

Appendix A: Monitoring Program

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Overview

Monitoring provides the feedback for the forest planning cycle by testing assumptions, tracking relevant conditions over time, measuring management effectiveness, and evaluating effects of management practices. Monitoring information should enable the Forest to determine if a change in plan components or other plan management guidance may be needed, forming a basis for continual improvement and adaptive management. Direction for the monitoring and evaluation of forest plans is found under the 2012 planning rule at 36 CFR 219.12 and in the directives at 1909.12 Chapter 30.

The plan monitoring program must contain one or more monitoring questions and associated indicators addressing each of the following:

1. The status of select **watershed conditions**.
2. The status of select **ecological conditions** including **key characteristics** of terrestrial and aquatic ecosystems.
3. The status of **focal species** to assess the **ecological conditions** required under § 219.9.
4. The status of a select set of the **ecological conditions** required under § 219.9 to contribute to the recovery of **federally listed threatened and endangered species**, conserve proposed and **candidate species**, and maintain a viable population of each **species of conservation concern**.
5. The status of **visitor use, visitor satisfaction, and progress toward meeting recreation objectives**.
6. Measurable changes on the plan area related to **climate change** and other **stressors** that may be affecting the plan area.
7. Progress toward **meeting the desired conditions and objectives** in the plan, including for providing **multiple use opportunities**.
8. The effects of each management system to determine that they do not substantially and permanently **impair the productivity of the land**.
9. Ecosystem services/social and economic (see final directives)

The plan monitoring program addresses the most critical components for informed management of the Forest's resources within the financial and technical capability of the Agency. Every monitoring question links to one or more desired conditions, objectives, standards, or guidelines. However, not every plan component has a corresponding monitoring question.

This monitoring program is not intended to depict all monitoring, inventorying, and data gathering activities undertaken on the Forest; nor is it intended to limit monitoring to just the questions and indicators listed in tables A-1 through A-17. Consideration and coordination with broader-scale monitoring strategies adopted by the regional forester, multi-party monitoring collaboration, and cooperation with State and Private Forestry as well as Research and Development as required by § 219.12(a), will increase efficiencies and help track changing conditions beyond the Forest boundaries to improve the effectiveness of the plan monitoring program. In addition, project and activity monitoring may be used to gather information for the plan monitoring program if it will provide relevant information to inform adaptive management.

The monitoring program sets out the plan monitoring questions, plan components, and associated indicators. The monitoring program will be guided by a monitoring guide (to be developed) that will

provide more detailed information on the monitoring questions, indicator, frequency and reliability, data sources and storage, and cost. For example, we anticipate that forest inventory and analysis data will be used to monitor vegetation conditions and that data will be updated about every 10 years. However, data sources and frequency of updates may change, so the specifics will be included in a monitoring guide. It is important to note that not all monitoring questions are expected to be evaluated biennially.

The Forest used the best available scientific information in the development of the monitoring plan, giving consideration to expected budgets and agency protocols. For example, forest inventory and analysis (FIA) data is the most accurate, reliable, and relevant data source for monitoring terrestrial vegetation conditions because it follows nationwide, statistically based, FIA protocols. Similarly, PACFISH/INFISH biological opinion (PIBO) data is the most accurate, reliable, and relevant data for monitoring aquatic ecosystem conditions because it uses a probabilistic sampling design. The program was initiated to evaluate the effect of land management activities on aquatic and riparian communities at multiple scales and to determine whether management practices are effective in maintaining or improving the structure and function of riparian and aquatic conditions.

An interdisciplinary team will develop a biennial monitoring evaluation report that summarizes the results of completed monitoring, including the evaluation of the collected data and relevant information from broader-scale or other monitoring efforts. The report will also include recommendations for the responsible official as to whether a change to Forest Plan management activities, or the monitoring program, or if a new assessment may be warranted based on the assessed information. The monitoring evaluation report is used to inform adaptive management of the Plan area and will be made available to the public (26 CFR 219.12(d)(2)).

Some types of monitoring indicators require longer time frames for thorough evaluation of results, but a biennial review of the certain information that has been collected ensures timely evaluation to inform planning. The biennial monitoring evaluation does not need to evaluate all questions or indicators on a biennial basis but must focus on new data and results that provide new information regarding management effectiveness, progress towards meeting desired conditions or objectives, changing conditions, or validation (or invalidation) of assumptions.

Tables A-1 through A-17 are organized to display the monitoring question(s), the indicator(s) for answering the monitoring question(s) and the plan components associated with them. Monitoring questions are used to evaluate whether management is maintaining or moving toward or away from desired conditions. Indicators are the specific resource measures used in answering the monitoring questions. In general, the forest plan components listed are the primary direction being addressed by the monitoring question.

Adaptive Management

The revised plan follows adaptive management principles outlined in the planning rule directives (Forest Service Handbook 1909.12, zero code 06.1 and 06.2). Assumptions and uncertainty are characterized throughout the plan and the plan's environmental impact statement. For example, the Forest modelled acres burned by wildfire over the last 1,000 years and interpreted results to assess the natural range of variability for the Forest's ecosystems. We graphed actual acres burned by wildfire in the last hundred years to help validate assumptions, modelled acres that may be burned by wildfire in the future, based upon projections of downscaled climate models, and disclosed the uncertainty of the models. The environmental impact statement used this information to inform the establishment of desired conditions and to assess effects of alternatives on ecological sustainability, considering likely future environments. Once the plan is implemented, monitoring item MON-TE&V-02 would be used to assess wildfire acres

by burn severity class, and monitoring item T&E-LYNX-01 would be used to relate this information to the percentage of lynx habitat burned by wildfire in each lynx analysis unit. This monitoring information would be shared internally and with the public through the monitoring report, so that the Forest can adapt its strategies and adjust decisions based upon what has been learned.

