaters, 2017). This funding made the project possible and ultimately led to the protection of 1,877 acres as additions to C.C. Putnam State Forest. VT FPR administers the Forest Legacy Program as a working forest conservation program and no forest management restrictions were imposed on any of the project's tracts prior to acquisition. The parcels acquired through the Hunger Mountain Headwaters conservation project are now subject to the public planning process for the long-range management of the Worcester Range Management Unit.

Comment Theme 117. Some commenters requested more information about the Department's land acquisition strategy, including information about conservation project identification, funding strategies, and conservation partnerships. These same commenters stated their support for ongoing land acquisition as a management strategy to protect unsecured lands with significant resource values and to advance management goals related to public access, timber harvest, and wildlife habitats.

FPR works with a variety of partners to protect land around the Worcester Range Management Unit. In recent conservation efforts involving the Worcester Range, VT FPR has worked with Stowe Land Trust, Trust for Public Land, The Nature Conservancy, Vermont Land Trust, Waterbury Land Initiative, and Vermont River Conservancy. FPR has also used, and continues to explore, a suite of funding sources to protect land in the Worcester Range, including the federal

guidelines for the sequestration of forest carbon (NRS-GTR-18; p. NRS-GTR-18). U.S. Department of Agriculture, Forest Service, Northern Research Station. <https://doi.org/10.2737/NRS-GTR-18>.

Forest Legacy Program, the federal Land and Water Conservation Fund, state funds from the Vermont Housing and Conservation Board, and local funds raised by FPR's conservation partners. FPR acquires land and interests in land to protect a wide range of conservation values, including natural values, scenic values, recreational values, and historic values, and uses Vermont Conservation Design to review and guide its conservation efforts. See section VIII. Future Acquisition/Disposition in the WRMU LRMP for reference (page 232). Long-range management plans are primarily focused on the management of existing lands, not as a tool for future acquisition which may be impacted by many factors not considered within an LRMP, including partner organizations, funding, conservation goals, etc.

Comment Theme 118. Northeast Wilderness Trust is currently working to donate a permanent forever-wild easement on the Woodbury Mountain Wilderness Preserve, making two reputable conservation organizations responsible for its protection and ensuring that this protection is as durable and permanent as possible. We challenge the state to do the same with the Natural Area and HSMAs in the Worcester Range Management Unit.

We appreciate that the Northeast Wilderness Trust is working to further protect certain values at its Woodbury Mountain Wilderness Preserve. As an owner of public land, the State of Vermont manages its lands for a suite of public uses and values. In some situations, ANR acquires land that is subject to a conservation easement typically required by the funding source for the acquisition, but ANR does not convey conservation easements on land currently owned and managed for multiple public uses and benefits. Instead, ANR, through the LRMP development process, assigns Land Management Classifications that guide management to appropriately protect natural resources and allow for a range of public uses.

Management Goals

Comment Theme 119. Add to ANR goals: To protect Vermont's spectacular viewsheds as viewed from strategic locations.

Please see the Scenic Resource Assessment, available on page 131.

Comment Theme 120. We would encourage the State to consider its resource-based goals when determining land use classification and let funding and capacity restrictions inform implementation. The State should not prevent itself from the possibility of doing good work because of prejudgment around financial feasibility.

This is an accurate characterization of our current process. Land use classifications are assigned with "resource-based goals" in mind, and implementation actions more accurately reflect staff capacity and funding realities.

Comment Theme 121. Why is providing wood products a goal specifically for this Unit?

One of the many uses for state lands in the public interest includes demonstrating exemplary forestry and providing sustainably produced wood products when compatible with resource management objectives and all the other demands on public land. Specifically, 10 VSA 2603(b) provides that "[t]he Commissioner shall manage and plan for the use of publicly owned forests and park lands in order to implement the policy and purposes of this chapter, promote and protect the natural, productive and recreational values of such lands, and provide for multiple uses of the lands in the public interest." As sustainable forest management includes the use of

timber harvests to achieve long-term goals efficiently and at scale, producing forest products is a complementary goal with the other forest management activities FPR undertakes. See Timber harvested on state lands is de minimis and wood production should occur on private lands. for more information about the role state lands plan in the overall forest products economy in Vermont.

