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SUBJECT: **Analysis of Vermont Agency of Natural Resources Proposed Lands Management Planning Rule**
DATE: June 17, 2026
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This report was prepared by FB Environmental and presents an analysis of the proposed Vermont Agency of Natural Resources (ANR) Lands Management Planning Rule and its potential impacts on Vermont state lands. Drawing on a comparative study of exemplary federal land planning rules, their approaches, and their historical environmental outcomes, this document evaluates the ANR rule as currently proposed. Furthermore, it provides specific recommendations for strengthening the rule, details the potential environmental impacts on water resources and biodiversity, and offers scientific guidance for implementing an improved, adaptive management framework through administrative directives.

1 Environmental Impact Analysis Review

1.1 Review of Environmental Impact Examples

The proposed Vermont ANR Lands Management Planning Rule (hereafter "ANR proposed rule") superficially follows the structure of several federal land management planning rules reviewed for this analysis. Both the ANR proposed rule and federal rules use high-level programmatic language to set the boundaries for creating unit-level management plans. The unit-level management plans, in turn, are where in-depth environmental analyses are conducted. In addition, the ANR proposed rule and federal rules create exemptions for minor, routine actions to bypass the comprehensive planning process. The ANR proposed rule, however, lacks substantive content and must be strengthened to have any meaningful environmental benefit to the State of Vermont.

To evaluate the rigor of the ANR proposed rule, we reviewed four federal planning rules for comparison including their history and related documents, including analyses of environmental impact, when applicable:

- United States Bureau of Land Management 2024 Final Rule: Conservation and Landscape Health (Bureau of Land Management 2024)
- United States Forest Service 2012 Final Rule: Land Management Planning (U.S. Forest Service 2012)
- United States Forest Service 1982 Final Rule: Land Management Planning (U.S. Forest Service 1982)
- United States Forest Service 2006 Green Mountain National Forest Land and Resource Management Plan (U.S. Forest Service 2006)

While the ANR proposed rule has adopted the basic structure of these federal frameworks, the proposal lacks the well-defined requirements, clear and mandatory priorities for land management, and the scientific support found in the federal planning documents. In addition, the ANR has an opportunity to go beyond these federal rules to ensure not just protection, but also enhancement of ecosystem services and habitat for endangered species, among other management goals.

In short, while the basic scaffolding may be present, the ANR proposed rule does not provide the necessary context and clear expectations for how the ANR shall conduct unit-level planning, including how it should assess and balance environmental impacts, prioritize outcomes, collect and report monitoring data as plans are implemented, and periodically conduct plan revisions with opportunities for public scrutiny and feedback.

1.1.1 Legal Mandate for the Environmental Impact Statement

The ANR proposed rule repeatedly states that the rule is "procedural in scope," and therefore will have no direct impact on the environment and thus does not require an environmental impact analysis. However, similar federal proposed rules have a clear legal history demonstrating that high-level planning rules do inherently impact the environment and must undergo rigorous environmental review.

The 2024 BLM planning rule bypassed a programmatic Environmental Impact Statement (EIS) by using a categorical exclusion, claiming the rule was merely a high-level framework with no immediate, measurable environmental impacts. Bypassing this rigorous review left the rule vulnerable and contributed in part to complete rescission of the rule earlier this year (Bureau of Land Management 2026, State of Utah v. Haaland 2024).

In the 2000s, the USFS attempted to rewrite its 1982 planning rule to relax strict species viability standards in favor of a more flexible and adaptive management rule. The resulting process became a major controversy in forest management, frequently exposing the agency to citizen enforcement and litigation over species protection (Schultz, et al. 2013). The USFS's first attempt to update the 1982 planning rule occurred in a 2005 proposed rule and bypassed the preparation of an EIS and a Biological Assessment, a consultation that is required under the Endangered Species Act. That decision was challenged in court, and the proposed rule was blocked. The USFS then produced an EIS for a subsequent draft rule in 2008, arguing that the updates were procedural frameworks that did not direct on-the-ground action. Federal courts rejected this rationale in the cases *Citizens I* (Citizens for Better Forestry v. USDA, 341 F.3d 961 2003) and *Citizens II* (Citizens for Better Forestry v. USDA, 481 F. Supp. 2d 1059 2007). Federal courts found the EIS insufficient and vacated the 2008 rule because the agency wrongfully used categorical exclusions and failed to analyze the environmental impacts of relaxing viability standards (Citizens for Better Forestry v. U.S. Department of Agriculture, 632 F. Supp. 2d 968 2009).

Learning from these two failed attempts, the USFS successfully promulgated the 2012 planning rule only after investing years into drafting a comprehensive programmatic EIS, in addition to considerable taxpayer expense in court and three rounds of rulemaking. In creating the successful EIS, the USFS reviewed nine previous land management plans for specific national forests and their respective EISs. The 2012 rule shifted the agency's focus toward broad ecological, social, and economic sustainability. The USFS ultimately succeeded in changing from a prescriptive approach to a flexible, adaptive management approach. The change was only possible after the agency examined the environmental outcomes of their

proposed actions and from that analysis developed a science-based process enforced by rules, ongoing monitoring, and transparent reporting to the public. When the 2012 planning rule was challenged by resource extraction industries who argued the rule unlawfully prioritized ecological health over resource extraction, federal courts upheld the 2012 planning rule, validating that the comprehensive EIS and the prioritization of ecological sustainability were lawful under the agency's mandate.