Items included in this monitoring plan also use data collection protocols for terrestrial and aquatic ecosystems at appropriate temporal and spatial scales. For example, monitoring item MON-TE&V-01 would be used to assess the change in key ecosystem characteristics for forest and non-forest vegetation at the scale of the biophysical setting, as well as forestwide. Using adaptive management principals, recently re-measured FIA data informed the development of management direction in the revised plan and will assist the Forest in determining if adjustments to management direction are needed in the future. For example, FIA data was used to assess the trend in the amount of old growth forest, determining the amount burned by wildfire since the last FIA measurements were completed. In light of this monitoring information, the revised plan has added plan components that place more emphasis on management for key ecosystem characteristics of old growth, such as live trees and snags in the 20 inch d.b.h. class. Monitoring item WL-MON-10 would be used to assess the status of habitat for wildlife species associated with snags and live trees in the 20 inch or greater d.b.h class. Monitoring item WL-MON-15 would be used to assess the status of the breeding season bird community on the Flathead National Forest, using Integrated Monitoring in Bird Conservation Regions (IMBCR) data and reports, including species associated with those characteristics.

For aquatic ecosystems, monitoring item MON-WTR-01 would be used to assess water quality, riparian, and aquatic habitats. PIBO monitoring data was used to develop plan components in the revised plan and will be used in the future to test assumptions and assess the trend in key ecosystem characteristics of aquatic ecosystems. For example, metrics such as percent fines, residual pool depth, percent pools, and median substrate size will be collected, along with native fish population monitoring using bull trout redd counts, electrofishing and genetic status monitoring (in cooperation with Montana Fish Wildlife and Parks). This information will enable the Forest to adapt its management strategies and adjust decisions in the future, as needed, based upon what has been learned.

Monitoring Scale and Responsibility

Monitoring occurs at the scale of the Forest, the Region, and even larger areas. Monitoring may be the responsibility of the Forest Service, another agency, or may involve multiple agencies and organizations. For example, key ecosystem characteristics related to a changing climate may be monitored at very large scales. One key ecosystem characteristic associated with high elevations is “persistent spring snow,” which is useful for monitoring habitat for species such as the wolverine. Persistent spring snow maps and data layers were produced by researchers at the scale of the broad range of the wolverine. These maps and data layers would be updated by researchers, not by the individual national forests, and changes would be made only if and when researchers update the existing data. Similarly, a retrospective study of stand composition, structure, and the density of snowshoe hares or habitat use by lynx in response to various past practices would be useful to inform and refine vegetation management techniques in lynx habitat, but would also require a research effort. The presence and distribution of threatened and endangered species, species of conservation concern, and species of public interest are monitored across large scales in cooperation with others or are often assessed as part of a research effort. Montana Fish Wildlife and Parks, Montana Natural Heritage Program, the universities, research stations, non-government organizations, and other federal agencies are all instrumental in monitoring species across multiple land management jurisdictions (e.g., Integrated Bird Monitoring in Bird Conservation Regions).

Monitoring related to the grizzly bear occurs at the large scale of the Northern Continental Divide Ecosystem (NCDE) and is the responsibility of multiple agencies. For example, the USFWS and Montana Fish, Wildlife and Parks are responsible for monitoring grizzly bear-human conflicts, livestock conflicts, and grizzly bear mortality. As directed by the NCDE Grizzly Bear Conservation Strategy (GBCS), monitoring results would be reported to the NCDE Coordinating Committee. The Coordinating Committee is not a decision-making body, although it may provide recommendations to member agencies from time to time. Additionally, the Coordinating Committee does not supersede the authority of the management agencies beyond the specific actions agreed to as signatories to the Conservation Strategy.

As detailed in the monitoring sections of the NCDE GBCS, the following monitoring information would be compiled by the USFS to support the habitat-related tasks of the NCDE Monitoring Team:

- Coordinate updates and maintenance of the motorized access, developed sites, and livestock allotments databases.
- Document and report any changes in motorized access route density, levels of Secure Core habitat, developed sites and their capacity, livestock allotments, and permitted sheep numbers biennially, according to the monitoring schedules described in chapter 3 of the Conservation Strategy.
- Ensure that cooperators have the tools and training to evaluate motorized access route density and secure core habitat for projects.
- Evaluate the need for updating or changing the methods used to evaluate habitat parameters and make recommendations to the NCDE Coordinating Committee on such changes, as necessary.
- Set and maintain standards, definitions, values, formats and processes for collecting and updating habitat data and assessment models consistently across jurisdictions.

In order to accomplish this, a coordinated approach to the funding, use and intensive maintenance of GIS databases are required. The GBCS monitoring team will include biologists and GIS specialists from the signatory agencies (including the USFS) and Tribes.

Because the draft NCDE GBCS describes a need for monitoring to adequately assess habitat conditions, adherence to the habitat standards, and reporting on the habitat monitoring items identified in the Conservation Strategy, some of the monitoring items listed in the table below are part of the USFS Region 1 broad-scale monitoring strategy, but would also be evaluated at the forest scale. The grizzly bear monitoring questions with an “NCDE” prefix, identified in the tables, would apply to the NCDE national forests (Flathead, Lewis and Clark/Helena, Kootenai, and Lolo). The other monitoring items listed in this appendix are intended to be used for forest plan monitoring at smaller scales, but may also be compiled at a regional scale.

Monitoring of ecosystem characteristics may also be applied at the mid-scale or project level. For example, spatial mapping of forest size classes or canopy cover classes may be done, using the Region 1 existing vegetation classification system (Region 1 VMap) or other vegetation data bases, to assess habitat conditions and their distribution for projects. Species-specific habitat models may also be used at the project scale to assess potential effects of forest plan implementation. For example, project-level monitoring can be used to assess availability of multistoried hare habitat within a lynx analysis unit or assess spatial distribution of old growth patch size and connectivity within a sub-watershed.