Comment Theme 122. A specific suggestion: could we create an additional Land Management Classification between the Highly Sensitive Management and the Special Management? It would include recreation and wildlife management, but not forestry harvesting with the specific goal of aiding the return of our old-growth forests.

The Land Management Classifications are not prescriptive about what specific types of management can/cannot occur within each LMC. Rather, they define the primary focus for management based on the sensitivity of the resources present.

Forest management is an important tool for wildlife management, carbon, restoration, etc. and can be used both actively and passively to contribute to old-growth forests and old-growth characteristics (Keeton 2006, D'Amato and Catanzaro 2022). Passive management to maintain or reserve forest stands is a form of sustainable forest management. Although active forest management does result in the production of timber products and harvesting of trees, it can be utilized to achieve multiple objectives. Please see, *Additional Information: Active Forest Management as a Tool to Increase Climate Resilience* in our Forests, for more information.

Fact-Checking

Comment Theme 123. One Fact-checking Correction Needed (Page 153) Under the heading of "Concerns and Unauthorized Uses" near the bottom of Page 153, there is a statement that "The Water Works parcel is owned and managed by the Town of Waterbury for its public water supply values and is available for dispersed pedestrian recreation." Please note that the Edward Farrar Utility District, which replaced the Village of Waterbury through a legislative mandate several years ago, manages the Water Works parcel. The Town of Waterbury does not own or manage a Public Water System.

This correction has been made.

Comment Theme 124. Error in first draft: Mt Putnam is the high point at 3642', and Mt Worcester is 3293'.

The LRMP was updated to state the highest elevation within the WRMU is an unnamed peak, elevation 3,642 ft. The highest named peak is Mt. Hunger, 3,539 ft.

Other

Comment Theme 125. I'd also like to have a better understanding of how the large parcel of former VLT land, the Forest Legacy land in Worcester / Elmore now sold, I believe, with a conservation easement - how does that dovetail with this large tract of Vermont wild land, in terms of both ecological stewardship and recreation?

FPR holds two easements that were acquired from VLT in 2021 as part of the federal Forest Legacy Program "Worcester Woods" project that are located on the east side of the Worcester

Range. One of these easement parcels directly abuts the WRMU, and the other is nearby. These parcels are privately owned, managed forest lands and are not part of the State-owned Worcester Range Management Unit, which is the subject of the Draft LRMP. The conservation easements on these private forest lands are designed to support the property's forest resources, biological diversity, wildlife habitats, and scenic and outdoor recreation resources. A third easement was acquired by the Forest Service in 1994 for the Atlas Timberland Partnership parcel. This parcel directly abuts CC Putnam and Elmore SP. FPR manages the Forest Legacy easement for the Forest Service. This parcel was previously owned by Vermont Land Trust and The Nature Conservancy through the Atlas Timberlands Partnership but has now been sold to private owners. Each easement is different, but all permanently protect the land from development and allow dispersed pedestrian public access. These protected lands contribute to the large, forested block that provides key habitat linkages within the Northern Appalachians region, while also supporting forestry, and public access for recreation.

Comment Theme 126. Isn't the point of a state park to protect it from natural resource extraction? Why any logging in Elmore state park? Eliminate Timber Harvest Tract #8 (49 acres) in Elmore State Park to preserve the integrity and aesthetics of the State Park. Let Elmore State Park become old growth forest.

