



HERBICIDE POLICY, SCIENTIFIC FOREST MANAGEMENT AREA (SFMA)

Director's Signature:

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Policy Statement¹:

Park donor Percival Baxter's stated goals for the SFMA portion of Baxter State Park emphasized the continuous (sustainable) production of a timber supply and the use of practices informed by the current knowledge in the science of forestry. This herbicide policy is meant to enable the SFMA to meet Percival Baxter's stated goals for the SFMA in response to conditions on the site. This herbicide policy guides decision-making about the use of herbicides expressly authorizes their use as a tool to facilitate the continuous production of timber under specific conditions, and details the processes to be followed when they are used in order to minimize their risks. The policy ensures that herbicides are included as an option along with silvicultural and other forest management tools while minimizing their impacts on the forest ecosystem.

Managing Forest Regeneration:

The regeneration of vegetation following timber harvests often presents challenges for forest management. In some instances, non-merchantable shade-tolerant shrubs and small trees can grow densely under forest canopies following a timber harvest, limiting the amount of sunlight that reaches the forest floor. This can suppress the establishment of tree seedlings of desirable merchantable species, which are components of the spruce-fir, northern hardwood, and mixed stands typical of the Acadian Forest. And while some of the species that suppress this forest regeneration are native and provide habitat benefits, their dense growth response following certain harvest prescriptions and under certain site conditions affords them greater dominance in the forest than they typically have in Maine's unmanaged Acadian Forest stands.

The Park strives to use silvicultural prescriptions in the SFMA to promote desirable regeneration, rather than relying on pre- or post-harvest treatment of undesirable regeneration. However, as in many other managed forests in Maine, conditions have developed following certain types of timber harvests or other management actions that have resulted in relatively widespread failure of desirable regeneration in the SFMA, or in a forest understory dominated by species that will respond aggressively to almost any disturbance to the stand's overstory, including many of the

¹ This policy applies only to the SFMA portion of Baxter State Park, where forest management takes place. It also applies to the Baxter State Park demonstration forests: Austin Cary lot and Mount Chase lot, since these have a similar mission to the SFMA.

prescriptions used in the SFMA. In response to these challenging conditions, forest managers may use mechanical means based on silvicultural principles to redirect the successional trajectory of such stands towards the regeneration of desirable species (e.g., various forms of the cutting of the vegetation that is interfering with the growth of desirable species, soil scarification). However, experience and the most current science show that in some stands the regeneration of desirable species under these circumstances is not feasible using these mechanical approaches (due to the understory species or in some cases due to the scale of the need for management). The use of herbicides represents an additional tool that can be effective for mitigating such conditions.² A robust assessment of stands, applied both pre- and post-harvest, can be used to determine when mechanical means will not be effective.

Desirable and Undesirable Regeneration:

Desirable regeneration refers to the seedlings and saplings that will lead to the replacement of the previous overstory, desired species composition at a site, or transition the site into a new desired forest type in cases where the aim of forest management is to force a forest type change (such as for restoration forestry or climate change adaptation). Undesirable regeneration in the SFMA refers to competing plant species that interfere with the germination or growth of desirable regeneration. When plants such as hobblebush (*Viburnum lantanoides*), American beech (*Fagus grandifolia*, which is typically affected by the beech bark disease complex in the SFMA), or striped maple (*Acer pensylvanicum*) dominate the understory, cutting at any intensity will promote these plants and cause them to severely limit the establishment and growth of desired species.³

It is important to note that native shrub and small tree species that represent undesirable *regeneration* when they grow densely in response to forest management are not undesirable *species*. Under less or non-managed conditions, they are part of the native forest ecosystem and provide habitat and ecological benefits. This policy is not intended to eliminate such species from forest stands in the SFMA. Some non-native shrubs can have the same impact in limiting forest regeneration but are not known to occur in the SFMA at this time. If they are introduced and become regeneration inhibitors, this policy will apply to them, along with approaches used to eradicate or manage invasive species in Baxter State Park and the SFMA.