Physical and Biological Ecosystems

The plan monitoring program contains monitoring questions and indicators addressing the physical and biological elements of the ecosystem, including those associated with vegetation, soils, fish, water, and wildlife (shown in tables A-1 through A-7).

Table A-1. Plan monitoring questions and indicators for Terrestrial Ecosystems and Vegetation, and Focal Species

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-TE&V-01: What is the change in key ecosystem characteristics for forest and non-forest vegetation?	FW-DC-TE&V-03	<p>IND-TE&V- Proportion (percentage of total acres) forestwide and by biophysical setting for each of these indicators:</p> <p>01. Dominance type (i.e., cover type) 02. Species presence 03. Size class 04. Tree canopy cover.</p> <p>Very large trees and Snags:</p> <p>05. Very large tree subclass – proportion of area forestwide and by biosetting 06. Very large tree density, trees per acre. All species combined, and for this species groups: C, DF, L, PP, WP, CW 07. Snag density, snags per acre. For >15 inch d.b.h., >20 inch d.b.h., in/out wilderness/roadless</p>
MON-TE&V-02: Disturbances – Fire. What is the status of fire regimes?	FW-DC-TE&V-03	IND-TE&V-08 Forestwide acres burned by wildfire by severity class (low, medium, high) and acres not burned (since 1980).
MON-TE&V-03: Disturbances – Insects and Disease. What is the change in insect and disease hazard?	FW-DC-TE&V-20	IND-TE&V-09 Acres or percent of Douglas-fir beetle hazard, mountain pine beetle hazard, western spruce budworm hazard, and root disease severity.
MON-TE&V Focal-01: What is the change in ecological conditions within the warm moist and cool moist-mod dry biophysical settings, as indicated by conditions suitable for western white pine?	FW-DC-TE&V-04	<p>IND-TE&V Focal- Proportion (percentage of total acres) forestwide and by the warm moist and cool moist-mod dry biophysical settings for each of these indicators:</p> <p>01. WP Species presence 02. WP Size class 03. WP tree canopy cover</p>
MON-TE&V Focal-02: What management actions are contributing to the restoration of western white pine?		<p>IND-TE&V Focal-04: Acres treated by various methods for the purpose of sustaining or restoring western white pine. IND-TE&V Focal-05: Survival of planted western white pine seedlings</p>

Table A-2. Plan monitoring questions and indicators for Threatened, Endangered, Proposed and Candidate Species

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-PLANT-01: What is the status of water howellia in areas where disturbances (natural or human-caused) have occurred?	FW-DC-PLANT-01	IND-PLANT-01: Presence/absence of water howellia in habitat that has been disturbed.
MON-PLANT-02: What is the change in ecological conditions within the cold biophysical setting, as indicated by conditions of whitebark pine? MON-PLANT-03: What management actions are contributing to the restoration of whitebark pine?	FW-DC-PLANT-02	IND-PLANT- Proportion (percentage of total acres) forestwide and by biophysical setting for: 02. WBP Dominance type (i.e., cover type) 03. WBP Species presence 04. WBP Size class 05. WBP Tree canopy cover. IND-PLANT-06: Acres treated by various methods for the purpose of sustaining or restoring whitebark pine. IND-PLANT-07: Survival of planted whitebark pine seedlings
MON-PLANT SCC-01: What is the status of the known occurrences of Plant Species of Conservation Concern (SCC) species?	FW-DC-PLANT SCC-01	IND-PLANT SCC-01: Occurrences of SCC plants and associated habitats will be monitored.

Table A-3. Plan monitoring questions and indicators for Non-native Invasive Species

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-NNIP-01: What is the status of plant communities at highest risk of negative impacts from established or new invaders to their system functions?	FW-DC-NNIP-01	IND-NNIP-01: Percent of invasive plant species cover within identified high risk/high priority areas. These would include such areas as forests on the warm dry biophysical setting, dry grassland plant communities, wilderness trailheads, and management area (MA) 33b special areas.
MON-NNIP-02: What management actions are contributing to coordination and cooperation with adjacent landowners and partners in managing non-native invasive weeds?	FW-DC-P&C-16	IND-NNIP-02: Number and type of weed management actions conducted involving coordination and cooperation with partners and adjacent land owners.

Table A-4. Plan monitoring questions and indicators for Soils

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-SOIL-01: To what extent have vegetation management activities prevented irreversible damage to soil conditions?	FW-DC-SOIL-01 FW-STD-SOIL-01	IND-SOIL-01: Number of harvest units surveyed and percent that meet the soil quality standard, post-harvest.

Table A-5. Plan monitoring questions and indicators for Fire and Fuels Management

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-FIRE-01: What management actions are contributing towards reducing wildland fuels?	FW-DC-FIRE-02	IND-FIRE-01: Acres of hazardous fuel treatments in/out of the wildland-urban interface (WUI).

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
<p>MON-FIRE-02: To what extent is unplanned fire used to achieve desired ecological, social or economic conditions?</p> <p>MON-FIRE-03: To what extent is planned fire (prescribed fire) used to achieve desired ecological, social or economic conditions?</p>	FW-DC-FIRE-03	<p>IND-FIRE-02: Number of unplanned natural fire ignitions managed for ecological, social or economic reasons, and the number of unplanned natural ignitions managed with the primary goal of suppression.</p> <p>IND-FIRE-03: Number of planned natural fire ignitions managed for ecological, social or economic reasons.</p>

