

APPENDIX Q

Monitoring

Subsection Forest Resource Management Plan Implementation

Background

The Department of Natural Resources (DNR) is developing forest resource management plans using the subsection level of its ecological classification system (ECS). A more standardized, structured planning process that provides opportunities for public involvement is being used to develop Subsection Forest Resource Management Plans (SFRMPs).

A SFRMP is a DNR plan for vegetation management on forest lands administered by the Divisions of Forestry and Wildlife (and on occasion lands administered by Fisheries, Parks, and Trails and Waterways). ECS subsections, not administrative boundaries, are the basic units of delineation. The strategic component of SFRMPs focuses on long-term strategic direction in response to identified issues, strategies to implement the general direction, and identification of quantifiable long-term desired future forest composition (DFFC) goals.

Plans identify forest stands on DNR administered lands proposed for treatment (e.g., harvest, thinning, regeneration, prescribed burning, reinventory) over a 10-year planning period. Forest stands are selected using criteria developed to begin moving DNR forest land toward the long-term DFFCs. Stand management consists of a series of actions (including no action) that will best move the forest landscape toward the DFFC goals.

This document outlines an approach to monitoring the manner in which SFRMPs are being implemented and the impact implementation actions are having on forest lands.

Monitoring Purpose

The term monitoring is defined as to watch or check and suggests a series of observations over time. Without monitoring we have no way of knowing whether we have achieved our goals or what we need to do to improve our work.

This monitoring effort is intended to address the following:

- Are management actions consistent with the plan?
- Are management actions moving DNR forest lands towards the goals outlined in the plan?

It is also intended that this monitoring effort will satisfy Forest Stewardship Council (FSC) certification requirements. Scientific Certification Systems, a certification body accredited by the FSC, was retained by DNR to conduct a certification evaluation of the forested lands it administers. Forest management operations meeting international standards of forest stewardship can be certified as “well managed.” Evaluation of operations relative to the FSC standard for monitoring and assessment (#8) generated the following comments (portion of CAR 2005.12):

- Frequency and intensity of monitoring may need to be expanded to better reflect the size and complexity of DNR forests, the SFRMP, and FSC monitoring requirements.
- By the 2007 surveillance audit, DNR needs to review its current monitoring protocols and determine what, if any, additional monitoring aspects are needed to more fully demonstrate conformance with Criterion 8.2, and that, more importantly, is needed to track specific accomplishments during the 10-year SFRMP timeframe.

Further direction for monitoring is provided in the agency’s strategic document, *A Strategic Conservation Agenda 2003 – 2007*, which uses approximately 90 measurable indicators and targets to describe progress towards achieving desired conservation results. Some of the indicators and targets relevant to the SFRMP process include:

- acres of state-administered lands approved for forest certification,
- number of cords of wood offered for sale on DNR lands,
- acres of protected old-growth forests on DNR lands,
- percentage of extended rotation forests (ERF) maintained on DNR lands,
- early successional forests maintained on DNR lands,
- net annual growth of growing stock on DNR-administered lands,
- acres of DNR forest lands reinventoried,
- forest associated wildlife species (deer and ruffed grouse), and
- the number of species in greatest conservation need.

Audience

Both internal and external stakeholders are the intended audience for monitoring results. Internal stakeholders include: SFRMP teams, SFRMP Process Work Group, Forest Resource Issue Team (FRIT), DNR field personnel and decision makers, etc. External stakeholders include: forest certification auditors, adjacent landowners, MN Forest Resources Council, loggers, forest recreational users, members of environmental organizations, etc.

Monitoring Approach

There are hundreds of possible questions that could be asked about the implementation and effectiveness of management actions on state forest land. Some important questions are just too difficult to monitor. Others are confounded, meaning it is difficult to distinguish one cause or effect from another (e.g., vegetation changes due to weather). This monitoring effort attempts to identify and focus on the most important questions that can reasonably be addressed.

It is our intention to monitor the implementation of all subsection plans with the framework and indicators laid out in this plan. Because initial plans differ significantly in terms of stated goals and objectives, there needs to be a fair amount of flexibility and the opportunity to add and adjust indicators to fit the specific plans. We view this as a dynamic undertaking that will evolve and improve as we proceed with implementation and monitoring responsibilities. We recognize that new data may come available due to expanded efforts and advanced technologies. We'll remain open to incorporating new opportunities and approaches.