Nevertheless, the 2012 planning rule environmental framework has been criticized. Some argue that the rule relies too heavily on adaptive management with a loss of accountability. As a result of the rule, they argue the USFS tends to write environmental plans components that are more ambiguous, either to account for the scientific uncertainty and rapidly changing nature of forest management, or to preserve its administrative discretion (Brown and Nie 2019). This criticism and caution should be instructive for the ANR and legislators conducting rule oversight. The ANR proposed rule relies more on administrative discretion, to the detriment of subsequent planning and project-level management.

By claiming the ANR proposed rule is purely procedural and does not require an EIS, the ANR leaves the proposed rule framework open to the same foundational flaws the USFS created in 2005 and opens the State of Vermont to the risk of a lengthy and expensive process to fix those flaws. More importantly, the ANR is missing an opportunity to understand, communicate, and strengthen protections for Vermont's state lands by a systematic use of science and public scrutiny and feedback. After all, a large-scale land management planning rule certainly should have clear and positive environmental impacts, so that time spent on developing and following the rule proves worthwhile.

1.1.2 Substantive Ecological Goals

The modern federal rules incorporate detailed, substantive standards for environmental protection that are absent from the ANR proposed rule. Under the 2024 BLM planning rule, environmental goals focused heavily on promoting conservation to ensure ecosystem resilience and preventing the permanent impairment of public lands. The BLM explicitly defined conservation as a valid use of public lands under the agency's "multiple use" mandate. Similarly, the 2012 USFS planning rule centers on the science-based development of plans that promote ecological integrity using a combined "coarse-filter" (ecosystem-level) and "fine-filter" (species-specific) approach to protect species of conservation concern. Even the older 1982 USFS planning rule included highly specific mandates to manage habitats to maintain viable populations of vertebrate species.

In contrast, the ANR proposed rule lacks clear and substantive environmental resource goals. The ANR holds approximately 8% of Vermont's total land area, the majority of which is forested (Underwood and Brynn 2015). These forested ecosystems have an important role in water regulation and biodiversity maintenance, but the ANR proposed rule relies only on broad, general topical categories for its stated "Resource Analysis." The proposed rule does not require the strict watershed condition frameworks, baseline climate assessments, or specific and quantifiable ecological drivers that make the federal rules ecologically rigorous and protective of vulnerable ecosystems, such as mountain landscapes.

1.1.3 Evaluating Alternatives

The substantive gap between the ANR proposed rule and federal rules is also evident at the unit-level planning stage. A primary requirement of federal environmental review is that agencies must formulate a range of reasonable alternatives and compare their physical, biological, social, and economic impacts. It explicitly mandates including a "no action" alternative. For example, the 2006 Green Mountain National

Forest (GMNF) EIS (U.S. Forest Service 2006) rigorously evaluated five distinct management alternatives to create the land and resource management plan. This established a "Current Management" baseline against which the ecological and economic tradeoffs of the other alternatives could be compared. The ANR's equivalent Long Range Management Plans (LRMPs) lack this alternative scenario comparison requirement entirely, meaning the state is not obligated to show that the chosen management action is the least detrimental and best able to advance the State of Vermont's interests.

1.1.4 Bounding Routine Actions versus Open Ended Exemptions

While both the ANR proposed rule and federal rules include exemptions for routine actions, they are implemented very differently. Federal categorical exclusions have strictly defined size and scope limits to ensure they have minimal environmental impact and allow for clear enforcement. For example, a categorical exclusion for habitat improvement could be limited to less than one mile of road construction. In contrast, the ANR establishes Universal Management Actions (UMAs) that can be implemented on all ANR lands without an approved LRMP. These UMAs use open-ended, qualitative descriptions like "limited vegetation management" and the "removal of hazard trees." Because the ANR's UMAs lack defined size or scope limits, broad actions could be taken without public review or environmental analysis, and enforcement criteria are open to subjective interpretation. Moreover, the ANR proposed rule does not establish a complete list of UMAs, and it suggests that the Statewide Plan will similarly contain an non-exhaustive list upon completion. The result of this design is open-ended discretionary management that could be used to subvert other components of the rule.

1.2 Review of Proposed Rule's Impacts

1.2.1 ANR Proposed Rule

Below, we make recommendations for an improved ANR planning rule and subsequently assess the environmental impacts we expect the ANR proposed rule to have; however, we note the ANR proposed rule as written lacks firm, well-defined requirements. Although one may trust the professionalism and care of state agency staff to do their best to avoid harm to the environment, the ambiguous text of the proposed rule in fact allows severe environmental impacts. A worst-case scenario under the proposed rule is indeed damaging to Vermont's water quality, flooding susceptibility, ecological conditions and more, as we illustrate in more detail below.