Table A-6. Plan monitoring questions and indicators for Aquatic Ecosystems

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-WTR-01: What are the changed conditions of instream physical habitat parameters in managed vs unmanaged sites?	FW-DC-WTR-04	<p>IND-WTR-</p> <p>01. PIBO monitoring: positive trend in PIBO metrics such as bank angle, wood frequency, percent fines, residual pool depth, percent pools, and median substrate size (D50).</p> <p>02. Results of McNeil core samples of percent fines.</p>
MON-WTR-02: To what extent are forest management activities moving toward habitat objectives for native fish?	<p>FW-OBJ-CNW-01</p> <p>FW-OBJ-WTR-01</p> <p>FW-OBJ-WTR-02</p> <p>FW-OBJ-WTR-03</p> <p>FW-OBJ-WTR-04</p>	<p>IND-WTR-</p> <p>03. Number of fish passage barriers removed or created.</p> <p>04. Number of roads decommissioned within the riparian management zone (RMZ).</p> <p>05. Number of culverts removed or upgrades.</p> <p>06. Number of activities with stream miles of habitat improvements.</p>
MON-WTR-03: What activities have occurred in the RMZ?	<p>FW-STD-RMZ-03</p> <p>FW-STD-RMZ-04</p> <p>FW-DC-RHCA-03</p>	<p>IND-WTR-</p> <p>07. Treatment type and acres within RHCAs.</p> <p>08. Number of entries and road crossing inside of RHCAs.</p>
MON-WTR-04: What is the condition of water quality in water bodies?	FW-DC-WTR-06	IND-WTR-09: Number of water bodies listed on State DEQ integrated report (305b/303d).
MON-WTR-05: What is the status of native fish populations?	FW-DC-CNW-01	<p>IND-WTR-</p> <p>10. Number of redds (bull trout).</p> <p>11. Fish density – number /100 square meters.</p> <p>12. Degree of spread of hybridization (MFWP data, redd counts).</p>
MON-WTR-06: Do management activities contribute nutrients to Flathead Lake?	FW-DC-WTR-17	IND-WTR-13: Phosphorus, nitrites, and nitrates.
MON-WTR-07: What is the status of stream banks within grazing allotments?	FW-GDL-05	<p>IND-WTR-</p> <p>13. Percent streambank alteration</p> <p>14. Percent utilization on woody veg</p> <p>15. Percent Utilization on herbaceous veg</p>

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-WTR-08: What is the status of temporary roads and drainage features?	FW-GDL-IFS-03 FW-GDL-IFS-04 FW-GDL-IFS-05	IND-WTR-16: Number of culverts cleaned and inspected

Table A-7. Plan monitoring questions and indicators for Wildlife

Monitoring Question	Plan Component(s)	Potential Indicator(s)
NCDE-MON-01: Grizzly Bear Habitat Security: What is the baseline open motorized route density (OMRD), total motorized route density (TMRD), and secure core % for each grizzly bear subunit in the primary conservation area (PCA) during the non-denning season?	FW-STD-IFS-02	IND-WLD- For each grizzly bear subunit in the PCA (figure B-01): 01. OMRD. 02. TMRD. 03. Secure core (see GBCS appendix 7 for methods).
NCDE-MON-02: Grizzly Bear Habitat Connectivity: How many miles of roads and motorized trails on National Forest System (NFS) lands are open to public use in the Salish DCA and the rest of zone 1 during the non-denning season?	GA-SM-STD-01	IND-WLD- 04. Miles road in the DCA and the rest of zone 1 (figure B-01) that is open to public motor vehicle use during the non-denning season (mileage as determined through INFRA). 05. Miles of trail in the DCA (figure B-01) that is open to public motor vehicle use during the non-denning season (mileage as determined through INFRA).
NCDE-MON-03: What is the change in the number and capacity of developed recreation sites designed for overnight use in each bear management unit (BMU) in the PCA? NCDE-MON-03a: What is the number of day use recreation sites and trailheads in each BMU in the PCA?	FW-STD-REC-01 FW-DC-REC-01	IND-WLD- 06. Number of developed recreation sites (NCDE definition) managed for over-night use in the non-denning season in each grizzly BMU (figure 1-32). 07. Capacity of sites managed for overnight developed recreation use in the non-denning season in each grizzly BMU (see monitoring guide). 08 Number of trailheads and day use developed recreation sites (NCDE definition) in the non-denning season in each grizzly BMU (see monitoring guide).
NCDE-MON-04: What is the number of active cattle grazing allotments in the PCA and what are their permitted animal unit months?	FW-STD-GR-05	IND-WLD- 09: Number of allotments in the PCA (figure B-01).
NCDE-MON-05: If leasable and locatable mineral activities occur in the PCA, does the Record of Decision and permit/plans of operation include measures to avoid, minimize, or mitigate environmental impacts to grizzly bears or their habitat?	FW-STD-E&M-01 FW-STD-E&M-02 FW-STD-E&M-03 FW-STD-E&M-04 FW-STD-E&M-05 FW-STD-E&M-06	IND-WLD-10: Number of permits authorized in the PCA (figure B-01) and mitigation measures included in the permit/plan of operations.