Herbicide Use Risk Management in the SFMA:

The application of herbicides involves risks, such as impacts to non-target species, soil, water, and the herbicide's applicators. A well-defined policy minimizes the risks of herbicides in situations when their use represents the only feasible way to effectively manage forest regeneration. This policy allows the use of herbicides, with the intention of re-establishing conditions that can once again be managed using silvicultural (and sometimes mechanical) tools alone.

Due to the risks associated with herbicides, the SFMA will always first consider using mechanical methods for plant control to address silvicultural problems (such as regeneration failure) and will resort to the use of herbicides only in instances where the SFMA's licensed foresters, following the

² Nyland, R. D., Bashant, A. L., Bohn, K. K., & Verostek, J. M. (2006). Interference to hardwood regeneration in northeastern North America: Controlling effects of American beech, striped maple, and hobblebush. *Northern Journal of Applied Forestry*, 23(2), 122–132. <https://doi.org/10.1093/njaf/23.2.122>.

³ Nyland, R. D., Bashant, A. L., Bohn, K. K., & Verostek, J. M. (2006b). Interference to hardwood regeneration in northeastern North America: Ecological characteristics of American beech, striped maple, and hobblebush. *Northern Journal of Applied Forestry*, 23(1), 53–61. <https://doi.org/10.1093/njaf/23.1.53>

assessment criteria described in this policy, determine that mechanical methods will be ineffective or impractical at the scale of the stand. This is often the case in larger areas because mechanical control is more labor-intensive and less effective (and so may need to be repeated). The Park will comply with the policy stated in 22 M.R.S. § 1471- X by “using the minimum amount of pesticides needed to effectively control targeted pests in all areas of application.” Additionally, the Park will employ best practices as outlined by the Maine Board of Pesticide Control Guidelines for the Application of Pesticides in Forest Settings in Order to Minimize the Risk of Discharges to Surface Waters.⁴ Furthermore, the SFMA will utilize an integrated pest management approach to reduce the overall volume and number of chemical herbicides used as well as ensure efficient and prudent use of the least hazardous effective chemicals. Chemicals used in the SFMA must have the least toxic chemical composition, the highest target efficacy, and the least negative effects on non-target vegetation, wildlife, water quality, and human health of any cost-effective chemical available, as outlined by the Forest Stewardship Council’s (FSC) List of Highly Hazardous Pesticides.⁵

Evaluation and Use of Herbicides for Forest Management in the SFMA:

The following procedures, decision criteria, and methods are based on the best available information at the time of the adoption of this policy. They will be updated and adjusted based on new knowledge and learning from their application in the SFMA.

Treatment candidates must meet one of the following conditions:

Condition 1- Prior to the establishment or final harvest: Forest stands with undesirable species (e.g., diseased beech, striped maple, hobblebush, *Rubus* species, beaked hazel, pin cherry, hay-scented fern) that are creating conditions that are known to exclude the establishment of desirable regeneration.

Condition 2- Post establishment or final harvest: Regenerated hardwood, mixedwood, and softwood stands where undesirable species are threatening the survival or severely hampering the development of desirable regeneration.

Note that invasive plants that are not directly impacting forest regeneration will continue to be assessed and managed in a manner consistent with the procedures used in Baxter State Park.

Evaluation Field Methods

Randomly establish 1/500th acre (5.3’ radius) fixed radius plots using the sampling intensity described under Sample Size below.

- All plants > 0.5” and < 4.5” Diameter at Breast Height (DBH) are tallied in 1” diameter classes. Record species. Note the tallest measured plant in the plot.
- Note the presence of hay-scented fern, beech, striped maple, or hobblebush if present within the plot but not tallied. Also, record its relative height to other plants in the plot.

⁴ Maine Board of Pesticide Control. (2015, June 5). Guidelines for the Application of Pesticides in Forest Settings in Order to Minimize the Risk of Discharges to Surface Waters.

⁵ Forest Stewardship Council . (2024, February 13). FSC-POL-30-001a V1-1.

Adjustments to plot size and sampling intensity are up to the discretion of a licensed forester. Examples of justifiable adjustments include spruce/fir sites where a 1/700th acre plot would be more efficient, extremely dense stands, or highly variable stands. The sampling intensity described below should be considered the minimum.

