

Monitoring, Review and Revision

Introduction

As described in the Introduction, the State Forest Management Plan is founded upon the principles of sustainable forest management, as (essentially) defined by the Montreal Process, through the DNR's forest sustainability planning framework. One of the tenets of the Montreal Process is a "common framework to monitor, assess and report on trends in forest conditions with response to the full range of forest values and, in turn, on the progress towards sustainable forest management." Monitoring is assured within the DNR sustainability framework through the identification of metrics for each management priority at the statewide and regional scales. The metrics were chosen to be realistic, achievable and within the scope of DNR operations and capacity. These metrics were carried through at the management area and special analysis unit scales, where applicable.

Monitoring, with assessment and reporting, occur across geographic scales and program operations. Monitoring is intended to identify the current status or condition of forest values, determine progress toward desired future forest conditions and determine the social, economic and ecological effects of management activities.

Basic monitoring, assessment and reporting requirements inherent to plan implementation are part of a responsible agency resource management program. These include:

- The DNR budget process
- Special purpose funding such as federal grants
- The DNR compartment review process
- Timber sale preparation and inspection process
- Forest regeneration surveying
- Resource damage reporting
- The Forest health monitoring program
- Wildfire detection
- Sustainable Forestry Initiative and Forest Stewardship Council certification protocols
- Public reporting – as required by the certification standards

These, and others, are achieved through different types of monitoring, some of which the DNR currently undertakes and others which the department will strive for within the sustainability framework (Table 1). These are:

- **Baseline monitoring – inventory:** A list of elements of interest on a site or landscape that represents what is known to be the present condition.
- **Baseline monitoring – surveillance:** Repeated inventory done to established standards and can indicate change over time, though not the cause for change.
- **Implementation (compliance) monitoring:** Collection of data to determine if stated actions were completed.

- **Effectiveness monitoring:** Collection of data to determine if the chosen methods resulted in the desired outcomes, and measures progress toward management objectives or desired future conditions.
- **Validation monitoring:** Verifies assumptions and causal pathways underlying conceptual models of system function and is typically restricted to research projects.

Table 1. Examples of the types of monitoring the DNR employs on state forest land.

Baseline Monitoring – Inventory	Baseline Monitoring – Surveillance	Implementation (Compliance) Monitoring	Effectiveness Monitoring
State forest infrastructure (roads, trails, campgrounds)	Michigan Forest Inventory system (MiFI)	Internal DNR forest audit	Management area analysis toward desired future condition
State forest features (ecological reference areas, deer wintering complexes, etc.)	Forest health monitoring	Forest certification audits	Forest regeneration surveys
--	Wildfire surveillance	Law enforcement	Pesticide use evaluation report
--	Fish and wildlife surveys	--	--

Validation monitoring was not included in the table because research does not represent a large part of DNR operations and is typically conducted through external partnerships. Recent examples of research in the state forest include the Northern Hardwoods Project (Walters et al. 2022), Cedar Research Project (Chimner et al. 2022), and the Predator Prey Project (Sitar and Roell 2021).

Monitoring management plan implementation

The monitoring efforts undertaken by the DNR continue to be employed in the State Forest Management Plan implementation. The difference with this plan is that while most of the data for each of the management priorities has been available as part of DNR inventory systems, metrics for most of them hadn't been defined to track changes over time or toward the desired future conditions in a state forest sustainability context. In some cases, metrics were identified that may require new monitoring, analysis and reporting efforts. This is particularly true for metrics identified for featured species and landscape habitat conditions, described in more detail below.

To assist with these new monitoring needs, the following steps will be completed by the implementation team upon approval of this plan:

- 1) Compilation of all the management priority objectives and management actions to be sorted by completion date with identified task owners (implementation and compliance monitoring).
- 2) Compilation of all the management priority metrics sorted by monitoring type and inventory system (inventory and surveillance monitoring).
- 3) Evaluation of current assessment and reporting systems to determine what gaps need to be filled and in what ways to ensure new metrics are monitored over time.

- 4) Establishment of a monitoring schedule so that metrics are routinely monitored according to the required frequency.

Featured species and landscape habitat condition monitoring

At present, little monitoring is done in relation to featured species or landscape habitat conditions on the state forest in general, much less in a forest sustainability context. This is a challenging endeavor, because wildlife is difficult and expensive to survey, habitat is species-specific, wildlife habitat can take decades to establish, and because DNR Wildlife Division staff time and resources are limited with state forest management being only part of what they do. Most of the inventory, monitoring and reporting systems established for the state forest were developed by the DNR Forest Resources Division to achieve its mission, mandates and goals pertaining to forest cover type management. The data collected describes forest conditions relevant to silvicultural applications; however, often these do not adequately capture the forest condition attributes relevant to wildlife habitat. There is a long-standing gap between the limiting wildlife habitat stand attributes described in peer-reviewed literature that represent management priorities and forest stand inventory data.

This is problematic for several reasons. It means that wildlife biologists currently have only coarse forest descriptors (e.g., cover type, age, basal area) to evaluate landscape habitat availability, and it also means that these coarse descriptors are the only attributes available to incorporate wildlife habitat into the State Forest Management Plan model. The model provides the DNR with the ability to passively track featured species habitat over time, to integrate featured species habitat goals into forest harvest planning and to evaluate different featured species management scenarios. Without a dataset that better describes important wildlife habitat attributes and that is collected and monitored over time, any advances this forest harvest modeling platform offers will go unrealized and wildlife habitat management will continue to be hindered.