In an effort to practice adaptive management, we have incorporated a mechanism to change our monitoring approach and techniques, and amend the subsection plans. The SFRMP Work Group has responsibility for the process to make such changes.

Limitations

Time – to get work done and for forest vegetation to respond – influences the complexity of forest management monitoring and is an important consideration when analyzing and interpreting results. Under the SFRMP process, a specific stand may not receive management treatment until the end of the planning cycle (as much as 10 years). Once treated, it may be many years before the desired effect is measurable in the stand (e.g., clearcut with reserves to convert the cover type). The time factor needs to be considered during monitoring and when interpreting results.

Plans include long (50+ years) and short-term goals (Appendix A. Excerpts of Subsection Plan Goals). Terminology is not always consistent between plans, but all plans do include Desired Future Forest Composition (DFFC) goals for cover type and age structure. Cover type conversion, species composition, patch management, (etc.) are DFFC goals in some plans. There is usually a numeric or trend target for DFFC goals. While some other (non-DFFC) goals are measurable and include a target, most do not. Goals without a measurable outcome may be important but they will be very difficult to monitor.

Methods

Monitoring involves a comparison between the conditions your actions have affected and some defined benchmark. In this effort, most monitoring questions will be addressed by comparing forest vegetation conditions prior to implementation of SFRMP management actions to vegetation conditions after implementation. We will also compare management actions to the management intent outlined in the plans.

Implementation Monitoring: Determines whether the management actions are being implemented as written in the plans.

Are management actions being carried out in a manner that is consistent with the plan?

Effectiveness Monitoring: Determines the appropriateness or effectiveness of specific management actions designed and implemented to accomplish an objective.

Are management actions having the desired on-the-ground effect?

Monitoring questions and indicators have been identified for both implementation and effectiveness monitoring (Table 1). Indicators are a particular unit of information that, when measured over time, documents changes in a specific condition referenced in the monitoring question. The following criteria were considered when choosing indicators: measurable, precise, consistent, and sensitive.

We recognize there are important indicators that we cannot monitor at this time due to a lack of available data and/or an appropriate monitoring effort. Wanting to move forward with monitoring in a timely manner, we have given indicators a priority ranking:

- 1 - measurements we can do fairly easily and will start immediately;
- 2 - measurements we are currently working on and hope to do soon; and
- 3 - measurements we want to do and will continue to investigate, but are currently not able to undertake.

A time-series design will be followed, meaning that most data will be collected multiple times during a plan's time span. This method will allow us to practice/refine techniques for withdrawing data from large databases and also to track trends.

Data Sources

A significant portion of the data needed to monitor plan implementation and effectiveness is collected in existing databases. Other data, especially those relating to effectiveness of management actions, are more difficult to obtain.

1. Forest Inventory Module (FIM)

- a. The primary source of information about DNR forest lands is the Forest Inventory Module (FIM). FIM is a stand-level forest inventory that captures essential information about every forest stand on more than four million acres of DNR forest land. It is the basic data set from which decisions are made about if, when, where, and in what manner DNR forest stands will be treated. Information gathered includes overstory and understory tree species, stand age, timber volumes, site productivity, shrub and ground species, insects and diseases, and other specific site conditions.

2. Silviculture and Roads Module (SRM)

- a. The Silviculture and Roads Module (SRM) enables foresters to plan and record management objectives and actions on state lands. A SRM site is the piece of land for which the manager has a prescription developed. The site may be a FIM stand, part of a stand, or more than one stand. SRM allows for multi-year prescriptions for sites to manage the site for a specified objective. The site prescription consists of all the actions prescribed for a site to obtain a desired future condition. Actions include all the site prep, planting and seeding, TSI, and regeneration survey work needed to manage a stand for a specified objective. This long-range schedule and record of completed work helps track management activities, obligations, and management objectives. It is the foundation for budget requests and work plans.
- b. Appendix B includes a draft list of reports that will be generated from SRM annually.*

3. Timber Sales Module (TSM)

- a. The new Timber Sales Module (TSM) will support the appraisal and sale of timber harvest permits; tracking security provided by permit holders; accounting for harvested timber; and collecting revenue. TSM was activated in the winter of 2006-2007.