Monitoring Question	Plan Component(s)	Potential Indicator(s)
<p>NCDE-MON-06: How many subunits in the PCA have temporary increases in motorized access for projects (see glossary)?</p> <p>NCDE-MON-06a: Are temporary increases in OMRD and TMRD, and temporary decreases in secure core due to projects meeting the standard?</p>	FW-STD-IFS-03	<p>IND-WLD-</p> <p>For each grizzly bear subunit in the PCA (figure B-01) with projects:</p> <p>11. Percent of grizzly bear subunits with temporary changes in OMRD, TMRD or secure core due to projects.</p> <p>12. Percent change in the 10-year running average of OMRD, TMRD, and secure core for each subunit which had temporary increases in projects (see appendix C for methods).</p>
<p>NCDE-MON-07: Are projects (see glossary) in the PCA completed within 5-year time period specified by the guideline?</p>	FW-GDL-IFS-01	<p>IND-WLD-</p> <p>For each grizzly bear subunit in the PCA (figure B-01) with projects (see glossary):</p> <p>13. Number of years to complete each project.</p> <p>14. Number of projects that exceeded 5 years and the reason(s).</p>
<p>T&E-LYNX-01: What is the percentage of lynx habitat in each lynx analysis unit (LAU) that is not yet hare habitat due to wildfire?</p>	FW-DC-TE&V-19 NRLMD Objective VEG01	<p>IND-WLD-15: Percentage of lynx habitat (figure B-14) on NFS lands in each LAU that is not yet hare habitat due to wildfire (perimeter of stand replacement fires within previous 20 years with unburned area deducted or site specific analysis).</p>
<p>T&E-LYNX-02: What is the percentage of lynx habitat in each LAU that is not yet hare habitat due to regeneration harvest?</p>	NRLMD Standard VEGS1	<p>IND-WLD-16: Percentage of lynx habitat (figure B-14) on NFS lands in each LAU that is not yet hare habitat due to regeneration harvest (regeneration harvest within previous 20 years or site-specific analysis).</p>
<p>T&E-LYNX-03: Is the amount of timber harvest in each LAU meeting the standard?</p>	NRLMD Standard VEGS2	<p>IND-WLD-17: Percentage of lynx habitat (figure B-14) on NFS lands in each LAU with regeneration harvest in the previous decade.</p>
<p>T&E-LYNX-04: Is the amount of precommercial thinning in lynx habitat on NFS lands in each LAU within the limits of incidental take estimated in the Forest Plan Biological Opinion?</p>	NRLMD Standard VEGS5	<p>IND-WLD-</p> <p>18. Acreage of lynx habitat (figure B-14) on NFS lands in each LAU that were precommercially thinned using exceptions to VEGS5.</p> <p>19. Acreage of lynx habitat (figure B-14) on NFS lands in each LAU that were precommercially thinned using WUI exemptions to VEGS5.</p>
<p>T&E-LYNX-05: Do modified precommercial thinning techniques in lynx habitat (see appendix C) increase dense horizontal cover and its persistence?</p>	NRLMD Standard VEGS5	<p>IND-WLD-</p> <p>20. The number of acres of lynx habitat (figure B-14) not treated.</p> <p>21. The number of acres of lynx habitat (figure B-14) treated with modified thinning techniques under exception #3 (if approved).</p> <p>22. The percentage of dense horizontal cover pre-treatment and post-treatment, in comparison to untreated plots.</p>
<p>T&E-LYNX-06: Is the amount of reduction in multistoried hare habitat in lynx habitat on NFS lands in each LAU within the limits of incidental take estimated in the Forest Plan Biological Opinion?</p>	NRLMD Standard VEGS6	<p>IND-WLD-</p> <p>23. Acres of multistory hare habitat in lynx habitat (figure B-14) on NFS lands in each LAU that were treated using exceptions to VEGS6.</p> <p>24. Acres of multistory hare habitat in lynx habitat (figure B-14) on NFS lands in each LAU that were treated using WUI exemptions to VEGS6.</p>

Monitoring Question	Plan Component(s)	Potential Indicator(s)
WL-MON-01: What is the status of habitat conditions that support harlequin ducks during the nesting season?	FW-DC-WL SCC-01 FW-GDL-WL SCC-04	IND-WLD- 25. Stream habitat data on known harlequin duck nesting streams (see aquatics section). 26. Number of activities authorized in known harlequin duck breeding stream reaches. 27. Number of activity authorizations that include timing requirements for harlequin duck nesting. 28. Number of harlequin duck broods detected and size of broods.
WL-MON-02: What is the status of habitat conditions that support flammulated owls during the nesting season?	FW-DC-WL SCC-01 FW-DC-TE&V-09 FW-DC-TE&V-12 FW-DC-TE&V-14 FW-DC-TE&V-16 FW-DC-TE&V-19	IND-WLD- 29. Percentage of the warm-dry and warm-moist biophysical settings (see figure B-07) with ponderosa pine trees greater than 15 inches d.b.h (dominance type or presence). 30. Average number of snags per acre greater than 15 inches d.b.h. in the warm-dry and warm-moist biophysical settings. 31. Average density of the ponderosa pine dominance type. 32. Number of acres of ponderosa pine forest treated to promote desired landscape pattern for flammulated owls.
WL-MON-03: What is the status of habitat conditions that support fisher?	FW-DC-TE&V-12 FW-DC-TE&V-13 FW-DC-TE&V-15 FW-DC-TE&V-16 FW-DC-TE&V-17 FW-DC-TE&V-18 FW-DC-TE&V-19 FW-DC-WL SCC-03 FW-GDL-WL SCC-03	IND-WLD- 33. Average number of very large live trees and average number of snags greater than 20 inches d.b.h in the warm-moist biophysical setting (see figure B-07) (excluding the ponderosa pine dominance type). 34. Acreage in the warm-moist biophysical setting (see figure B-07)(excluding the ponderosa pine dominance type) with trees greater than 10 inches d.b.h. and canopy cover greater than 40%. 35. Landscape pattern of forest in the warm-moist biophysical setting (see figure B-07)(excluding the ponderosa pine dominance type) with trees greater than 10 inches d.b.h. and canopy cover greater than 40%.
WL-MON-04: What is the status of habitat conditions in RMZs to support wildlife movement and habitat connectivity (include fisher but also other wildlife species)?	FW-DC-WL SOI-02 FW-DC-WL SOI-03 FW-GDL-WL SOI-05	IND-WLD- 36. In RMZs (see figure B-06): acres with trees with an average d.b.h. of 5 inches or greater and canopy cover greater than 40%. 37. In RMZs (see figure B-06): mapped distribution of forest cover with an average tree d.b.h. of 5 inches or greater and canopy cover greater than 40%. 38. In American Wildlands polygons (see appendix 3): mapped distribution of forest cover with an average tree d.b.h. of 5 inches or greater and canopy cover greater than 40% on NFS lands and all lands.