State Parks are managed for a variety of uses and a range of management tools are used depending on the conditions on the ground and the goals of the LRMP. This variability is reflected in the range of Land Management Classifications applied to State Parks owned by FPR, which has parks ranging from a few acres to thousands of acres. In less developed portions of the park, forest management can be utilized to address a suite of social and ecological objectives including timber harvesting, recreation and trail maintenance, forest health improvement, invasives management, etc. This is also consistent with the statutory requirement that FPR maintain State Forests and Parks to sustain the long-term health, integrity and productivity of forests, regardless of whether those forests are located within a designated State Forest or State Park. ANR confirmed that Treatment Area #8 is appropriate for further analysis based on the management goals of the plan and conditions on the ground. For more information, see . Concern and/or perception that all trees within the timber harvest treatment areas depicted on the maps will be cut and that sensitive areas within those areas are not being considered. and the addition to the Implementation Schedule on page 172.

Comment Theme 127. Consider updating its AMPs to include the techniques described in the “Emergency Erosion Control Techniques for Dealing with Severe Weather Conditions During an Active Timber Harvest” report developed by UNH Cooperative Extension.

ANR is evaluating the recommendations of this report as it does all emerging tools, techniques and science related to reducing erosion from timber harvests. Any changes to the AMP Rules would be proposed through the Administrative Procedures Act rulemaking process, which includes public input. Since the AMPs are applicable to all logging jobs in Vermont, including on private lands, any amendment to the AMP Rules would not occur as part of the WRMU LRMP process, and no change was made to the plan to address this comment.

Comment Theme 128. Landscapes that have experienced essentially no pesticide application since the World War II era should be off limits to pesticide usage as a general guideline. Such

landscapes offer a unique scientific opportunity from a comparison reference standpoint. Again those lands should not be contaminated with pesticides, especially in light of their PFAS chemical composition and five-fold impact on global warming.

Pesticides are one important tool in our toolbox to control the spread of invasive species and maintain forest health and integrity in the face of climate change. When use of pesticides is warranted to achieve the goals of the plan, their application is governed by all existing rules and regulations as well as the Use of Pesticides on ANR Lands Policy (2019).

Comment Theme 129. The State should retain all the tools available and apply them as appropriate to meet the resource goals of the Unit. The generation of wood products seems to limit the availability of all management tools.

The LRMP top-level goals have been edited for clarity, including the way wood product production is evaluated along with other goals and uses of the LRMP. ANR uses an array of management practices and tools to achieve the stated goals in the LRMP and timber harvesting and production of forest products is one of these management practices, but it does not limit the use of other management practices where appropriate. See Consider compatibility between land management classifications and the values of interior forest blocks and connectivity blocks, and wildlife corridor function. See Additional Information: Active Forest Management as a Tool to Increase Climate Resilience in our Forests, for more information.

Comment Theme 130. Consider forest carbon as a revenue source to sustain management of the WRMU. Many of the proposals above, and perhaps other potential forest management actions for the WRMU, could also improve carbon stocking at a scale that makes a carbon project viable for existing markets. Revenue from such a project could provide a new extended source of funding that could be used to support the State's stewardship of the WRMU. TNC has a successful track record of implementing carbon projects in the Northeast and our office has been exploring carbon management on our own lands in Vermont. If carbon emerges as a management priority, or as an opportunity resulting from other management decisions, we would be happy to contribute our experience and resources to help assess the viability of a carbon project on the WRMU and potentially bring it to market.

We appreciate the offer of assistance for assessment, and this evolving sector is certainly something that ANR will continue to monitor and engage with moving forward. Pursuing revenue from carbon sequestration and storage is not currently a practice on state lands. The staffing and infrastructure required to inventory, monitor, and verify accumulation and security of carbon beyond baseline rates is a substantial undertaking that ANR currently lacks capacity to execute.

Comment Theme 131. I would like to see a more succinct description of: decisions that have been made and embedded in the plan; alternatives that were considered; and reasons why the planners choose specific alternatives from among those available?