1.2.2 Recommended Improved Rule

We recommend an improved ANR land management planning rule with clear requirements and limits suitable to an effective rule. Based on our review of successful land planning rules described above, we recommend the ANR proposed rule be revised to include at least these components:

- An adaptive management framework, where plans are made, plan implementation is monitored, data are publicly reported, and after a suitable time plans are revised with the benefit of data collected and renewed public input.
- A requirement that the ANR staff consult the state of the science in relevant fields, including
    - Water quality
    - Water flows and flooding susceptibility
    - Ecological conditions
    - Threatened and endangered species

    - Forest health
    - Climate trends and impacts
    - Human influence factors like recreation, forest harvests, etc.
- Set the duty to enhance ecosystem process and function
- A required monitoring program, even if modest, which observes the results of management actions under the plan compared to areas of natural (unmanaged) lands. This should include the following:
    - A monitoring plan developed transparently with public input
    - Monitoring covers water quality and select ecological indicators (e.g., a relevant keystone species like amphibians)
    - Contains a data quality control component
    - Monitoring data are made public annually
    - Monitoring reports are published periodically (every 2-4 years)
- Define and constrain the exceptions to the rule under UMAs and Routine Maintenance
- Require an alternatives analysis at the LRMP level of planning, including a no action alternative and at least one other alternative to assist with comparing tradeoffs
- Periodic plan updates through a transparent public process.
- Transparent project-level analysis with opportunity for public comment

Below, we describe how to assess environmental impacts under both the ANR proposed rule and an improved rule as outlined above.

1.2.3 Impacts to Water Resources

Context: Nearly 90% of Vermont state lands are located within forested headwater regions (Underwood and Brynn 2015). Forests and water are integrally connected. Forests slow and filter rainwater runoff, protecting both forest streams and all downstream waterbodies. Forest soils can absorb rainfall, slowing overland flow and mitigating downstream flooding, while also gradually releasing water to maintain steady stream flows during dry spells. Water retention in forest soils is accompanied by the retention of nutrients that could otherwise flow into streams and lakes and raise the risk of algal blooms downstream. Forest canopies also maintain cooler water temperatures, maintaining habitat for some cold water fish species.

Most of the headwater regions managed by the ANR are in steep areas with relatively thin soils. These areas naturally tend to generate ample runoff due to their specific geology and steep topography. These conditions make headwater forested regions especially susceptible to soil erosion and overland flow when disturbance occurs. This vulnerability is exacerbated by climate change. Vermont has already experienced significant increases in overall precipitation, leading to higher baseline soil saturation, alongside a sharp rise in the frequency and intensity of extreme storms (Betts 2017, Huang, et al. 2017). In the Northeast, extreme precipitation could become six times more likely by 2100 (Jong, et al. 2023). At the same time, annual air temperature has risen by 2.5°C since the early 20th century in New England and risen faster for the winter compared to the summer months .

One consequence of the rising winter temperatures is impacts to snow. Vermont experienced an estimated drop in snow depth of 14% between 2000 and 2024 (Young and Young 2025). In the Northeast, there is an average of 21 fewer days of snow cover than a century ago (Contosta, et al. 2019).

Rain-on-snow events are becoming more frequent (Aldrich 2025, Mount Washington Observatory 2023) that generate higher runoff and nutrient loads to streams earlier in the year (Crossman, et al. 2016, Eimers, Buttle and Watmough 2007). These events destabilize and weaken the snowpack, leading to earlier melting.

For forested watersheds in Vermont, this loss of snowpack creates several watershed management concerns. Reduced snow cover and warmer daytime temperatures mean that soils may thaw during the day and freeze at night. These conditions can produce high amounts of runoff water due to lower infiltration rates, but lower erosion because the soil profile is frozen in place (Toot, et al. 2025). In addition, the loss of insulating snowpack can lead to deeper freezing of soil profiles, damaging roots and compromising the associated protection against erosion provided by root systems. A New Hampshire study demonstrated that reduced snowpack was associated with a decline in overall sugar maple tree mass and canopy cover (Toot, et al. 2025) . In the context of logging operations, a thick snowpack can act as a buffer to impacts from winter logging operations (Toot, et al. 2025). By the same token, partially thawed soils from reduced snowpack leads to an increased risk of soil compaction and erosion from heavy machinery (Toot, et al. 2025). These are just a few citations of recent scientific research affecting ANR-managed forests and other public lands. The ANR proposed rule should require the ANR staff to review and incorporate the latest science into land management plans, publicly providing citations and rationale in the process.

Given the rapidly changing climate in New England, the ANR rule would benefit from an adaptive planning system, with robust monitoring and public reporting, to ensure Vermont's public land planning keeps pace with evolving science and real-world conditions. Adaptive management means a periodic, comprehensive, rule-based system that evolves with emerging data and science and is enforced by transparent public participation.

1.2.3.1 Freshwater Provisioning and Pollutant Discharge

Impacts of the Proposed Rule: Undisturbed forested headwaters mediate water quality by absorbing rain water and retaining the associated sediments and nutrients, preventing higher loads from entering streams and other waterways. Disturbance from human activities can compromise the ability of forest soils to provision for high water quality by increasing the amount of pollutants delivered to headwater streams and downstream waterways. The 2006 GMNF EIS (U.S. Forest Service 2006) explicitly defines road construction, trail maintenance, and vegetation management as ground disturbing activities that are primary drivers of soil erosion, rutting, and compaction. In the ANR proposed rule, some types of these activities apparently have a blanket permission as UMAs, which are vaguely defined and occur outside any planning process.