Monitoring Question	Plan Component(s)	Potential Indicator(s)
WL-MON-05: What is the status of habitat conditions that support Clark's nutcrackers during the nesting season?	FW-DC-TE&V-19 FW-DC-WL SCC-01 FW-GDL-PLANT-03 FW-OBJ-PLANT-01	IND-WLD- 39. Acreage with presence of live whitebark pine greater than 10 inches d.b.h. 40. Average basal area of live whitebark pine greater than 10 inches d.b.h. 41. Acres of modelled whitebark pine habitat with wildfire. 42. Acreage of vegetation management treatments that contribute to restoration of whitebark pine.
WL-MON-06: What is the status of habitat conditions that support Townsend's big-eared bats and other bat species?	FW-DC-WL-SCC-01 FW-GDL-WL SCC-01 FW-GDL-WL SCC-02	IND-WLD- 43. Number of structures (old buildings, bridges) and caves surveyed and how many where Townsend's big-eared bats or other bat species were detected. 44. Number of evaluations for closure or removal of structures used by bats and measures specified to mitigate or provide for bat use.
WL-MON-07: What is the status of habitat conditions that support common loons on Code A territorial nesting lakes?	FW-DC-WL SOI-04 FW-GDL-WL SOI-03 FW-OBJ-WL SOI-01	IND-WLD- 45. Number of Code A territorial nesting lakes surveyed for loon presence (Hammond 2010). 46. Number of loon breeding pairs present on Code A territorial nesting lakes during May. 47. Structures installed to support common loon nesting (if needed). 48. Number of activities on NFS lands authorized within 150 yards of loon nesting sites and number that included activity timing constraints during the loon nesting season.
WL-MON-08: What is the status of habitat for wildlife species associated with hardwood tree habitats on NFS lands?	FW-DC-TE&V-10 FW-OBJ-TE&V-03	IND-WLD- 49. Percentage of NFS lands with presence of hardwood trees less than 10 inches d.b.h. (including acres burned by wildfire). 50. Percentage of NFS lands with presence of hardwood trees greater than 10 inches d.b.h. 51. Number of acres with vegetation management treatments to promote diverse hardwood forest.
WL-MON-09: What is the status of habitat for wildlife species associated with grass/forb/shrub habitats on NFS lands?	FW-DC-TE&V-10 FW-OBJ-TE&V-04 FW-DC-NNIP-01 FW-DC-NNIP-02 FW-DC-NNIP-03 FW-OBJ-NNIP-01 FW-GDL-NNIP-01	IND-WLD- 52. Percentage of NFS lands in the grass/forb/shrub condition class. 53. Number of acres treated to promote grass/forb/shrub habitats for wildlife. 54. Number of big game winter habitat acres treated to control non-invasive plants.
WL-MON-10: What is the status of habitat for wildlife species associated with live trees and snags in the 20 inch or greater d.b.h class??	FW-DC-TE&V-16 FW-DC-TE&V-17	IND-WLD- 55. Percentage of NFS lands with presence of snags greater than 20 inches d.b.h. in each biophysical setting. 56. Average number of snags greater than 20 inches d.b.h. in each biophysical setting. 57. Presence of live, decaying, and broken topped trees greater than 20 inches d.b.h. in each biophysical setting.

Monitoring Question	Plan Component(s)	Potential Indicator(s)
WL-MON-11: What is the status of habitat for wildlife species associated with snags in the 10-19.9 inch d.b.h class?	FW-DC-TE&V-16 FW-DC-TE&V-17	IND-WLD- 58. Percentage of NFS lands with presence of snags from 10-19.9 inches d.b.h. in each biophysical setting. 59. Average number of snags from 10-19.9 inches d.b.h. in each biophysical setting. 60. Presence of decaying and broken topped live trees from 10-19.9 inches d.b.h. in each biophysical setting.
WL-MON-12: What is the status of habitat for wildlife species associated with large down woody material?	FW-DC-TE&V-18	IND-WLD-61: Average tons per acre of coarse woody material greater than 10 inches diameter in each biophysical setting.
WL-MON-13: What is the status of habitat for wildlife species associated with forests burned with moderate to high severity wildfire?	FW-DC-TE&V-24 FW-GDL-TIMB-02 FW-GDL-TIMB-03 FW-GDL-TIMB-04	IND-WLD- 62. Acreage and distribution of coniferous forests burned with moderate to high severity wildfire. 63. Percentage of areas burned with moderate to high severity wildfire with salvage harvest. 64. For each wildfire greater than 100 acres, acres of post-fire salvage harvest and acres of burned trees not harvested within fire perimeter. 65. For each wildfire greater than 100 acres, size of burned tree patches retained within burn perimeter. 66. For each salvage harvest unit in forest that previously met the definition of old growth, number of trees per acre greater than 20 inch d.b.h. retained within salvage harvest units.
WL-MON-14: What is the status of human disturbance in areas modelled as wolverine maternal denning habitat during the time period from March to mid-May (based upon Copeland and Yates 2006 or subsequent date updates for the northern Rocky Mountains)	FW-GDL-REC-05	IND-WLD-67: Percentage of modelled maternal denning habitat where motorized over-snow vehicle use is allowed during the March to mid-May time period.
WL-MON-15: What is the status of the breeding season bird community on the Flathead National Forest (including neo-tropical migratory birds)?	FW-DC-WL SOI-01	IND-WLD- 68. Number of bird species detected on the Flathead National Forest. 69. Number and names of species detected previously but no longer detected. 70. Number and names of species not detected previously but now detected. 71. Statistically significant trends in bird data on the Flathead National Forest.