Decision Criteria

Condition 1: The purpose is to determine if the plot represents a site that will successfully regenerate upon an establishment harvest or will fail to regenerate due to competition after an establishment harvest. Each plot is judged on a pass/fail basis. If the tallest plant in a plot is of an undesirable species, the establishment of desirable regeneration is expected to fail, and the plot fails. If over 30% of the plots fail, intervention with herbicides may be considered.⁶

Note: If an inventory is solely performed for an herbicide assessment, the inventory may cease when 30% of the plots have failed, as the block (or area within it with the same conditions) has failed the regeneration assessment and may be considered for herbicide treatment.

Condition 2: The purpose is to determine if established regeneration requires a release (i.e., a management intervention that will provide a plant an advantage over its competition). To ensure that the majority of the species that will respond to a harvest have had a chance to do so, the survey should be performed at least three seasons after an establishment or final harvest. A stand will warrant a release only if it is fully stocked with desirable regeneration. If over 50% of the plots are stocked with desirable regeneration, the stand should be considered fully stocked. If over 30% of the stocked plots (fully stocked with desirable regeneration) are overtopped by an undesirable species (even a single stem), an herbicide treatment may be employed. If less than 30% of the stocked plots (fully stocked with desirable regeneration) are overtopped by an undesirable species, an herbicide treatment may not be employed.

- An average of 1 hardwood or pine greater than 4.5 feet tall per plot represents a completely stocked plot (500 trees per acre [tpa]). Greater than 50% of the plots should have at least one stem of desirable hardwood or pine to be considered stocked with desirable advance regeneration.
- An average of 1.5 spruce, fir, or cedar greater than 4.5 feet tall per plot represents a completely stocked plot (750 tpa). Greater than 50% of the plots should have at least one stem of spruce, fir, or cedar to be considered stocked with desirable regeneration. 1/700th acre (4.45 feet) plots may be substituted in spruce/fir stands to improve sampling efficiency.

⁶ Nyland, R. D., Bashant, A. L., Bohn, K. K., & Verostek, J. M. (2006). Interference to hardwood regeneration in northeastern North America: Controlling effects of American beech, striped maple, and hobblesh. *Northern Journal of Applied Forestry*, 23(2), 122–132. <https://doi.org/10.1093/njaf/23.2.122>

Sample Size: sampling intensity is calculated using the “rule of thumb” in A Sampler of Inventory Topics by Kim Iles & Associates Ltd.(2003):

Stand Area	Number of Points
Less than 10 acres	10 plots
11-40 acres	1 plot per acre
41-80 acres	20 + 0.5 (area in acres)
81-200 acres	40 + 0.25 (area in acres)
Over 200 acres	$n = \frac{t^2 cv^2}{E^2}$

Where n = number of points for the desired precision E, with a probability level implied by the value t. The CV is the coefficient of variation of the forest in percent.

Selecting an Herbicide Application Method

The selection of an application method will be made by a licensed forester. The method will be determined based on species to be released, species to be controlled, stems per acre of both, terrain, soil types, and proximity to a protected resource, among other considerations. However, in general:

1. If there are fewer than 500 undesirable stems per acre, use individual stem treatments⁷.
2. If there are over 500 undesirable stems per acre (under 15 feet tall), use mist blowers.
3. Aerial applications of any kind (e.g., by plane or Unmanned Aerial Vehicle), as silvicultural treatments for forest regeneration or for the treatment of invasive plants, will be considered only in cases where the use of mist blowers is determined by a licensed forester to be ineffective and will be discussed with the SFMA Advisory Committee and the BSP Authority prior to its use.

Record Keeping

The justification for any herbicide treatment—based on the assessment criteria above—must be recorded in the block narrative, along with the inventory data, and all records for the application (all of which include dates and employee names).

⁷ In larger areas, even densities of undesirable stems below 500/ac may make efficient use of herbicides not feasible. The assessing forester will use their professional judgment, and if this threshold density is consistently found to be too high to be feasible, the policy will be updated to reflect a better guideline threshold.