Pollutant discharges into surface waters may still occur if the ANR uses Acceptable Management Practices (AMPs) for these activities. For example, logging activities can increase erosion and sediment delivery to streams because logging roads and skid trails act as impermeable surfaces that funnel runoff into streams (Gucinski, et al. 2001, McEachran, Karwan and Slesak 2021). Research shows that even when Best Management Practices (BMPs) are applied, suspended sediment loads can be elevated during the harvest and in the months following (Arthur, Coltharp and Brown 1998). In the steep soils of northern New England, logging with BMPs can result in a long-term tripling of sediment yields compared to unharvested conditions (Cook, et al. 2020). Furthermore, Vermont's current AMPs are not designed to

handle climate-driven storm volumes. The AMPs allow drainage structures to be spaced further apart than recommended in neighboring states, which allows a greater volume of stormwater to accumulate and accelerate before diversion, increasing the erosive potential (Wemple 2013). The AMPs also permit at-grade fords for stream crossings, providing direct pathways for sediment drainage to streams, as well as dictate that stream culverts be sized based solely on drainage area rather than anticipated peak storm flows. Thus, AMPs do not provide any guarantee against potential land and water impairments that are allowable under the ANR proposed rule.

In a "no-change" scenario, even if the ANR maintains the status quo in its ordinary maintenance activities, climate change with increasingly severe storms and degraded snow cover will drive increased pollutant loads to Vermont's streams. More extreme precipitation and the resulting floods will increase sediment and nutrient loads to headwater streams and downstream waters (Kaushal, et al. 2014, Inamdar, et al. 2015). A worst-case scenario is that the ANR will rely on the exemption within the rule to construct more roads and logging skid trails, and will broadly interpret "vegetation management" to remove a large volume of living or dead timber or other plant species. Social or economic pressures may result in a narrow focus on objectives related to forest harvest and recreation. The result would be degraded water quality at the headwaters which can further compound downstream water quality problems.

Impacts of a Stronger Alternative Rule: A stronger alternative rule could establish Hydrologic Reserve Zones in areas highly vulnerable to runoff (Underwood and Brynn 2015). Zones could be identified through broad topographic analyses as areas with steep slopes (>35%), high elevations (>2,500 feet), and shallow soils. In these zones, logging could be prohibited, and only limited and well-defined UMAs permitted to protect the starting point of the streams (Underwood and Brynn 2015). The planning rule would require mapping of Hydrologic Reserve Zones as each land management plan is developed, along with mapping any other areas of ecological, conservation, or natural water source value, based on clear scientific guidance.

The planning rule should require a scientific review of current AMPs. The rule could mandate that unit-level plan development be based on the state of the science in water quality, flooding, and climate. There is relatively little scientific research on forestry impacts specific to Vermont on water quality under climate change conditions. As a part of the ANR mandate to enhance ecosystem processes and functions, the rule could contain measurable, enforceable goals and objectives for increasing forest structural complexity. One option to strengthen the land planning rule could be to make the AMPs quantitative based on the best available science. Quantitative AMPs are easier to interpret and enforceable. Examples of a quantitative limit could include a 150-foot no-vehicle buffer around streams or capping basal area removal at 36%. Specific requirements can also assist with enforcement such as banning at-grade stream fords or mandating immediate post-harvest soil stabilization and re-seeding of exposed soils with native plant mixes. Finally, requiring water quality monitoring of logging operations would ensure compliance and provide much needed real-world data on the impacts of land management activities specific to Vermont.

The environmental impact of this improved planning rule would be to better protect water quality in fragile mountain headwater areas through improved forest health and reduced human disturbance. Forest practices generally would be strengthened through a well-rounded scientific review of impacts. Valuable scientific data would be collected to better inform future land management plans, and would fill

an existing data gap to provide the ANR with insights that allow for adaptive management in the face of climate change.

1.2.3.2 Water Flow Regulation (Baseflow and Flood Mitigation)

Impacts of the Proposed Rule: As established in the 2006 GMNF EIS (U.S. Forest Service 2006), ground-disturbing activities and the removal of vegetation alter local hydrology. Specifically, roads and skid trails divert surface and subsurface runoff (Wemple 2013, National Research Council 2008), and the lack of forested buffer strips and the removal of large woody debris can lead to stream channel instability, increased flow volumes, and higher peak flows during storm events (Aust and Blinn 2004). Compacted trails and roadside ditches effectively act as artificial extensions of the stream network and these ground disturbances concentrate runoff and convert slow-moving subsurface groundwater into fast-moving surface runoff (Kochenderfer and Hornbeck 1999, National Research Council 2008, Underwood and Brynn 2015). In addition, logging-induced increases in peak flows can amplify downstream flood damage when combined with climate-driven extreme weather events (National Research Council 2008).