Monitoring Question	Plan Component(s)	Potential Indicator(s)
WL-MON-16: What is the status of the aquatic amphibian and reptile community on the Flathead NF?	FW-DC-WTR-01 FW-DC-WTR-03 FW-DC-WTR-12 FW-DC-WTR-16 FW-DC-WTR-19 FW-DC-NNIP-01 FW-DC-NNIP-02 FW-DC-NNIP-03 FW-OBJ-NNIP-01 FW-GDL-NNIP-01	IND-WLD- 72. Number of aquatic sites monitored. 73. Number of sites where boreal toad reproduction detected. 74. Number of sites where aquatic invasive species detected.

Human Uses and Designations of the Forest

The plan monitoring program contains monitoring questions and indicators addressing human uses of the forest associated with the transportation system, recreation, scenery, timber production, and other socioeconomic factors (tables A-8 through A-10; tables A-15 through A-17). Monitoring items associated with designated areas, such as recommended wilderness and wild and scenic rivers, are also identified (tables A-11 through A-14).

Table A-8. Plan monitoring questions and indicators for Infrastructure (roads and trails)

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-IFS-01: Are road restrictions effective?	FW-DC-IFS-11	IND-IFS-01: Number of road closure devices determined to be ineffective at restricting motorized use.
MON-IFS-02: What are the trends in the transportation system?	FW-DC-IFS-04	IND-IFS- 02. Miles of road open year-long. 03. Miles of road open seasonally. 04. Miles of roads maintained by maintenance level. 05. Miles of roads decommissioned. 06. Miles of roads put into intermittent storage.
MON-IFS-03: Have management activities trended towards desired conditions for a transportation system that provides recreation opportunities, safe and efficient public and agency access, and are environmentally compatible?	FS-DC-IFS-06	IND-IFS- 07. Acres open to over-snow vehicle use 08. Miles of groomed over-snow vehicle trails 09. Number and miles of motorized and non-motorized loop trail.
MON-IFS-04: Is the existing trail system sustainable to meet the current demand?	FW-DC-IFS-09	INDS-IFS 10. Amount of miles maintained to standards. 11. Amount of miles improved to standards.

Table A-9. Plan monitoring questions and indicators for Recreation

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-REC-01: What is the status of visitor use, and visitor satisfaction? MON-REC-02: Does the forest provide sufficient and sustainable recreation opportunities?	FW-DC-REC-11	IND-REC- Using the National Visitor Use Monitoring data, show trends for: 01. Visitation estimates. 02. Visitor activities. 03. Percent overall satisfaction.
MON-REC-03: What is the progress towards meeting recreation objectives in the plan?	FW-OBJ-REC 01 FW-OBJ-REC-03 FW-OBJ-REC-04 GA-NF-OBJ-02 GA-SV-OBJ-01 GA-SM-OBJ-02 GA-SM-OBJ-03 GA-SM-OBJ-04	IND-REC- 04. Number of dispersed recreation sites on the forest that have been rehabilitated to correct erosion or sanitation issues. 05. Number of campgrounds that have been improved. 06. Number of recreation cabin rentals added to the national reservation system since the record of decision. 07. Number of bicycle trails constructed in the Whitefish Range vicinity. 08. Construction of a bike trail in the Crane Mountain area.

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
		<p>09. Construction of a non-motorized trail that connects NFS lands in the Blacktail vicinity to the Foy's to Blacktail Trail system.</p> <p>10. Construction and designation of a motorized trail connectors that provide high elevation loop opportunities.</p> <p>11. Construction of a non-motorized trail that connects the Whitefish Trails (WhitefishLegacy.org) to NFS lands.</p>
MON-REC-04: Are management actions moving the existing summer and winter recreation opportunity spectrum classes towards the desired summer and winter recreation opportunity spectrum classes?	<p>FW-DC-SREC-01</p> <p>FW-DC-WREC-01</p> <p>FW-DC-REC-02</p>	IND-REC-12: Describe amount of existing recreation opportunity spectrum classes compared to the desired recreation opportunity spectrum classes by season (winter and summer) across the forest.

Table A-10. Plan monitoring questions and indicators for Scenery

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-SCN-01: Are management actions moving towards desired scenic integrity objectives identified in the plan?	FW-DC-SCN-02	IND-SCN-01: Describe the amount of existing scenic integrity objectives compared to desired scenic integrity objectives.

Table A-11. Plan monitoring questions and indicators for designated Wild and Scenic Rivers

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
<p>MON-WSR-01: Is the free-flowing character of the three forks of the Flathead Wild and Scenic river maintained?</p> <p>MON-WSR-02: Are the outstandingly remarkable values for which the three forks of the Flathead Wild and Scenic River was designated preserved and enhanced?</p>	<p>MA2a-DC-01</p> <p>MA2a-DC-02</p>	<p>IND-WSR-</p> <p>01. Number of monitoring items per the limits of acceptable change direction in the Wild and Scenic River Recreation Direction that are in compliance.</p> <p>02. Number of monitoring items per the limits of acceptable change direction in the Wild and Scenic River Recreation Direction that are <u>not</u> in compliance.</p> <p>03. Number and type of actions that changed free-flowing character, water quality or affected the outstandingly remarkable values on the three forks of the Flathead River.</p>

Table A-12. Plan monitoring questions and indicators for eligible Wild and Scenic Rivers

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
<p>MON-EWSR-01: Is the free-flowing character of eligible wild and scenic rivers maintained?</p> <p>MON-EWSR-02: Are the outstandingly remarkable values for which the river was deemed eligible, preserved and enhanced?</p>	<p>MA2b-DC-01</p> <p>MA2b-DC-02</p>	<p>IND-WSR-</p> <p>04. Number and type of actions that changed free-flowing character or affected the outstandingly remarkable values of eligible rivers.</p>

Table A-13. Plan monitoring questions and indicators for designated wilderness areas

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-WILD-01: Do management activities in designated wilderness areas protect and maintain preserve wilderness character?	FW-MA1a-DC-01	IND-WILD- 01. The National Wilderness Stewardship Performance monitoring measures. 02. Limits of acceptable change monitoring measures for the Bob Marshall Wilderness Complex and Mission Mountains Wilderness. 03. The number and type of authorized motorized travel and use and mechanized transport entry as reported through INFRA. 04. The number and type of unauthorized motorized travel and use, and travel and uses and mechanized transport.
MON-WILD-02: Are natural process and disturbance the primary forces affecting the composition, structure, and pattern of vegetation?	FW-MA1a-DC-03	IND-WILD-04: Number, kind, and extent of vegetation disturbances (natural and human-caused) that have occurred in designated wilderness areas on the forest.