Treatment Process

- Assess the qualification of the stand and method of herbicides by performing the stand assessment (as described above).
- Lay out treatment areas, delineating the treatment area boundary and recording it with GPS.
- To alert pesticide applicators to the presence of potentially sensitive areas and to facilitate their careful monitoring by staff, the boundaries of areas within the following distances will be delineated prior to ground-based herbicide applications.
 - Buildings or wells 300 feet
 - Ownership boundaries⁸ 100 feet
 - Lakes, ponds, streams, and wetlands 25 feet
 - Except with a variance permit, pesticides may not be applied within 25 feet of certain waterbodies as per state regulations.⁹
 - Riparian Management Zones (RMZ) As mapped
 - Herbicides applied within an SFMA RMZ must be formulated for use near water, and justification for the use must be clearly documented.

Appropriate protective buffers for occurrences of rare species, exemplary natural communities, reserve management areas, and other potentially sensitive natural resources will be determined in consultation with Park or other qualified natural resource conservation staff.

- Place notices regarding the application in any public access areas with restricted entry, as per chemical labels and applicable State of Maine rules and regulations. This includes roadside areas and any trails crossing the treatment area.
- Develop prescriptions describing the appropriate type and amount of herbicide to control target species and detailing the application method.
- Herbicide application may be performed by qualified BSP staff or a contractor. If using a contractor, a contract should specify responsibilities, treatment conditions, treatment prescriptions, areas, and timelines.
- Provide an overarching plan and a summary of the block acreages and prescriptions to the applicator in advance of commencing the work.
- Review with the applicator:
 - The overarching plan
 - Individual treatment area maps
 - Treatment areas in the field
- If the applicator is a contractor, SFMA staff familiar with the treatment area and chemical application must be present at the commencement of work for each block being treated.
- Records to be kept during the application are:
 - Date and time of treatment

⁸ This minimum buffer distance from the boundaries with adjacent properties will also be applied to the boundary of the SFMA with other portions of Baxter State Park.

⁹ Department of Agriculture, Conservation, and Forestry (01), Board of Pesticides Control (026), Standards for Water Quality Protection (Chapter 29 Section 6)

- o Wind speed, temperature, relative humidity, and precipitation
- o Batch information: chemicals, volumes, label #
- Records to be kept in the block narrative include:
 - o A map showing the treatment area and any sensitive or other appropriate features.
 - o A prescription page discussing the chemicals used, delivery method, target species, treatment block acreage, and sensitive features associated with the treatment area.
 - o Applicator documentation:
 - Name
 - License number
 - Address of applicator
 - Block number
 - Habitat
 - Date
 - Start and stop times
 - Chemical used
 - EPA Reg number
 - Concentration used
 - Carriers/additives
 - Total amount of chemical used
 - Mode of application
 - The weather during the application
 - Weather 24 hours before
 - Comments
- The outcome, including any divergence from the plan and reasons for the divergence.
- Assess the treatment area no sooner than 48 hours following, but within 1 week of, the application to ensure the work was completed as planned and to remove signage. Assess the treatment again the following growing season to evaluate and ensure the efficacy of the treatment, and if necessary, reassess two growing seasons post treatment. If successful, the treated stand will then be assessed every 10 years, in accordance with the SFMA's general assessment protocols.

Additional Requirements

- Herbicides that are prohibited for use by the state of Maine shall not be used in the SFMA.
- Herbicides listed by the Forest Stewardship Council in 2024 as "Prohibited" shall not be used in the SFMA.
- Herbicides used in the SFMA must have a low toxicity to non-target organisms, as outlined in categories 2.1b and 7 of the FSC Highly Hazardous Pesticides list.
- All herbicide applications in the SFMA will comply with Maine's pesticide laws and regulations.
- Only licensed and qualified applicators shall apply herbicides in the SFMA, and shall always apply the herbicides as specified by the label.

- If recreational trails are within a restricted entry areas, the Public will be notified via the Park's most effective public notification avenue, such as the Park website (in addition to signage on site).
- SFMA staff will keep track of new information in the field of chemical vegetation management (including risks and impacts) in order to make any necessary adjustments to this policy.
- The efficacy of the policy in relation to forest regeneration conditions in the SFMA will be assessed at regular intervals, at a minimum every 5 years (and as frequently as every year, especially as forest inventory information is updated and early herbicide applications are assessed).