A wide variety of activities appear to be permitted under the current wording of the ANR proposed rule for routine maintenance under UMAs. The rule allows open-ended disturbances to natural water flow regulation which can accelerate flooding during storms and worsen droughts during dry periods. The lack of a review requirement for site or statewide forest land management plans with respect to flooding impacts and failing to explicitly require plans and projects to avoid any worsening of flooding, could allow management that inadvertently worsens flooding.

Impacts of a Stronger Alternative: A stronger rule would protect the forest's ability to attenuate flood peaks by mandating climate-resilient infrastructure, such as requiring all culverts to be sized to accommodate at least a 25-year flood levels or greater for longer term infrastructure rather than based solely on drainage area. A stronger rule could also require the 25-year flood to be periodically updated in future years based on recent, real-world river flows applicable to Vermont state lands. Additionally, the rule should include a unit-specific requirement that management plans conduct a formal analysis of stream flows in logged versus unlogged areas to better understand and mitigate runoff impacts prior to approving projects.

The environmental impact of this improved land management planning rule would be to ensure flooding risks are understood and minimized by the ANR as plans are developed. Such a revised rule would better protect downstream life and property as well as reduce the number of bridge and culvert wash-outs that are costly to repair and rebuild. By providing a clear rationale for focusing state land management on flood mitigation and resilience, the ANR can also help to address and minimize conflicts based on multiple interests.

1.2.4 Impacts on Biodiversity and Natural Communities

Context: As climate change alters regional ecosystems and private land development accelerates habitat fragmentation, public lands will increasingly serve as critical refugia for vulnerable plant and animal species (Schultz, et al. 2013). Consequently, state agencies face an elevated responsibility to protect and actively maintain biodiversity in the face of these extrinsic, landscape-scale threats. The state is in a unique position to protect its habitats and wildlife. The ANR is entrusted with long-term management of large tracts of forest, wetland, and aquatic habitats. Many of those habitats include a wide range of elevations, which may enable many species to migrate from lower to higher elevations as temperatures

increase, a trend already observed in Vermont's Green Mountains (Beckage, et al. 2008). New and endangered species are often found in headwater streams because such streams are relatively unexplored (Gomi, Sidle and Richardson 2002). These large, uninterrupted habitats also provide larger contiguous populations of species, which provides greater genetic diversity within the population. This population genetic diversity may prove a crucial resource for survival as climate change places selective pressure on certain individual traits (Sgrò, Lowe and Hoffmann 2010). A smaller and less diverse population will generally have less trait variability and be more susceptible to extinction (Alberto, et al. 2013, Aitken, et al. 2008). While federal laws and programs may provide significant protection for species threatened at the federal level, the state has the ability and responsibility to protect species that are threatened within Vermont.

Impacts of the Proposed Rule: The proposed rule risks unintended habitat degradation by authorizing undefined limited vegetation management, removal of hazard trees, and trail and infrastructure maintenance as UMAs without site-specific LRMPs. As noted in the 2006 GMNF EIS, even limited vegetation management alters canopy cover, light regimes, and forest structure, which directly impacts the micro-habitats of local species. Furthermore, relying on broad, habitat-level exemptions (a coarse-filter approach) without site-specific evaluations fails to account for the specialized habitat needs of rare species. For example, the 2006 GMNF EIS explicitly identifies that retaining snags and den trees, which are often routinely felled as hazard trees, is critical for the survival of the federally endangered Indiana bat, which relies on these exfoliating structures for roosting (U.S. Forest Service 2006). Bypassing site-specific analysis allows population declines to occur incrementally and go unrecognized until a species requires emergency protection under the Endangered Species Act (Schultz, et al. 2013). Additionally, the 2006 GMNF EIS identifies ground-disturbing activities such as trail maintenance, road work, and vegetation harvesting as the primary pathways for the introduction and dispersal of non-native invasive species. These localized disturbances and canopy removals also elevate the risk of browsing herbivory from white-tailed deer, which disproportionately impacts sensitive native plants like orchids (Knapp and Wiegand 2014). By providing a blanket approval for UMAs, the ANR proposed rule increases the risk of non-native invasive species dispersal and habitat alteration without adequate environmental review. As Schultz et al. (2013) state, when regulations for protecting biodiversity are not specific, measurable, and binding, wildlife conservation planning is reduced to a secondary objective.

Impacts of a Stronger Alternative Rule: A stronger rule would provide only limited and well-defined habitat-altering exemptions, and may define certain types of habitat which are off-limits to UMAs. The rule would mandate a science-based monitoring effort to ensure critical biodiversity is detected and maintained. This requires a combined approach that uses both a coarse-filter, such as tracking the abundance and successional stages of major forest communities, and a fine-filter, such as direct, site-specific monitoring of vulnerable species (Schultz, et al. 2013). For the fine-filter component, the rule should require the monitoring of specific focal species chosen for their functional role in the ecosystem (e.g., keystone species or indicators of specific stressors) to gauge the effectiveness of ongoing habitat management. Furthermore, monitoring data are only effective if it drives management decisions. A stronger rule must establish predefined threshold values for species decline or habitat degradation that, when crossed, legally mandate an immediate halt and review of the associated management activities. Finally, the rule should require site-specific evaluations before snag or den tree removal to ensure the protection of roosting habitats for rare and endangered species.