The long-range management planning process is described in the Executive Summary of the LRMP, as well as in FPR Policy #21: State Lands Management Planning (1995). The state management planning process contains no formal consideration of alternatives, but rather represents what the DST collectively believes represents the best possible management outcome for the property based on the natural resource assessments, the desired future

conditions (as determined by management goals, objectives and public vision), staff expertise, Agency and Department missions, and public opinion.

The Public Responsiveness Summary provides feedback about other “alternatives” proposed by commenters, notes when a comment resulted in a change to the final draft of the plan, and provides a rationale for the decision made.

Comment Theme 132. Great plan.... Please make sure that decisions are made based on the science and not emotions.

Long-range management plans are written by staff with topical and scientific expertise in their field. Management of public lands is a responsibility conferred upon ANR on behalf of the people of Vermont in recognition of this expertise, and in service to the mission of the ANR. Public engagement in state lands management is a critical part of the management planning process to ensure that we understand the public’s desires and interests and are providing for those opportunities where they are compatible with the other natural resource goals of the property and are compatible with the Agency and Department missions.

ADDITIONAL INFORMATION: ACTIVE FOREST MANAGEMENT AS A TOOL TO INCREASE CLIMATE RESILIENCE IN OUR FORESTS

Active forest management plays a critical role in preparing and maintaining healthy and resilient forests in the face of a changing climate and other stressors such as pests, pathogens, and invasive plants. Past land use—including agricultural clearing of more than 80% of the Vermont landscape in the 19th and 20th centuries—and previous land use policies in the late 20th century have left many forests lacking the ecosystem characteristics that increase the likelihood of forest resilience in response to current and future stressors based on current scientific knowledge. Sustainable forest management can be used to address the lack of complexity in many Vermont forests and increase resilience to climate change and other forest health threats.

Forests Through the Lens of the Past and Present

To the lay person, a glance into a typical Vermont forest may seem like a thriving and healthy ecosystem, teeming with plants and animals; however, this may not be the case ecologically. This glance may miss a deeper picture of the forest's overall health and resilience, including the spatial arrangement of open and closed canopies, crown structures of individual trees, diversity of tree species, tree age, understory and leaf litter composition, and the number of dead trees in the canopy and on the ground—all important characteristics of ecosystem function and health. These complexities have not only gone unnoticed by many people but have not always been the primary focus of management efforts until the last few decades.⁹⁸ Since the latter half of the twentieth century, societal shifts supported by an increased scientific understanding of the complex dynamics of forest ecosystems have led to shifts in forestry practices.⁹⁹ This greater recognition of ecosystem services has spurred a shift in forest management objectives to encompass a broader range of values, such as creating a healthy, sustainable, and resilient forest; and maintaining biodiversity, providing wildlife habitat and recreational opportunities, regulating surface water flow, and optimizing carbon sequestration and storage.

Further, past land use history has led to homogenized (i.e., similar) forests with simple age structure and lack of species diversity. In Vermont, the extirpation of indigenous knowledge and practices on the landscape, followed by the clearing of 80% of Vermont's forests and subsequent farm abandonment in Vermont in the 19th and 20th century led to regrowth of forests across the landscape that fall into this homogenized category. This landscape-scale disturbance leading to homogenous conditions across the state increases risk of forest degradation under a changing climate. Forests with minimal species diversity and similar age and structural composition have increased vulnerability to climate-related disturbances due to reduced recovery pathways (e.g., a forest containing a greater diversity of species has an

⁹⁸ Bengston, D. (1994). Changing Forest Values and Ecosystem Management. *Society & Natural Resources - SOC NATUR RESOUR*, 7, 515–533. <https://doi.org/10.1080/08941929409380885> and Palik, B. J., D'Amato, A. W., Franklin, J. F., & Johnson, K. N. 2020. *Ecological Silviculture: Foundations and Applications*. Waveland Press.