Table A-14. Plan monitoring questions and indicators for recommended Wilderness Areas

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-RWILD-01: Do restoration activities outcomes protect the wilderness characteristics of the recommended wilderness area? MON-RWILD-02: Are restoration activities within recommended wilderness maintaining and protecting the ecological and social characteristics that provide the basis for suitability into the National Wilderness Preservation system?	MA-1b-DC-02 MA1b-SUIT-06	IND-RWILD- 01. Number, kind, and extent of restoration treatment (including prescribed fire) that has occurred in recommended wilderness area.
MON-RWILD-03: Alternative B only: Has use levels of mechanical transport and motorized over-snow vehicle use increased over baseline use levels (Record of Decision)? MON-RWILD-04: Alternative B only: Are existing motorized over-snow vehicle use and existing mechanized transport preventing the protection of the social and ecological characteristics that provided the basis for each areas suitability into the National Wilderness preservation System?	MA1b-SUIT-01	IND-RWILD- 02. Determine if mechanized transport use levels trails on trails in recommended wilderness areas that allow mechanized transport is above existing baseline levels by the use of trail counters, ocular estimates, and site visitation. 03. Determine if motorized over-snow vehicle use in the Fatty Creek Recommended Wilderness Area is above baseline levels by the use of ocular estimates and site visitation.
MON-RWILD-05: Have commercial or non-commercial use of non-timber forest products (e.g., mushrooms, huckleberries) within the recommended wilderness areas protected or maintained the	MA1b-SUIT-04	IND-RWILD- 04. Number, kind, and extent of commercial or non-commercial use of non-timber forest products (e.g., mushrooms, huckleberries)

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
ecological and social characteristics that provided the basis for each areas suitability into the National Wilderness preservation System?		

Table A-15. Plan monitoring questions and indicators for Timber

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-TIMB-01: How are management actions contributing to a sustainable mix of forest products in response to market demands?	FW-DC-TIMB-01 FW-DC-TIMB-03	IND-TIMB-01: Million board feet (MMBF)/ million cubic feet (MMCF) offered and sold annually.
MON-TIMB-02: How are management actions contributing towards the recovery of economic value of dead/dying trees on suitable lands?	FW-DC-TIMB-02	IND-TIMB-02: Million board feet (MMBF) / million cubic feet (MMCF) offered and sold annually as salvage harvest.

Table A-16. Plan monitoring questions and indicators for Cultural Resources

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
MON-C&HR-01: To what extent cultural and historic resource objectives being met with trending towards desired conditions to identify, evaluate, and nominate cultural resources for listing on the National Register of Historic Places?	FW-OBJ-C&HR-01 FW-OBJ-C&HR-02 FW-OBJ-C&HR-03	IND-C&HR- 01. Number of submitted cultural resource nominations to the State Historic Preservation Officer or number of the completed historic contexts, overviews, thematic studies, or cultural resources property preservation plans for significant cultural resources identified through the inventory that are not National Register-eligible. 02. Number of completed public outreaches or interpretive projects.
MON-C&HR-02: To what extent is the Forest meeting Forest Plan desired conditions to assuring treaty rights are preserved and trending toward desired conditions for consultation with each Tribe?	FW-DC-C&HR-02 FW-OBJ-TRIB-01 FW-OBJ-TRIB-02	IND-C&HR- 03. Number of completed consultations under the consultation protocol. 04. Completion of a cooperatively established tribal consultation protocol.

Table A-17. Plan monitoring questions and indicators for Social and Economic

Monitoring Question(s)	Plan Component(s)	Potential Indicator(s)
<p>MON-S&E-01: To what extent is forest providing goods and services for local communities?</p> <p>MON-S&E-02: To what extent is forest contributing towards desired conditions for a stable and functioning local economy?</p>	<p>FW-DC-S&E-02</p>	<p>IND-S&E-01: Levels of production of multiple uses including timber products, grazing, recreational visits, wilderness hunting and fishing opportunities, and downhill skiing (as measured through day visits, night visits, local and non-local, animal unit months, thousand cubic feet from harvest and sales).</p> <p>IND-S&E-02: Number of jobs and thousands of dollars in labor income from Flathead National Forest management.</p> <p>IND-S&E-03: Land payment revenues (e.g., Secure Rural Schools Act, payment in lieu of taxes, etc.) to state and counties from Flathead NFS lands.</p>
<p>MON-S&E-03: To what extent do opportunities to connect people, including youth, with nature exist across the Forest?</p>	<p>FW-DC-S&E-03 FW-DC-R&E-01 FW-DC-R&E-02 FW-DC-R&E-03 FW-DC-R&E-04</p>	<p>IND-S&E-03: Number and type of education and youth programs NVUM report IND-REC-X visitor center tracking</p> <p>IND-S&E-04: Number of youth participating in various forest education and youth programs, including employment.</p>
<p>MON-S&E-04: Is the cost of implementing the Forest Plan consistent with that predicted in the FEIS?</p>	<p>Not component specific</p>	<p>IND-S&E-02-01: Forest annual budget, supplemented with partnerships and other outside funding.</p>