Metrics identified for featured species and landscape habitat conditions management priorities begin to address this. Similar to the situation described above, many of these are newly identified metrics that rely on currently available inventory data out of necessity and in acknowledgement of the current data gaps for wildlife habitat attributes. However, some are new metrics that will require new monitoring approaches. To address the suite of new monitoring needs generated by both management plan metrics and to better model wildlife habitat, a featured species and landscape habitat conditions monitoring framework was developed.

While the plan implementation team will be responsible for implementation and monitoring oversight, they will be largely focused on annual MA and SAU compliance and effectiveness monitoring. It will be up to the DNR division representatives on the team to ensure compliance and other types of monitoring occur with regard to their management priority objectives and metrics (e.g., for Parks and Recreation, Fisheries and Wildlife). For featured species and landscape habitat conditions, Wildlife Division staff on the implementation team along with several other Wildlife Division employees formed a wildlife-specific team. The team will ensure identified metrics are captured in a monitoring system and address long-standing wildlife habitat monitoring needs. This team will periodically require the help of species specialists and field staff to enact various monitoring efforts, and partners will be essential in expanding

monitoring capacity. Some species specialists and field staff may also be asked to help develop an approach to incorporating featured species habitat goals into the next iteration of the model. As these monitoring efforts grow, so too will data storage, management and assessment needs. Those may be addressed through partnerships, but as this is a recognized limitation for Wildlife Division, there are efforts underway to address data needs in a larger context.

Implementation (Compliance) Monitoring Definition: Did the DNR do what it said it was going to do?	Habitat Variable Monitoring and Modeling Definition: Bridging the gap between MiFI variables and important habitat attributes to prioritize for management, monitoring and modeling.	Effectiveness Monitoring Definition: Is the DNR effectively moving toward the desired habitat future conditions? Is there a positive or desired featured species response?
<p>Objective 1: Beginning in YOE 2027, ensure State Forest Management Plan habitat goals at various spatial scales are enacted through compartment review.</p> <ul style="list-style-type: none"> Track annual landscape habitat condition acres and ensure they are in alignment with model projections. Track annual special analysis unit harvest targets and ensure they in alignment with model projections and are meeting species plan habitat objectives. Track annual model featured species habitat acres and ensure they are in alignment with model projections. 	<p>Objective 1: Within five years, develop and implement an integrated monitoring system for wildlife habitat attributes not captured in MiFI to better inform the next forest plan model.</p> <ul style="list-style-type: none"> Identify priority habitat variables for featured species that aren't captured in MiFI. Identify feasible monitoring tools, such as remote sensing, to address some monitoring needs. Work with partners to develop and implement routine monitoring for selected habitat attributes. Crosswalk between habitat variables and model inputs. 	<p>Objective 1: Beginning in 2028, sample stands in various stages post-treatment to monitor for planned stand level habitat objectives.</p> <ul style="list-style-type: none"> Work with partners to develop and implement monitoring, and to find funding sources if necessary.

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<p>Objective 2: Beginning in YOE 2027, ensure the habitat goals agreed on at compartment reviews are reflected accurately in timber sale contracts.</p> <ul style="list-style-type: none"> Annually conduct a randomized review of a subsample of timber sale contracts and vet them against compartment review sign-off documents. 	<p>Objective 2: Within five years, develop habitat goals for all featured species to be incorporated in the next State Forest Management Plan model.</p> <ul style="list-style-type: none"> Evaluate featured species habitat needs. Develop an approach to incorporate featured species habitat needs into the State Forest Management Plan model. 	<p>Objective 2: Beginning in 2029, sample the same stands as Objective 1 for targeted featured species response.</p> <ul style="list-style-type: none"> Work with partners to develop and implement monitoring, and to find funding sources if necessary.
<p>Objective 3: Beginning in YOE 2027, ensure habitat goals in timber sale contracts are implemented accurately at the harvest site.</p> <ul style="list-style-type: none"> Annually visit a subsample of newly completed timber sales to assess how well timber sale contract specifications were applied. 	<p>--</p>	<p>--</p>

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<p>Objective 4: By the end of 2025, create a backup system outside of the MiFI environment to house stand treatment history.</p> <ul style="list-style-type: none"> • Work with the DNR Forest Resources Division and the Michigan Department of Technology, Management and Budget to determine the best approach, funding needs and commitments, and training for staff. 	<p>--</p>	<p>--</p>
<p>Objective 5: By the end of 2025, develop an automated database to track featured species habitat and landscape habitat conditions treatments in real time for annual reporting purposes.</p> <ul style="list-style-type: none"> • With division partners, develop a Power BI or other real-time database to automate featured species and habitat treatment tracking. 	<p>--</p>	<p>--</p>

Review and revision of the State Forest Management Plan

The planning horizon for the State Forest Management Plan is 10 years. At that time, the plan and model will be reviewed and revised or updated, with public engagement, provided that no major changes occur in the interim. However, sometimes unforeseen and unavoidable changes in environmental conditions, forest or wildlife health, timber markets or recreational demands may result in a necessary change in management direction. Likewise, if plan monitoring over time indicates that some management objectives are no longer valid or are not being achieved, that may necessitate revisiting the management objectives or methods. Depending on the extent and impact of the proposed changes, a public review of

the changes may be initiated, and notifications sent out as appropriate. Changes that amount to minor refinements based on new data will be considered as normal business and adjustments will be made without public review.