⁹⁹ Puettmann, K. J., Coates, K. D., & Messier, C. C. (2009). *A Critique of Silviculture: Managing for Complexity*. Island Press.

increased capacity to adapt to warmer conditions or a pest outbreak compared to a forest containing one species, highlighting the importance of a landscape of heterogeneous forest.¹⁰⁰

Forests in a Changing Climate

Our forests are now facing significant threats from climate change, with changes in temperature and precipitation patterns as well as increases in human-introduced insects, pathogens, and plants. Response to these stressors is often thought of in the context of ‘resilience’—the recovery and trajectory following a disturbance event.¹⁰¹ A resilient forest is one that can recover quickly with minimal change to the forest. Therefore, an important element of any strategy to promote resilience in our forests is to increase heterogeneity—through adding species and age diversity, improving tree vigor, reducing competition, etc.—to increase the likelihood of a forest to recover from climate change and other disturbances and remain as an intact forest into the future.¹⁰²

To add resilient characteristics to our forests, forests should be managed to improve structural characteristics. Structural complexity at both the stand and landscape scale is important and has been linked to increased resilience (Liang et al. 2016, Senf et al. 2019, Wikle and D’Amato 2023). On the landscape scale, structural complexity includes the presence of young, mature, and old forests which creates a dynamic and resilient landscape that supports rich biodiversity, contributes to climate regulation, and enhances ecological stability. At the stand-scale, “structure” refers to the physical arrangement and organization of various components within the ecosystem including the following:

1. **Vertical structure** includes the different canopy layers such as the forest floor, understory, midstory, and canopy which represents different age classes. A range of age classes and vertical structure adds resilience to a forest.

¹⁰⁰ Oliver, T. H., Heard, M. S., Isaac, N. J. B., Roy, D. B., Procter, D., Eigenbrod, F., Freckleton, R., Hector, A., Orme, C. D. L., Petchey, O. L., Proença, V., Raffaelli, D., Suttle, K. B., Mace, G. M., Martín-López, B., Woodcock, B. A., & Bullock, J. M. (2015). Biodiversity and Resilience of Ecosystem Functions. *Trends in Ecology & Evolution*, 30(11), 673–684. <https://doi.org/10.1016/j.tree.2015.08.009> and Tilman, D., Isbell, F., & Cowles, J. M. (2014). Biodiversity and Ecosystem Functioning. *Annual Review of Ecology, Evolution, and Systematics*, 45(1), 471–493. <https://doi.org/10.1146/annurev-ecolsys-120213-091917>.

¹⁰¹ Gunderson, L. H. (2000). Ecological Resilience—In Theory and Application. *Annual Review of Ecology, Evolution, and Systematics*, 31(Volume 31, 2000), 425–439. <https://doi.org/10.1146/annurev.ecolsys.31.1.425>, and Lloret, F., Siscart, D., & Dalmases, C. (2004). Canopy recovery after drought dieback in holm-oak Mediterranean forests of Catalonia (NE Spain). *Global Change Biology*, 10(12), 2092–2099. <https://doi.org/10.1111/j.1365-2486.2004.00870.x>

¹⁰² Messier, C., Bauhus, J., Doyon, F., Maure, F., Sousa-Silva, R., Nolet, P., Mina, M., Aquilué, N., Fortin, M.-J., & Puettmann, K. 2019. The functional complex network approach to foster forest resilience to global changes. *Forest Ecosystems*, 6, 21. <https://doi.org/10.1186/s40663-019-0166-2>, Nagel, L. M., Palik, B. J., Battaglia, M. A., D’Amato, A. W., Guldin, J. M., Swanston, C. W., Janowiak, M. K., Powers, M. P., Joyce, L. A., Millar, C. I., Peterson, D. L., Ganio, L. M., Kirschbaum, C., & Roske, M. R. (2017). Adaptive Silviculture for Climate Change: A National Experiment in Manager-Scientist Partnerships to Apply an Adaptation Framework. *Journal of Forestry*, 115(3), 167–178. <https://doi.org/10.5849/jof.16-039>, and Puettmann, K. J., & Messier, C. 2020. Simple Guidelines to Prepare Forests for Global Change: The Dog and the Frisbee. *Northwest Science*, 93(3–4), 209. <https://doi.org/10.3955/046.093.0305>