An improved land management planning rule would lead to a well-balanced consideration of biodiversity and threatened and endangered species as each plan is developed. An adaptive framework and monitoring component would make sure up-to-date science, public oversight, and changing habitat conditions are systematically incorporated into planning.

1.3 Methodological frameworks for an EIA

The National Environmental Policy Act (NEPA) requires federal agencies to weigh the environmental consequences of their choices before greenlighting major actions, permits, or funding. When a project's potential environmental impact is uncertain, the agency drafts an Environmental Assessment (EA). An EA acts as a concise screening document to explore the project's necessity, analyze basic alternatives, and disclose environmental impacts. If the EA reveals that impacts are minimal or manageable, this concludes the review process. If the EA reveals significant environmental impacts, or if the project is inherently large in scale from the outset, the agency must execute a larger EIS.

In preparing an EA and an EIS, public notification, review, and comment are layered into the project development at three points: (1) at the notice of proposed action; (2) when the drafted EA or EIS is released; and, (3) depending on the federal agency, at the final drafted decision phase. This final phase of review and comment gives the agency a final chance to amend a project to avoid legal or other problems highlighted by the public.

Under NEPA, federal agencies utilize a Programmatic EIS when assessing broad agency actions, such as new rules. Unlike a site-specific assessment, a programmatic review looks at the broader environmental picture, evaluating how a policy could shift factors like watershed integrity and ecological trends over time. The ANR proposed rule is inherently programmatic; it alters the baseline management of ecosystems across the entire state land system. The ANR must draft a state-level EIA that matches this scope.

The 2012 USFS planning rule and the 2006 GMNF plan both required a comprehensive EIS. In addition, the 2012 USFS Programmatic EIS refers to the EIS for the 2006 GMNF plan. Both of these EISs can serve as examples of a methodological framework that the ANR could follow.

The USFS framework specifically addresses the challenge facing the ANR: analyzing environmental impacts when a planning rule does not authorize immediate on-the-ground projects or commit resources. To navigate this, the USFS uses a three-tier decision framework that separates (1) the national planning rule, (2) unit-level land management plans, and (3) site-specific project authorizations. Because actual environmental impacts are two stages removed from the initial rulemaking, the USFS evaluates consequences at a strictly programmatic level, displaying potential impacts in two distinct ways:

1. Evaluating the effects of the rule on the planning process and on plan content by analyzing how the rule's requirements will dictate what future land management plans must contain. For example, if the programmatic rule requires components that restore water quality, it establishes a legal expectation that all future lower-tier plans will include those components.
2. Evaluating resource outcomes over time. The analysis uses broad, data-driven assumptions to project how natural resources will fare across the entire system as the new plans are implemented over time.

This federal model illustrates how a meaningful environmental review can still be successfully conducted, even in the absence of immediate, site-specific data.

State agency rulemaking is bound by the Vermont Administrative Procedure Act (APA). A proposed rule faces formal objection if its accompanying environmental impact analysis fails to recognize or meaningfully evaluate a substantial environmental impact. The ANR proposed rule does not capture the complex trade-offs of forest management, including impacts on water resources, biodiversity, or climate resilience. To shield this rule from arbitrary implementation and potential legislative objections, the ANR must treat its environmental analysis as a rigorous, data-driven environmental impact analysis that mirrors a federal EA or EIS.

A rigorous environmental impact analysis modeled after an EA or EIS framework would provide the rule-making committee and the public with three critical pieces of data currently missing (among others):

- A critical look at the anticipated impacts on state lands from plan and project development according to the proposed rule and any alternatives;
- An analysis of a range of alternatives: a true assessment must evaluate multiple regulatory paths (including a "no-action" baseline) to demonstrate that the proposed rule is the most ecologically sound method to achieve the state's goals.
- Cumulative impact analysis: while a single logging road, recreational trail, or vegetation management project might seem negligible in isolation, the cumulative impact of these plans and actions across Vermont's entire state land network (8% of Vermont's land area) could significantly alter water resources, downstream flooding, wildlife habitats, and forest climate resilience.

A statewide-level review would establish a framework to guide subsequent site-specific actions. By evaluating broad, systemic impacts at the rulemaking stage, a programmatic environmental impact analysis sets uniform, binding guardrails and minimum ecological standards that every individual state forest management plan must meet. When the ANR later develops localized plans for specific forests or timber harvests, those site-level assessments do not have to duplicate previous efforts or analyze regional cumulative impacts in isolation. Instead, they "tier" back to the overarching programmatic document, ensuring that every localized action adheres to a consistent, high baseline of environmental protection and prevents fragmented, cumulative degradation of public lands.

2 Scientific Guidance for State Land Planning

This section provides recommended guidance on administrative policy or administrative directives for the ANR to guide an improved rule implementation. These guidelines are not comprehensive, and are merely examples pertaining to two selected aspects the rule will cover: water quality and flows, and biodiversity. Our recommended rule (or similar) would also require administrative policy on other topics such as forest health, recreation, climate resilience, climate regulation, economic considerations, etc., and we suggest they follow the same general approach and pattern as presented below. Any administrative policy should also be refined by regional experts in each respective subject area.