4. SFRMP Shapefile

- a. The SFRMP shapefile includes FIM stand data for all state-administered forest lands in the subsection plans. Subsection boundaries may have been slightly adjusted to avoid splitting of stands, for consideration of access, etc. Therefore,

the SFRMP subsection shapefile boundaries may be somewhat different than the original ECS subsection shapefile.

- b. In addition to the standard FIM data fields, the SFRMP shapefile includes fields added during the planning process to identify stands for specific purposes (e.g., ERF, EILC, patches, preliminary objectives, new access data, and stand selection fields). These added fields varied somewhat for subsection plans started prior to 2005. Now, there is a standard set of fields for use in SFRMPs. The pre-2005 plans will be updated so that all plans contain the same set of SFRMP shapefile fields. This will make it possible to create a statewide shapefile and provide a uniform set of fields for importing into SRM, posting on the DRS, reporting, and monitoring purposes.

5. DNR Data Resource Site (DRS)

- a. The Data Resource Site (DRS) is a standardized collection of GIS data, metadata and programs. A DRS is a place where GIS resources are stored and made available to the users. The layers available on the DRS are designed such that use by DNR personnel is intuitive and efficient. Many layers have been converted to shapefiles that are statewide in extent and targeted to a specific piece of information.

6. Internal Assessments and Inventories

- a. We will incorporate data from existing and pending assessments and inventories conducted by the divisions of Ecological Resources, Fish and Wildlife, and Waters. Possible specific data sources include wildlife population surveys (ruffed grouse, deer, goshawk, red-shouldered hawk, etc.), harvest reports, and water sampling results (impaired waters).

7. External Assessments and Inventories

- a. We will continually look for opportunities to integrate assessment and inventory work conducted by universities and other agencies.

8. Imagery

The Forestry Resource Assessment Center has available aerial photos and satellite images. These tools can be used to assess changes to the structure and pattern of forest vegetation.

Sampling of Sites

Sites will be sampled annually to verify accuracy of SRM data entry and consistency between the site objective and vegetation conditions (incorporating both implementation and effectiveness monitoring). This is an important component of the monitoring plan because so much of the monitoring data comes from the SRM database. The SFRMP Process Work Group will further

develop methods for sampling sites (number of sites, site selection, techniques, etc.). Timber sale inspections and regeneration surveys are existing tools to gather validation data.

Baseline Data

Every effort will be made to identify baseline data for each indicator. The subsection assessments done at the beginning of the planning process contain all or most of the necessary data. Some indicators are tracked as a frequency or occurrence, for which there was not prior record keeping (e.g., the number of treatment deferrals). Although pre-plan implementation data is lacking, data will be recorded annually so trend information during the plan's timeframe will be available.

Data Collection, Analysis and Interpretation

Data for implementation monitoring will be collected on an annual basis. Effectiveness monitoring data will be collected and compiled at the end of a plan's time span and also midway (five years) for some indicators. Data will be analyzed and summarized annually, and provided to the subsection teams for interpretation.

Data is entered into the FIM, SRM, and TSM modules continually. Fiscal year entries must be completed by September 1 of the following year. Data for the previous fiscal year can be extracted anytime after September. Plan shape files and DRS files are continually available.

Roles and Responsibilities

Successful implementation and monitoring of the SFRMP process is dependent on the good work of many people. Following is an explanation of specific roles and responsibilities.

Forestry Field Personnel

Accurately record data and clearly document decisions regarding site objectives and associated actions for entry into appropriate databases.

Timber Sales, Silviculture, and Inventory

Program Foresters

Accurately records data into the appropriate database (FIM, SRM, TSM) in a timely manner. Screens field data/decisions for consistency between actions and objectives, and with SFRMP plan direction.

Subsection Teams' Core 4

The Core 4 reviews the monitoring results and is responsible for any follow up on issues that arise. Follow up may include convening the full

The Core 4

For each subsection team, members of the Core 4 have been identified and given additional responsibilities.

Core 4 members include the:

- Regional Wildlife member,
- Regional Forestry member,
- Ecological Services member, and
- Forest Planner.

team, conducting additional training, re-emphasizing certain plan goals, initiating the plan amendment process, etc. The existing SFRMP Work Group process for resolving problems will be followed.