2. **Horizontal structure** includes the spatial arrangement of trees and plants across the landscape which can be uniform, random, or clumped. Through varying arrangements of forests (e.g., canopy gaps, retention trees in openings, thinned canopies), there are variable combinations of light, moisture, and temperature which in turn support a diversity of regeneration conditions and habitat opportunities.¹⁰³
3. **Diversity of species and age classes** is important given different species have different characteristics and vulnerabilities. For example, having a monoculture of one species can lead to greater vulnerability to drought or a certain pest or pathogen and carries increased risk of reduced tree vigor and, in some cases, widespread mortality.
4. **Increased deadwood**, such as snags (standing dead trees) and downed logs, provides habitat for wildlife and arthropods, and contributes to nutrient cycling that supports healthy and diverse soils and plants. Deadwood is an incredibly important structural feature that improves water infiltration in the soil and can act as a ‘nurse log’ for the establishment of future seedlings.

All these structural elements can provide successful recovery (i.e., resilience) in the face of novel stressors such as climate change while also supporting broader biodiversity and a greater range of wildlife habitat.¹⁰⁴

Active Forest Management as a Tool for Invasive Species-Related Forest Health Threats

Invasive pests and pathogens threaten to reduce or even eliminate tree species from our forests. Active management can mitigate these losses by promoting tree vigor and increasing age class and species diversity that are critical for resilience to current and future stressors. For example, designing active management strategies for forests threatened by Emerald Ash Borer (EAB) should account for ecological function, genetic diversity, cultural integrity, and ethical responsibility.¹⁰⁵ For pests like hemlock woolly adelgid (HWA), timing forest management with the release of HWA predators (i.e., parasitic wasps) can improve tree health and success of treatments.

¹⁰³ Aussenac, G. (2000). Interactions between forest stands and microclimate: Ecophysiological aspects and consequences for silviculture. *Annals of Forest Science*, 57(3), 287–301. <https://doi.org/10.1051/forest:2000119>

¹⁰⁴ Aguilar-Cruz, Y., García-Franco, J. G., & Zotz, G. (2020). Microsites and early litter decomposition patterns in the soil and forest canopy at regional scale. *Biogeochemistry*, 151(1), 15–30. <https://doi.org/10.1007/s10533-020-00705-3>, Mullally, H., Buckley, D., Fordyce, J., Collins, B., & Kwit, C. 2019. Bee Communities across Gap, Edge, and Closed-Canopy Microsites in Forest Stands with Group Selection Openings. *Forest Science*, 65.

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¹⁰⁵ Catanzaro, P., D’Amato, A. W., Orwig, D. A., Siegert, N. W., Benedict, L., Everett, T., Daigle, J., & Mahaffey, A. (n.d.). *Managing Northeastern Forests Threatened by Emerald Ash Borer*, D’Amato, A., Catanzaro, P. 2023. Restoring Old-Growth Characteristics to New England’s and New York’s Forests. <https://masswoods.org/caring-your-land/restoring-old-growth-characteristics>.

Active Forest Management Can Increase Structural Complexity in a Forest

Although it may seem counterintuitive, active, sustainable forest management can enhance or maintain these structural characteristics in a forest landscape, thereby directly contributing to forest resilience and climate adaptation. One aspect of sustainable forest management is harvesting trees in a manner that promotes both regeneration and a healthy post-harvest forest ecosystem, via silvicultural methods¹⁰⁶ that avoid soil compaction, create site conditions beneficial for the regeneration of species, leave some trees and downed logs for wildlife habitat, and create breaks in the canopy to give regenerating seedlings access to sunlight. It's important to note that when forests are sustainably managed and trees are harvested and then allowed to regenerate, the forested landscape persists and continues to provide ecosystem services, such as water regulation, wildlife habitat, and carbon sequestration. For this reason, sustainable forest management is not the same as fragmentation or deforestation which is defined as the conversion of forest land to non-forest land by the Intergovernmental Panel on Climate Change (IPCC). By actively managing forests with timber harvests, we can add more structural diversity—both horizontal and vertical—as well as species and age diversity. This may be accomplished through varying silvicultural practices such as the following:¹⁰⁷