Generally, the recommendations are the following approach: agency policy during land management planning will require the ANR to evaluate the state of the science in each field, assess proposed activities in the specific geographic area for which planning is underway, identify critical activities and resources

which will be affected in this area, report to the public these findings, monitor the effects of the plan as it is carried out, compare monitoring results to those from an undisturbed reference area, annually release all monitoring data to the public, and open the plan to revision through a transparent and public process after an appropriate maximum period of time (e.g. 5-20 years, suitable to evaluate the plan's effect and make any needed adjustments).

Importantly, subsequent to producing a Statewide Plan or Long Range Management Plan, the ANR must conduct site-specific surveys, disclose comprehensive information to the public about site conditions and planned activities, and solicit meaningful public comment and collaboration prior to making any final decisions about management actions, including UMAs.

2.1 Water Flows and Pollutant Discharges

We recommend that the land management planning rule require the ANR to formally consider each plan's effect on water flows and discharges of pollutants to waters. This example directive may be split to cover each separately. Agency policy shall be to complete the following steps within the plan area and any affected adjacent lands.

2.1.1 Assessing Baselines and Identifying Key Risk Factors

- Mapping steep slopes, high elevations, and highly erodible soils, defined as Hydrologic Reserve Zones by Underwood and Brynn (2015).
- Identifying high-quality headwater streams and significant wetland areas.
- Assessing the average runoff from subbasins within a larger watershed to determine the relative contribution of water flow and pollutants from state lands versus other land ownerships. This information will better clarify the cumulative impacts of headwater management and guide how state lands can best contribute to flood and pollution mitigation.
- Assessing changing baseline climate conditions, such as fewer frozen ground days and changes to snowpack, changes to extreme precipitation and flood hazards through monitoring data.
- Compiling and assessing all available water quality data in the watershed, and designated uses of downstream waterbodies with the intent to understand representative conditions prior to plan implementation.
- During planning, all activity restrictions aimed at having an effect on water quality and flow shall be based on prevailing site conditions, rather than calendar dates. This is necessary because changing climate conditions are expected to shift the calendar dates for many important water-related conditions (e.g., ice out for ponds, frozen ground, snow cover, etc.). Site plans should utilize language that bases operational windows on actual, monitored site conditions (e.g., specific soil frost depths or accumulated freezing degree days).
- Where suitable, directives will encourage flexible contract timeframes (e.g., extending a harvest window from two years to three years) so operators are not pressured to harvest despite suboptimal, wet conditions due to unpredictable extreme weather (Toot, et al. 2025).

2.1.2 The State's Unique Role at Multiple Spatial Scales

- State lands contain an outsized percentage of high-elevation lands (e.g., >2,500 feet) and headwater streams compared to Vermont woodlands as a whole (Underwood and Brynn 2015).
- Headwater stream systems shape the health of the entire watershed, contributing a large proportion of the water volume and nutrient flux to downstream rivers and waterbodies (Gomi, Sidle and Richardson 2002, Alexander, et al. 2007).
- Because the ANR lands encompass a high concentration of headwater streams that shape the health of the entire watershed, this outsized influence on downstream water quality and flood resilience must factor into the agency's planning process.
- The monitoring framework must require the ANR to establish baselines using both broad-scale climate data (e.g., regional streamflow projections/streamflow gauges, drought monitors, and snow-depth maps) and project-scale onsite surveys.

2.1.3 Weighing Risk Factors in an Overall Planning Matrix

- The ANR land planners and managers shall weigh site-specific conditions (like soil moisture and frost depth) in a matrix rather than relying on static calendar dates to dictate when operations can occur.
- The ANR land planners and managers shall weigh options to avoid and minimize stream crossings by comparing the environmental impact of establishing a crossing versus avoiding the crossing entirely at the cost of longer hauling distances and any other consequences (Toot, et al. 2025).
- The ANR land planners shall summarize and compare water quality and flow concerns in a matrix with other planning concerns.
- The ANR shall prioritize the protection or enhancement of water quality, as well as the preservation of natural hydrological functions for flood and drought resilience, in all of its planning actions.

2.1.4 Replacing Discretionary Guidelines within Acceptable Management Practices with Binding Directives

Discretionary guidelines often fail to protect resources when faced with competing agency pressures, whereas binding standards have regulatory force (Schultz, et al. 2013). The rule should upgrade AMPs from guidelines to enforceable standards:

- **Quantitative riparian buffers:** Establish precise, enforceable limits within forested stream buffers. This may include prohibiting vehicle activity and harvest within at least 100 feet of a stream (Sweeney and Newbold 2014, Toot, et al. 2025), or capping basal area removal within the buffer zone. For example, New Hampshire's Basal Area Law (NH Rev Stat § 227-J:9 2025) mandates that no more than 50% of the basal area be removed within 150 feet of great ponds and major rivers, or within 50 feet of smaller perennial streams.
- **Climate-resilient infrastructure:** Mandate that culverts be sized using forward-looking, climate change-adjusted peak flow projections rather than legacy drainage area metrics. Structures must be explicitly designed to safely pass projected high-volume storms (e.g., 50- or 100-year flood

levels) while ensuring the passage of debris and aquatic organisms under a wider range of fluctuating conditions, including climate-induced low-water periods (Toot, et al. 2025).