Subsection Teams

Meets at the request of the teams' Core 4 to discuss and interpret monitoring results and determine appropriate course of action.

Subsection Teams' Forest Planner

Incorporates monitoring in SFRMP training for field personnel. Communicates the nature and importance of SFRMP monitoring to field personnel. During plan development, works with SFRMP teams to incorporate monitoring considerations in formulating goals (i.e., measurable DFFCs). Convenes the Core 4 to review monitoring reports. Provides brief summary of monitoring reports for review by FRIT. Assists with preparation of monitoring reports.

Central Office Forest Planner

Works with the subsection teams' forest planner and the Core 4 to compile baseline data. Facilitates annual extraction of data from databases and other sources, and assists the subsection teams' Core 4 in obtaining and analyzing monitoring data. Coordinates the preparation of monitoring reports. Maintains a central data and report storage system.

FORIST Steering Committee

Determines work priorities for FIS personnel.

Forest Information Systems St. Paul Personnel

Maintains databases. Prepares mechanisms for extracting reports and data. Helps solve database related problems.

SFRMP Process Work Group

Overall responsibility for, and oversight and evaluation of the SFRMP monitoring effort. Identifies and recommends ongoing changes and improvements to the SFRMP monitoring process, including content, timing and roles/responsibilities

Forest Resource Issues Team (FRIT)

Reviews and approves SFRMP monitoring plan, reviews/approves recommended changes to the plan and, periodically reviews summaries of monitoring results.

Outline for Reporting

- I. Introduction*
- II. Methods*
- III. Data*
- IV. Analysis*
- V. Findings*
- VI. Recommendations*

Division Directors (Forestry, Fish and Wildlife, Ecological Resources)

In addition to their FRIT membership, directors approve allocations of resources to the monitoring effort and make decisions on issues not resolved at the region level.

Communicating Results

Each subsection team's Core 4 and forest planners will analyze and summarize monitoring results annually. A comprehensive written report, summarizing results of the annual efforts, will be prepared mid-term and at the end of the plan's time frame. These reports will be distributed internally and accessible via the DNR web site. Stakeholders for each planning process will be notified once the various reports are on-line.

Reference Materials

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Livingston, B. et al. 2005. Habitat Conservation Plan for State Trust Lands: 2004 Implementation Monitoring Report. Washington State Department of Natural Resources. Olympia, WA.

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Minnesota Department of Natural Resources. 2006. A Strategic Conservation Agenda 2003 – 2007: Measuring Progress Toward Mission (June 2006 Update). State of Minnesota. St. Paul, MN.

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Wager, D. 2005. Forest Management and Stump-to-Forest Gate Chain-of-Custody Certification Evaluation Report for the: Minnesota DNR Administered Forest lands. Scientific Certification Systems. Emeryville, CA.

Table 7.14: SFRMP Monitoring questions, indicators, outcomes, data sources, frequency, and priority

*1 - measurements we can do fairly easily and will start immediately; 2 - measurements we are currently working on and hope to do soon; 3 - measurements we want to do and will continue to investigate, but are currently not able to undertake.