1. **Reserves:** reserving healthy individual trees or groups of trees within gaps or patch cuts to serve as seed source for future regeneration, or support continuity of species associated with individual trees or groups of trees like lichen, mycorrhizae, wildflowers and others. Reserves may also apply to stands with high structural diversity as part of a suite of management strategies.
2. **Single-tree selection and group selection:** small to moderate gap openings that mimic moderate disturbances like wind throw. Smaller gaps favor shade-tolerant species and larger gaps favor shade intolerant and intermediate intolerant species have valuable adaptive characteristics.¹⁰⁸
3. **Patch cuts:** larger cuts that are beneficial for wildlife species and young forest habitat. In areas with high concentration of diseased beech and granitic soils, larger patch cuts are recommended for the regeneration of a more diverse forest.¹⁰⁹

¹⁰⁶ Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis as defined by the USDA Forest Service.

¹⁰⁷ Palik, B. J., D'Amato, A. W., Franklin, J. F., & Johnson, K. N. 2020. *Ecological Silviculture: Foundations and Applications*. Waveland Press., Leak, W. B., Yamasaki, M., & Holleran, R. (2014). Silvicultural guide for northern hardwoods in the northeast. *Gen. Tech. Rep. NRS-132. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station*. 46 p., 132, 1–46. <https://doi.org/10.2737/NRS-GTR-132>, and Palik, B. J., & D'Amato, A. W. 2023. *Ecological Silvicultural Systems: Exemplary Models for Sustainable Forest Management*. John Wiley & Sons.

¹⁰⁸ Russel M. Burns, & Honkala, B. H. (1990). *Silvics of North America: 1. Conifer; 2. Hardwoods* (Vol. 2). U.S. Department of Agriculture, Forest Service, and Peters, M.P., Prasad, A.M., Matthews, S.N., & Iverson, L.R. (2020). *Climate change tree atlas, Version 4*. (n.d.).

¹⁰⁹ Yamasaki, M., Costello, C. A., & Leak, W. B. (2014). Effects of clearcutting, patch cutting, and low-density shelterwoods on breeding birds and tree regeneration in New Hampshire northern hardwoods. *Res. Pap. NRS- 26. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station*. 15 p., 26, 1–15. <https://doi.org/10.2737/NRS-RP-26>.

4. **Strip cuts:** harvesting long, narrow strips of forest, leaving adjacent areas intact to provide seed sources and protection for regeneration. This technique aims to promote natural regeneration, reduce soil erosion, and maintain biodiversity. Shade-intolerant and intermediate-tolerant species benefit from the increased light and space provided by strip cuts, which mimic natural disturbances such as windthrows and small-scale fires.
5. **Shelterwood:** variable size cuts through which a new generation of trees is established naturally under the shelter of older trees by a series of partial cuttings intended to stimulate seed production and create favorable seedbed conditions.

These examples are not an exhaustive list but are representative of common silvicultural practices used on state lands. All these strategies—including forest reserves—require careful consideration of forest regeneration, site conditions, invasive species, and future climatic conditions. Active sustainable forest management coupled with passive management strategies can be used where needed on the landscape to increase structural complexity, create a more resilient landscape that improves and maintains an array of ecosystem services and addresses social (e.g., wood consumption and production) and ecological (e.g., promoting forest health and resilience, carbon sequestration and storage, biodiversity) needs while also bolstering resilience to climate change impacts and other forest health stressors.

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APPENDIX 8: Glossary