- **Prohibit at-grade fords:** Explicitly ban at-grade stream crossings for logging equipment, as they disrupt streambeds and provide a direct pathway for nutrient and sediment pollution.
- **Mandatory site stabilization:** Require immediate post-harvest soil stabilization and the re-seeding of all exposed soils with native plant mixes, rather than limiting these requirements only to areas within 50 feet of a stream.
- **Exclude forestry from Hydrologic Reserve Zones:** Prohibit forest harvest and access networks within these highly sensitive areas.
- **Road ditch disconnection**: Mandate that road ditches be disconnected from stream networks through the mandatory use of turn-outs, infiltration basins, or settling ponds to ensure stormwater sinks into the subsurface rather than discharging directly into surface waters (Underwood and Brynn 2015).
- **Legacy road networks**: Require the ANR to identify and downsize, decommission, or re-wild unused or underused road and trail segments, particularly those located in highly vulnerable River Corridors and Hydrologic Reserve Zones (Underwood and Brynn 2015). Require the removal of unused bridges and culverts to enhance aquatic organism passage.
- **Low-impact harvesting equipment**: To minimize soil compaction and disturbance, incentivize or mandate the use of forwarders over skidders wherever possible. Forwarders require narrower and fewer access roads and maintain better site integrity across a wider variety of weather conditions (Underwood and Brynn 2015).
- **Establish hard environmental trigger points:** Require active monitoring of site conditions and weather forecasts during operations. If unfavorable weather (such as an early thaw or an extreme precipitation event) is predicted, or if active soil rutting begins to occur, this must serve as a hard trigger to immediately halt operations, remove temporary stream crossings, and install emergency erosion control measures before the storm event (Toot, et al. 2025).

2.2 Biodiversity and Threatened and Endangered Species

We recommend that the land management planning rule require the ANR to formally assess biodiversity and threatened and endangered species. Agency policy shall be to complete the following steps within the plan area, and consider any relevant contiguous habitat. These example directives are not exhaustive.

2.2.1 Assessing Baselines and Identifying Key Risk Factors

- Mapping natural communities on state lands, assessing their rarity with the state.
- Mapping forest diseases, pests, and invasive species risks.
- Identifying at-risk species and their threats.
- Mapping threatened and endangered species' historic, present, and predicted future ranges.
- Identifying high-quality headwater streams and significant wetlands areas.

Additionally, the planning rule needs a monitoring framework to track whether management plans are achieving their goals. A stronger rule would mandate an adaptive management monitoring system:

- **Combined filter approach:** The rule must require the ANR to assess biodiversity using a coarse-filter (tracking the abundance and successional stage of major forest communities) combined with a fine-filter (direct, species-level monitoring of vulnerable species).
- **Focal species:** Require the monitoring of specific focal species chosen for their functional role in the ecosystem (e.g., keystone species or indicators of specific stressors) to gauge the effectiveness of habitat management.
- **Hard trigger points:** Monitoring data are unactionable without predefined thresholds. The rule must establish threshold values for species decline or habitat degradation that, when crossed, legally mandate an immediate halt and review of the associated management activities.

2.2.2 The State's Unique Role at Multiple Spatial Scales

- The state and the ANR specifically have the ability to affect positive outcomes across a large and diverse collection of public lands. Collectively, the large expanse of these properties offers meaningful opportunities for successful habitat management and connectivity.
- The state is uniquely answerable to its citizens and shall prioritize protection and enhancement of public resources, including biodiversity and clean water, over competing interests from private or other interests.
- Public involvement at the state level offers a meaningful opportunity to use public knowledge and expertise to influence large-area management. This localized engagement is uniquely effective due to the public's deep local knowledge, physical proximity, and ability to communicate directly with state policy makers.
- The state has the unique capacity to aggregate natural community and species inventory data across its entire public land network. This allows the proposed programmatic rule to guide resource protection at a landscape scale, ensuring connectivity and habitat resilience that is much harder to achieve across fragmented private land ownerships. The state must therefore develop protective directives for rare natural communities and endangered species within the rule to provide the overarching framework to be followed by statewide and site-specific plans and actions.

2.2.3 Weighing Risk Factors in an Overall Planning Matrix

- The ANR shall have a duty to avoid extinction of any species as a result of planning actions. Pathogens damaging to human health are excepted.
- The ANR land planners shall summarize and compare biodiversity and rare species concerns in a matrix with other planning concerns.

In summary, to effectively implement an improved land planning rule, the ANR must adopt administrative policies that mandate a rigorous, science-based approach to resource management. By transitioning from discretionary guidelines to enforceable, binding standards for water resources and establishing hard trigger points for biodiversity, the agency can actively protect vulnerable ecosystems. This framework requires land planners to evaluate site-specific conditions and formally weigh risk factors for both water

flows and rare species within a comprehensive planning matrix. Ultimately, the success of these directives relies on an ongoing adaptive management cycle: the ANR must conduct detailed site-specific surveys, monitor outcomes against undisturbed reference areas, publicly release all monitoring data annually, and solicit meaningful public comment prior to making final decisions on any management activities, including Universal Management Actions.

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