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|---|--|---------------------------------|--|---|---------------|------------------|
| Implementation Monitoring: Are management actions being carried out in a manner that is consistent with the plan? (numbers 1 – 26) | | | | | | |
| 1. Are the numbers of acres harvested (by cover type) consistent with the plan? | Acres harvested | Acres by cover type | <i>This column will be filled in with the measurable outcomes specified in the subsection plans.</i> | SRM Location Detail Properties and Actual Actions | Annual | 1 |
| 2. Which management actions (prescriptions) were carried out (by cover type)? | Management actions (prescriptions) carried out | Actions by cover type and acres | | SRM Location Detail Properties and Actual Actions | Annual | 1 |
| 3. Are the numbers of acres reforested and the species used consistent with the plan (by cover type)? | Acres reforested and the species used | Acres and species | | SRM Objectives and Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|---|---------------------------------------|--|--|---|----------------------|-------------------------|
| 4. Are the acres and age of ERF stands harvested in a way that is consistent with the plan (by cover type)? | Acres and age of ERF stands harvested | Acres and age by cover type | | FIM SFRMP Shape File | Annual? | 1 |
| 5. Are the numbers of “normal rotation” acres harvested consistent with the plan (by cover type)? | “Normal Acres” harvested | Acres by cover type | <i>This column will be filled in with the measurable outcomes specified in the subsection plans.</i> | FIM SFRMP Shape File | Annual? | 1 |
| 6. What is the frequency of stand treatment being a deferral (by cover type)? | Stand treatment = deferral | Number of stands by cover type and acres | | SRM Location Detail Properties Actual Actions | Annual | 1 |
| 7. What is the frequency of stand treatment being a FIM alteration (by cover type)? | Stand treatment = alteration | Number of stands by cover type and acres | | SRM Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|--|--|--|--|-----------------------------------|----------------------|-------------------------|
| 8. Is the number of stands managed to maintain cover type consistent with the plan (by cover type)? | Stands managed to maintain cover type | Number of stands by cover type and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 9. Is the number of stands managed to maintain cover type but increase stand species composition consistent with the plan (by species)? | Stands managed to maintain cover type but increase stand species composition | Number of stands by cover type and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 10. Is the number of stands managed to maintain cover type but change structural composition consistent with the plan (by type of change)? | Stands managed to maintain cover type but change structural composition | Number of stands by cover type and acres | <i>This column will be filled in with the measurable outcomes specified in the subsection plans.</i> | SRM Objectives and Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|--|---|--|--|-----------------------------------|----------------------|-------------------------|
| 11. Is the number of stands managed to convert to another cover type consistent with the plan (by cover type)? | Stands managed to convert to another cover type | Number of stands by desired cover type and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 12. Is the frequency and location of stand management to maintain a large patch consistent with the plan? | Stand management to maintain a large patch | Number of stands and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 13. Is the frequency of stand management to increase patch size consistent with the plan? | Stand management to increase patch size | Number of instances and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 14. Is the frequency and location of stand management to enhance smaller patches consistent with the plan? | Stand management to enhance smaller patches | Number of instances and acres | <i>This column will be filled in with the measurable outcomes specified in the subsection plans.</i> | SRM Objectives and Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|--|--|-----------------------------------|--|--|----------------------|-------------------------|
| 15. Are the numbers of RMZ acres managed for long-lived conifers consistent with the plan? | RMZ acres managed for long-lived conifers | Acres | | SRM Objectives and Actual Actions, GIS | Annual | 1 |
| 16. Are the numbers of RMZ acres managed to maintain shade to trout streams consistent with the plan? | RMZ acres managed to maintain shade to trout streams | Acres | | SRM Objectives and Actual Actions, GIS | Annual | 1 |
| 17. Is the frequency of stand management to maintain existing NPC and structure (by NPC) consistent with the plan? | Stand management to maintain existing NPC and structure | Number of stands by NPC and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 18. Is the frequency of stand management to retain NPC older growth stage components consistent with the plan? | Stand management to retain NPC older growth stage components | Number of stands by NPC and acres | <i>This column will be filled in with the measurable outcomes specified in the subsection plans.</i> | SRM Objectives and Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|---|---|--|------------------------|-----------------------------------|----------------------|-------------------------|
| 19. Is the number of stands managed to protect rare plant and animal locations consistent with the plan (by species)? | Stands managed to protect rare plant and animal locations | Number of stands and acres (note whether a portion of stand) | | SRM Objectives and Actual Actions | Annual | 1 |
| 20. Is the frequency of stands under special management for species or habitat consistent with the plan? | Stands under special management for species or habitat | Number of stands and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 21. Is the frequency of stand management to maintain adequate residual BA within an identified corridor consistent with the plan? | Stand management to maintain adequate residual BA within an identified corridor | Number of stands and acres | | SRM Objectives and Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|---|--|--|--|-----------------------------------|----------------------|-------------------------|
| 22. Is the number of stands managed to protect a rare native plant consistent with the plan (by species)? | Stands managed to protect a rare native plant | Number of stands and acres | <i>This column will be filled in with the measurable outcomes specified in the subsection plans.</i> | SRM Objectives and Actual Actions | Annual | 1 |
| 23. Is the frequency of use of prescribed burning as a management tool consistent with the plan? | Use of prescribed burning as a management tool | Number of instances and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 24. Is the frequency of use of less intensive TSI or site preparation techniques consistent with the plan? | Use of less intensive TSI or site preparation techniques | Number of instances and acres | | SRM Objectives and Actual Actions | Annual | 1 |
| 25. Is the number of stands managed to protect a known cultural resource consistent with the plan (by species)? | Stands managed to protect a known cultural resource | Number of stands and acres (note whether a portion of stand) | | SRM Objectives and Actual Actions | Annual | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|--|---|--|---|-------------------------------------|--------------------------|-------------------------|
| 26. Is the number of new roads built and road closure methods used consistent with the plan? | New roads built and road closure methods used | Miles and methods | | SRM | Annual | 1 |
| Effectiveness Monitoring: are management actions having the desired on-the-ground effect? | | | | | | |
| (numbers 27 – 40) | | | | | | |
| 27. Change in the amount of forest land and timber land? | Amount of forest land and timber | Acres of forest land and timber land | Increase the amount of forest land | FIM Satellite Imagery GIS/DRS | Plan Mid Point & Renewal | 1 |
| 28. Change in representation of forest cover types? | Cover type representation | Total forest acres in each cover type and percent change | Increase diversity; to be specified based on subsection plan | FIM Satellite Imagery | Plan Mid Point & Renewal | 1 |
| 29. Change in forest size and age class distribution? | Forest size and age class distribution | Total forest acres in each size and age class and percent change | Desired outcome varies; to be specified based on subsection plans | FIM | Plan Mid Point & Renewal | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|---|--|---|--|---|--------------------------------------|-------------------------|
| 30. Change in the number of stands with long-lived conifers? | Stands with long-lived conifers | Total acres and percent change | Increase/decrease depending on plan goals | FIM Satellite Imagery | Plan Mid Point & Renewal | 1 |
| 31. Change in area of forest affected by potentially damaging agents (tree mortality and damage; wildfire; flooding, insects and diseases, animals, and utility/road construction)? | Area of forest affected by potentially damaging agents | Acres affected by agent and percent change | Decrease affected acres | FIM (look into surveys by Forest Health staff) | Plan Renewal | 2 |
| 32. Change in forest spatial patterns (patch and connectivity)? | Forest spatial patterns | Number of and size (acres) of patch and index of connectivity | Larger patches with greater connectivity | FIM GIS/modeling | Plan Renewal | 2 |
| 33. Change in forest-associated species of concern by taxonomic group? | Forest-associated species of concern | Indicator of population size and change | Healthier populations (need to define healthier and spp of concern) | Work with Wildlife & Eco Resources, etc. | Plan Renewal, when data is available | 2 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|--|--|--|---|---|--------------------------------------|-------------------------|
| 34. Change in forest bird populations? | Forest bird populations | Indicator of population size and change; possibly red-shouldered hawk, goshawk | Healthier populations (need to define healthier and spp) | Collaborate, possibly with University study, Eco Services | Plan Renewal, when data is available | 2 |
| 35. Change in rare plant communities (number of sites, area, and composition)? | Rare plant communities | Number of and size (acres) of sites, and measure (indices) of health | Maintain or enhance | Work with Eco Services | Plan Renewal, when data is available | 3 |
| 36. Change in miles of impaired streams within forests? | Miles of impaired streams within forests | Miles of impaired streams and change | Decrease in miles of impaired streams | Work with Waters GIS/DRS | Plan Renewal, when data is available | 2 |
| 37. Change in percent of old forest? | Old forest | Acres and percent of total forest | Increase | FIM | Plan Mid Point & Renewal | 1 |

| Monitoring Question | Indicator | Report by | Desired Outcome | Data Source | Approx. Freq. | Priority* Rating |
|---|--|---|--|--------------------|--------------------------|-------------------------|
| 38. Change in the percent of effective ERF? | Effective EFR | Acres and percent of total forest | Increase | FIM | Plan Mid Point & Renewal | 1 |
| 39. Change in the percent of young forest? | Young forest | Acres and percent of total forest | Increase | FIM | Plan Mid Point & Renewal | 1 |
| 40. Change in condition of the under story? | Condition of the under story (including invasives) | Acres and percent of total forest (need agreement on indices) | Increase/Decrease depending on species | FIM | Plan Mid Point & Renewal | 3 |

NOTE: Numbering is not consecutive between Appendix Q and Appendix R (Stand Exam List). Appendix R starts on page 147.